Discover the pleasure of learning.

Music
Ancient + Classical + Pop

The Language of Mathematics

YOUR ENGLISH SUPPLEMENT
Volume 20 // 9.95€

www.yes-mag.com

More than 1 hour of audio

22 pages of exercises

9 772255 567003 20
Treat ing you as an adult
Complete your collection of Yes while stocks last. Free shipping in Spain.

Yes 1
The one about you

Yes 2
Food

Yes 3
Sexology

Yes 4
Human physiology

Yes 5
The brain

Yes 6
Emotions

Yes 7a
Gothic literature

Yes 7b
The law*

Yes 8
Religion

Yes 9
Love

Yes 10
Sleep and dreams

Yes 11
Geology

Yes 12
Medicine

Yes 13
Shakespeare

Yes 14
Palaeo-archaeology

Yes 15
Sports

Yes 16
Radical grammar

Yes 17
Business English

Yes 18
Women

Check out our special offers at www.yes-mag.com

* only available with this cover in digital format (the contents is the same for 7a and 7b).
GENERAL CONTENTS

This page should help you to navigate the magazine in general. Notice that on pages 6, 17, 55, 87 and 111 there are more details for each section of the magazine.

4 How to Use Your English Supplement

6 Current Affairs Contents
7 News and anecdotes
10 Science News
12 Internet News
13 The Political Economy of Isis
16 Education: getting maths wrong

17 Music Dossier
18 The Science of Music
20 Ancient Music
22 Anecdotes from the Lives of Classical Composers
27 A History of Pop Music
30 Music’s Difficult Words
31 The Meaning of Bands’ Names
34 Nicknames for famous classical compositions
36 The Grammar of Music: false friends, phrasal verbs, idioms and etymology

44 Literature: John Steinbeck
46 Sports: Imran Khan
50 Cinema: Sean Penn
54 SUBSCRIPTION FORM

55 Maths Dossier
56 The Universal Language
57 The Lost Art of Measuring
60 Maths & Religion
62 Fun with Numbers
64 Beautiful Minds: the lives of great mathematicians
67 Etymology of Maths Terms
68 Mathematical Anecdotes
69 Probability and You
72 The Number 7
74 Parabolas
77 The Origins of Mathematical Symbols
78 The Grammar of Maths: false friends, idioms, phrasal verbs, pronunciation and spelling

84 The Yes Community
86 Picture Description

87 Audio Scripts Contents
88 Audio Scripts

111 Exercises Contents
112 Exercises

134 Staff and contact addresses
135 In next month’s issue
How to Use
Your English Supplement

SYMBOLS
Each page-long article in the magazine has been created to be used more or less independently so that you can learn and practise even if you only have five or ten minutes free.

At the same time, the symbols below allow you to develop a theme you are interested in more extensively. Teachers can use these symbols to instantly prepare a class or classes around a common theme.

Exercise (at the end of the magazine). Test and consolidate what you have learned.

Speaking extension. A question aimed at provoking a group discussion of the topic in question.

Downloadable audio file (see also audio scripts). There are recommendations on how best to use the audio files on p. 87.

This arrow directs you to other related articles in the magazine.

ABBREVIATIONS KEY
These are the only abbreviations you have to know to use this magazine:

- sb. = somebody
- sth. = something
- swh. = somewhere
- [U] = uncountable noun
- [C] = countable noun

The fear now is that robots could bring about the demise of humanity. This is not just something that Hollywood scriptwriters think about. Such things worry computer-programming expert Jaan Tallinn, co-founder of Skype, professor of philosophy at Cambridge, and Lord Rees, the astronomer royal and master of Trinity College, Cambridge. They have set up the Centre for the Study of Existential Risk at Cambridge.

Part of the problem arises because the speed and capacity of computers doubles every 18 months. It is predicted that around 2040 we will build our last machine. From then on machines will create other ever-more-intelligent machines autonomously. At this point – known as ‘the Singularity’ – we will no longer be the most intelligent beings on the planet.

Some researchers and philosophers think that machines will be nice to us. There are two problems with this naïve idea: first, as we have seen, we have already created robots that kill. Secondly, artificial intelligence is created in our image – how do we treat the next most intelligent beings in our world? Chimpanzees, dolphins and octopuses? We destroy their habitat, keep them in zoos, experiment on them and eat them. Once robots can replicate themselves and control their own evolution, humanity can be marginalized. This doesn't have to be anything as dramatic as genocide. As we have seen, robots can simply make the majority of us unemployed, superfluous, obsolete.

This is the way the world ends // Not with a bang but a whimper...
FOOTNOTES

The superscript numbers in the text refer to the footnotes at the bottom or at the side of the same page. The footnotes explain the difficult vocabulary as determined by our non-native proofreaders. Like you, these proofreaders are learners so they are able to identify the exact words you need to know to understand the sentence. Definitions are given in English, so that you learn to think in English and these definitions are then checked by the non-native proofreaders to ensure that you will understand them. Some words are defined by pictures: we use these visual stimuli when that is the best way to fix an idea in your memory. Read the definition or look at the illustration and then re-read the sentence in question. By working with English-language footnotes you will rapidly increase your vocabulary and learn how English words relate to each other, all of which will have a dramatic impact on your fluency and **self-confidence**.

Some readers find it useful to put their finger next to the word in the article that they are looking for in the footnotes to make it easier to return to the text afterwards. Either way, it shouldn’t be difficult to find your place because the footnotes are numbered and the words are highlighted in bold. Notice that the syllables and words that should **be stressed** are underlined. **Red footnotes** give extra cultural (rather than linguistic) information, or they refer you to other articles.

PHONEMIC SYMBOLS

Here are the phonemic symbols that we use which might cause you problems.

<table>
<thead>
<tr>
<th>Consonants</th>
<th>Pure Vowels</th>
<th>Diphthongs</th>
</tr>
</thead>
<tbody>
<tr>
<td>/ʃ/ as in church, watch</td>
<td>/æ/ as in cat</td>
<td>/aɪ/ as in ear, here</td>
</tr>
<tr>
<td>/ʃ/ as in wash, sure, action</td>
<td>/ʌ/ as in cut</td>
<td>/e/ as in air, there</td>
</tr>
<tr>
<td>/ʤ/ as in judge, gesture</td>
<td>/ɑ/ as in occur, supply, aroma</td>
<td></td>
</tr>
<tr>
<td>/ʒ/ as in measure, vision</td>
<td>/ɜ/ as in first, turn, earn</td>
<td></td>
</tr>
<tr>
<td>/l/ as in yes</td>
<td>/ɔ/ as in court, warn</td>
<td></td>
</tr>
<tr>
<td>/θ/ as in thick, path</td>
<td></td>
<td></td>
</tr>
<tr>
<td>/ð/ as in this, breathe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>/n/ as in sing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Research from the **US Fish and Wildlife Service** in Charleston, South Carolina, has confirmed decades of anecdotal reports: over half the existing crocodilian species supplement their diet with fruit. It seems that at least 13 of the 23 species of crocodiles and alligators in the world today eat fruit as well as meat.

Dolphins have a **signature whistle** identify themselves and to hear a familiar whistle they **acquaintance**, which they use to communicate. Moreover, a study from the US Fish and Wildlife Service at Anglia Ruskin University of Basel has now found that dolphins have **signature whistles** after hearing a familiar whistle they will repeat it back to their companions as determined by our non-native proofreaders.

The nights are darkest. This suggests that they understand that darkness lowers the risk of being killed by predators, suggesting they have the best memory in the animal world. Dolphins have a **signature whistle** which they use to communicate. Moreover, a study from the US Fish and Wildlife Service has found that dolphins have **signature whistles** after hearing a familiar whistle they will repeat it back to their companions as determined by our non-native proofreaders.
This section of the magazine offers short news stories organized thematically:

7 News
- anecdotes from around the world.

8 US News
- anecdotes from America.

9 Society
- the new realities of adoption

10 Neuroscience News
- amazing discoveries about the mind

11 Health-Science News
- live longer, live better

12 Internet: Algorithm ‘n’ Blues
- how mathematics controls your life

13 Economics: the Business of Isis
- how to fund an international terrorist campaign

14 Politics: Shock Tactics
- how Isis manipulates the West through our media

15 Politics: Creating Isis
- how Western mistakes gave rise to the Islamic State

16 Education: Getting Maths Wrong
- can we sex maths up in time to save our economies?

---

SPEAKING & LISTENING EXTENSION

7 Speak: what music would you like played at your funeral?

8 Speak: should single-stall public restrooms be unisex?

9 Speak: how does the current adoption situation in your country compare to that described in Britain? Have any adoption cases been in the news recently? Do the British Somali community have a right to influence who adopts the somali girl mentioned?

12 Read about the algorithm glitch at Amazon: http://goo.gl/l5B8sb

13 Read about the alternative terms for the so-called Islamic State at: http://goo.gl/hOvtPN

16 Watch: Dr Clio Cresswell talks about the connection between sex and mathematics at: http://goo.gl/AsY1zG
THE ULTIMATE\(^1\) ANSWER

Douglas Adams, author of The Hitchhiker’s Guide to the Galaxy, stated\(^2\) that the answer to the ultimate\(^1\) question of life, the universe and everything was 42. While this was a joke, it turns out\(^3\) he may not have been far\(^4\) wrong. According to Maxim Makukov, an astrobiologist at the Fesenkov Astrophysical Institute\(^5\) in Almaty, Kazakhstan, the right answer is in fact 37. Makukov and others have been looking for patterns\(^6\) in the genetic code of life. Unlike\(^7\) genomic DNA the genetic code is stable, being passed down from generation to generation over billions of years. Makukov and others have found hidden\(^8\) regularities. Specifically, the prime number 37 recurs\(^9\) frequently in the code. The probability of this occurring randomly\(^10\) is apparently \(10^{-13}\) – pronounced “ten to the minus thirteen” – (i.e.\(^11\) 1 in 10 trillion). Does this prove that we were designed by ancient aliens? Is it evidence for ‘intelligent design’ – favoured by fundamentalist Christians? Not according to Makukov but that won’t stop many from drawing\(^12\) these conclusions.

BRITISH FUNERALS

Britain is one of the most secular countries in the world and this fact is reflected in British funerals. For most of the 21st Century Frank Sinatra’s I Did It My Way has been the funeral favourite in the UK. However, last year Ol’ Blue-Eyes\(^13\) was knocked off the top spot\(^14\) by Monty Python’s Always Look on the Bright Side of Life. It gets worse\(^15\). The music to the BBC soccer\(^16\) show Match of the Day is also popular, as is the theme tune\(^17\) of the long-running soap opera\(^18\) Coronation Street. Other options have been vetoed by funeral directors on the grounds of\(^19\) bad taste – notably Queen’s Another One Bites the Dust\(^20\).
**IS IT BETTER TO SHARE?**

The first segregated toilets for men and women appeared in Paris in 1739. Over the next 250 years the separation of the sexes in such **matters** became the norm in public buildings. However, this **trend** may be about to go into reverse. The Los Angeles suburb of West Hollywood has introduced a law obliging all **single-stall toilets** to be unisex. The move is meant to favour three minorities. First transgender individuals often find gender-specific **restrooms** unsafe and/or unwelcoming. Secondly, in gay bars with two toilets there is often a **queue** for one while the other is underutilized. Finally, the gender-neutral **loos** should be more welcoming for **disabled people** with **carers** of the opposite sex. Multi-stall **bathrooms** will still be segregated.

**ASKING FOR TROUBLE**

Police in Hudson, Pasco County in Florida, arrested a man in a Kmart store for possession of narcotics. What was it that caused the law enforce to make the arrest? Well, the **deputy** became suspicious when he saw 50-year-old John Balmer's T-shirt, which read across the chest, **“WHO NEEDS DRUGS? No, seriously, I have drugs.”** Balmer was telling the truth. The deputy found he was carrying a bag containing **crystal meth** and cannabis.
In the second debate on the audio files we discuss two notorious adoption cases that made the news back in 2014. Our perception of adoption is often erroneous because the whole phenomenon has changed radically in the last 50 years. Britain provides an illustrative case study. Adoption only became a formal legal procedure in the UK 90 years ago in 1926. Until the 1960s 90% of children up for adoption were ‘illegitimate’ babies. In 1968 51% of adopted children were babies; today only 6% are less than a year old. Indeed, in the 21st Century 56% of children who are adopted in Britain are over 10 years old. However, most children who reach that age will never find adoptive parents. As a result of the increasing age of the children offered for adoption, the numbers of children in care that are actually adopted has fallen by around 86% over the last 50 years.

Almost all children who are up for adoption have lived for some time with one or both of their biological parents; 60% of adopted children have suffered some form of abuse. Moreover, the number of adoptions that are contested by the biological parents has increased massively to around 50%. As a result of all this, the adoption process is much more traumatic for children than it was half a century ago and, because they are older, the children involved are more aware of the situation.

It is universally accepted that the younger a child is when adopted the easier the process will be; children adopted as babies display the same emotional attachment to their adopted parents as do their non-adopted siblings. Moreover, for every year that passes, a child’s chances of adoption falls by 20%.

Current controversies in Britain as regards adoption include whether it is important to achieve a perfect or near perfect ethnic match between adoptee and adopters, and whether children should only be removed from dysfunctional families as a last resort. For instance, there were protests in the Somali community in London last year when the three-year-old daughter of a mentally ill Somali woman was offered in adoption to a (non-Muslim) lesbian couple.
Neuroscience news

**THE HAUNTED LAB**

Researchers at the École Polytechnique Fédérale de Lausanne in Switzerland have induced the sensation of a ghostly presence in a laboratory for the first time. The study started from the premise that some supernatural experiences are caused by the mind momentarily losing track of the body’s location. First the researchers blindfolded volunteers. Then they gave them a finger-operated mechanism that moved a mechanical arm in front of them. However, the mechanism also moved a mechanical arm behind them, which prodded them in the back when the volunteers moved the first mechanical arm. However, the experience turned seriously disconcerting for the volunteers when a time delay of a fraction of a second was introduced between the figure movement and the action of the mechanical arm behind the volunteers. They reported that they felt like they were being watched and touched by a ghostly presence. Two of the 12 participants found the experience so disconcerting that they begged for the experiment to be halted so that they could go home.

**DÉJÀ VU AGAIN**

Déjà vu is a relatively rare experience for most of us. It is, however, more common amongst some people who suffer certain neurological disorders such as epileptic seizures and dementia. Now for the first time researchers at Sheffield Hallam University in the UK have discovered a case of psychogenic déjà vu. The 23-year-old Briton began to experience regular déjà vu after starting university. The experience is so distressing that he avoids TV, radio and newspapers because their content seems familiar. Unfortunately, there is a vicious circle: anxiety triggers the déjà vu, which leads to more anxiety. Researchers postulate that the problem may be that the neurons in his temporal lobe are misfiring, causing experiences to be stored as memories. The onset of the man’s psychogenic déjà vu was accompanied by obsessive compulsive disorder and the problem worsened significantly after he tried LSD.

**SINGING GENES**

Researchers at the Massachusetts Institute of Technology have identified 55 genes that show similar patterns of activity in the brains of humans and songbirds but not in other species of birds and animals. For more on the science of music, see pp. 18-19.

---

1. ghostly - phantasmal, eerie
2. to lose track of (lose-lost-lost) - stop being conscious of
3. blindfold/blindfolded - with one’s eyes covered
4. to prod - poke, jab, nudge, push
5. to turn - (in this case) become
6. time delay - interval, postponement
7. to beg - implore, ask desperately
8. to halt sth. - stop sth.
9. amongst - among, for
10. seizure - convulsion, spasm, paroxysm
11. to avoid sth. - try not to experience sth.
12. content - (in this case) information
13. to trigger - activate, provoke
14. to lead to (lead-led-led) - cause, provoke
15. to misfire - malfunction
16. onset - start, beginning
17. pattern - tendency, configuration
GOOD NEWS ON ANTIBIOTICS

For some time now one of the biggest preoccupations in medical science was the increasing resistance of superbugs\(^1\) to antibiotics. For instance\(^2\), last year British Prime Minister David Cameron warned\(^3\) that antibiotic resistance could take us “back to the Dark Ages”, medically speaking. However, researchers at Northeastern University in Boston have not only developed\(^4\) the first new antibiotic in 30 years but they have also created a technique that promises to create many more. The new antibiotic, teixobactin, has proved effective against tuberculosis, septicaemia\(^5\) and Clostridium difficile in studies on mice\(^6\). The new antibiotic was developed\(^7\) using an electronic chip that can be buried\(^8\) in soil\(^9\). The soil is naturally full of bacteria that could give rise to\(^10\) antibiotics but 99% cannot live away from the soil. By growing the bacteria in the chip buried\(^11\) in the soil\(^12\), chemicals produced by the bacteria can be harvested\(^13\) and tested for antibiotic properties. Indeed\(^14\), 25 new antibiotics have been discovered using the method, teixobactin is just\(^15\) the most promising of them.

What’s more, researchers at the Public Health Laboratory in Kennemerland in the Netherlands have developed\(^16\) an alternative to conventional antibiotics that is proving effective against MRSA\(^17\) and other bacteria with impenetrable membranes. The new drug is based on naturally occurring\(^18\) viruses that attack bacteria using endolysins\(^19\). However, these enzymes have been modified to combine the best elements for attaching to\(^20\) the bacteria with the best elements for killing them.

warning to parents

Detergent caps for washing machines and dishwashers\(^21\) are sending on average\(^22\) one child a day to hospital in the UK. Kids seem attracted to the brightly coloured capsules because they look like sweets. However, if swallowed\(^23\) they can cause severe internal burns.

It’s the couch more than the potato

A major study from Cambridge University has concluded that while obesity is not good for you the real killer is inactivity. The study followed a third of a million Europeans over 12 years and concluded that 676,000 lives per year could be saved in Europe if everyone took 20 minutes exercise per day. 337,000 lives would be saved if nobody were obese.
A central notion in projections of a dystopian future is the idea that our world could be taken over by machines. However, recent research suggests that it already has been. The great contribution of mathematics to computing is the concept of the algorithm: a procedure for performing a complicated operation by carrying out a precisely determined sequence of simpler ones. The great advantage of algorithms is that we have to think less and once they are set up, they exclude subjective human value judgements.

Algorithms are at the heart of modern digital technology and quite simply it couldn't function without them. Unfortunately, because they function automatically and very quickly, when they go wrong they can do immense damage.

ALGORITHMS & YOU
If all this sounds immensely abstract and boring, here are some of the things algorithms do in your day-to-day life. Algorithms decide which Facebook posts you will be interested in and which you won't. If you posted something on FB and it was apparently completely ignored even by your nearest and dearest, it may simply be that an algorithm decided that your gem wasn't going to interest them, so they never got to see it. Algorithms determine what results come up for you on a Google search. They may even determine how much you have to pay for insurance or plane tickets.

With algorithms you are not some anonymous customer, you are a wealth of data and which smartphone you use, where you live, your ethnicity and your internet-search history can affect prices you pay, products you are offered and even whether you are investigated by security services.

Algorithms are increasingly used by US judges to determine sentencing and may decide who gets a Green Card. Some people even blame algorithms for provoking the subprime-mortgage crash and the World Financial Crisis.

On 12th December, 2014 an algorithm glitch at Amazon UK had thousands of products' prices drop to 1p for an hour. Sometimes the machines are on our side.
ISIS: THE ECONOMICS OF TERROR

Like trip-of-a-lifetime tourists from the USA, Islamic terror seems to be visiting European capitals one by one: Madrid, London, Paris, Brussels, Copenhagen. Unfortunately, the list may be longer by the time you read this. As the list grows, the terms used to describe IS become more shrill: it is becoming increasingly common in the Anglosphere to refer to the Islamic State as a ‘death cult’ and, following the Copenhagen attacks in February the French Prime Minister talked about ‘Islamofascism’. However, we cannot hope to defeat Da’ish unless our analysis goes beyond name calling.

ANCIENT & MODERN

We focus on the barbaric acts of Isis but fail to recognize how modern they are. The Islamic State is a sophisticated financial operation. Vast sums of money are generated from black-market oil, kidnapping, selling looted antiquities and extortion. Islamic State is smuggling around 10,000 barrels of oil a day from the oilfields it controls onto the black markets of Turkey, Iran, Syria and Kurdistan. This cheap source of oil is believed to be one of the reasons that NATO-member Turkey has not been pulling its weight in the fight against Isis.

Extortion of local businesses is another lucrative activity. Documents captured in June 2014 suggest that IS’s Mafia-style activities had earned the group $36 million just from the Syrian province of al-Nabuk.

Conquest itself is lucrative. when Da’ish took Mosul they robbed $425 million from the banks. However, even before they took over, they were earning $8 million a month from extortion in the city. It is calculated that IS has $2 billion in cash reserves. ISIL has to be defeated economically as much as militarily.

A STATE OF SORTS

However, Da’ish is also ruling territory as competently (albeit as brutally) as the internationally recognized states it has replaced. IS controls 40% of Iraq’s grain production and they have ensured that the food supply has continued uninterrupted in the areas they control.

Nevertheless, the area in which IS has proved to be more 21st-century than 6th-century is undoubtedly in communications. The group has a Twitter account with 24-hour updates on their operations. They run question-and-answer sessions online. They even have an English-language magazine: Dabiq.

---

1 trip-of-a-lifetime tourist - tourist on a once-in-a-lifetime holiday
2 shrill - hysterical
3 to defeat - be victorious over
4 Da’ish - Islamic State in Iraq and Syria/the Levant
5 to go beyond (go-went-gone) - be more perspicacious than
6 name calling - insults
7 fail to - do not
8 kidnapping - abduction
9 looted - stolen, robbed
10 to smuggle sth. - export sth. as contraband
11 source - place from which sth. can be obtained
12 to pull one’s weight - make the necessary effort
13 just - (in this case) only
14 to take over (take-took-taken) - take control
15 to rule - govern
16 albeit - even if
17 grain - cereal
18 food supply - provision of food
19 update - revision to include the latest news
20 to run (run-ran-run) - (in this case) organize
SHOCK TACTICS

IS: SHOCK & AWE¹
Any reasonable, mature individual would be scandalized by IS’s repeated acts of barbarism. However, the West has misinterpreted this campaign of terror. First, acts of brutality that may sicken² us play rather³ differently amongst the brutalized populations of Iraq, Syria and Gaza. From their perspective we have complacently ignored their suffering until it was taken to our doorstep⁴. It is hard to refute this argument: by comparison the repression in Syria, Egypt and Gaza makes the terror acts in Europe pale into insignificance⁵. A Western life is clearly worth far more⁶ than a non-Western one: the week that two dozen people were murdered in Paris, 2,000 were murdered by Boko Haram⁷. But even in Nigeria more attention was given to the Charlie Hebdo killings!

Moreover, middle-aged commentators (like myself) have a completely different understanding of violence than those brought up on⁸ Grand Theft Auto or Call of Duty. Da’ish know how to play modern media so that they are always in the news, always scandalizing closeted⁹ societies. They connect effectively with their two intended¹⁰ audiences creating alternately shock and awe¹¹.

PLAYING GOD
On 22 November 1917 The British Government pledged¹² support¹³ for the creation of a Jewish State in Palestine in what is known as ‘The Balfour Declaration’. The very next day the new Bolshevik Government in Russia leaked¹⁴ the existence of a secret Anglo-French agreement to divide up the Ottoman Empire in the Middle East. The frontier between the two new imperial territories was drawn¹⁵ by Sir Mark Sykes and François Georges-Picot and became known as the ‘Sykes-Picot line’, which divides Syria from Iraq. This 800km border¹⁶ through some of the most disputed land on earth ignored ancestral divisions between Sunnis, Shiites, Alawites, Druze and Christians, Arabs and Kurds. The consequences are still with us today.

¹awe - wonder, astonishment; terror
²to sicken - nauseate, revolt
³rather - somewhat, quite
⁴one’s doorstep - where one lives
⁵to pale into insignificance - be comparatively irrelevant
⁶worth far more - valued more highly
⁷an Islamist terrorist group in northern Nigeria
⁸brought up on sth. - who have known sth. as children
⁹closed - insulated and protected from danger
¹⁰intended - planned, desired
¹¹‘shock and awe’ was the binomial used by the US Administration to describe their 2003 invasion of Iraq.
¹²to pledge - promise
¹³support - backing
¹⁴to leak sth. - reveal sth.
¹⁵to draw (draw-drew-drawn) - delineate
¹⁶border - frontier
Creating IS

THE COMING OF THE CALIPH
The origins of Isis can be traced to the US invasion of Iraq. In 2003 Abu Bakr al-Baghdadi was a quiet, scholarly PhD student at Baghdad University. His passion was soccer. In 2004 he was sent to Camp Bucca, a US military prison in southern Iraq, for 10 months. Despite the fact that the caliph of the Islamic State is the USA’s number one enemy in the world, the US has never even explained why he was arrested. The nearest thing to an explanation came when the camp’s commander commented that Baghdadi was a “bad dude”. ‘Operation Iraqi Freedom’ did not give Iraq a taste of democracy and the rule of law; rather, it suggested that the Western option was just as arbitrary and more anarchic than Saddam Hussein’s brutal regime.

THE MILITARY BLUNDER
However, the more serious side of the US occupation was not arbitrary mass arrests or a complete inability to understand the inter-ethnic tensions in the country. The biggest mistake was the wholesale sacking of Iraq’s military officers. Many Iraqi officers became radicalized following the US invasion and can now be found among the ranks of IS’s area commanders. The Iraqi army, which is effectively leaderless, is no match for these professional officers leading a motivated volunteer army from the Sunni communities of Iraq and Syria plus thousands of international volunteers. As they have defeated the Iraqi army and moderate Syrian rebels, Islamic State has amassed massive amounts of high-tech US military equipment that had been given to the West’s hapless allies.
THE WRONG SORT OF MATHS?

In November 2014 Peter Wedderburn-Ogilvy wrote the following in *The Daily Telegraph*: “The reason for the shortage of engineers and scientists in Britain is that applied maths was replaced by pure maths at secondary level in the 1970s. Applied maths uses maths to solve problems. It is essential to teaching and learning engineering and the sciences. Pure maths is the study of mathematical conundrums, with no practical application. This short-sighted policy destroyed Britain’s engineering and science tradition and expertise, and has produced two generations of mathematically illiterate adults. The skill shortages have had to be made up by migrant workers.”

Mr Wedderburn-Ogilvy may be right but the problem is surely deeper.

THE MATHS FIASCOS

49% of adult Britons don’t have basic maths skills despite their continuing importance. Those who are innumerate are twice as likely to be unemployed and far more likely to end up in prison. However, a study from *Ohio State University* found that there was a significant discrepancy between those who considered themselves good or bad at mathematics and their actual maths ability. Only about 6% of the population in fact suffer from dyscalculia. Far more people suffer ‘math anxiety’ because they think they can’t do maths, avoid maths as a result and so can’t do maths.

MAKING MATHS SEXY

There is now a concerted campaign in several fields – including philosophy, psychology and education – to sex up maths. Of course, it is important to break the puerile association between mathematics and nerds. However, it is also increasingly clear that there is a beauty to maths that should be talked up. For example, brain scans from *University College London* have shown that the experience of mathematical beauty excited the same area of the brain as music and art. Psychologically, a moment of true mathematical understanding provides a sense of meaningfulness, connection and purposefulness, similar to that of music or poetry.

According to Dr Clio Cresswell, if you get people to think about sex before doing maths, they are more analytically successful because they connect better with their analytical brains. However, if you get them to think about love, they think more creatively. Properly taught by motivating teachers, maths can be for practically everyone.
MUSIC

This section of the magazine offers...

18-19  **The Science of Music**: the latest discoveries of musicology
20-21  **Ancient Music**: the prehistory of music and its relationship with architecture
22    **Classical Music**: anecdotes from the lives of Baroque composers
23    **Big Bad Beethoven**: anecdotes from the great composer’s life
24    **Romantic Lives**: Schumann, Chopin and Rossini
25    **Love & Hate**: Brahms and Wagner
26    **Modernist Madness**: anecdotes from the life of Stravinsky
27    **Pop Music**: African Roots
28    **Pop Music**: the White bit
29    **The Birth – and death? – of Pop Music**
30    **Difficult Words**: music terms that cause problems of spelling and pronunciation
31-33  **Band Names**: learn English from the names of pop groups
34-35  **Nicknames**: the unofficial names of great symphonies and sonatas
36    **Musical False Friends**: the false cognates every musician needs to know
37    **Musical Phrasal Verbs**: multi-word verbs from the world of music
38    **Expressions used by the Beatles**
39    **Expressions used by the Rolling Stones**
40-42  **Music Idioms**: everyday expressions about trumpets, fiddles, drums and more
43    **Music Etymology**: the fascinating origins of musical terms

**SPEAKING & LISTENING EXTENSION**

18    **Watch**: there’s a fascinating short TED presentation on the relationship between music and mathematics at: [http://goo.gl/9e4qtC](http://goo.gl/9e4qtC)

19    **Watch**: a great TED presentation on the world’s ugliest piece of music (designed by a mathematician!): [http://goo.gl/X3uhKM](http://goo.gl/X3uhKM)

22-24  **Speak**: what’s your favourite piece of classical music? What does it evoke for you?

25    **Speak**: Wagner’s music is effectively banned in Israel because the composer was so viciously antisemitic. Is it possible to separate the music from the composer? Is it wrong to love the music even if you hate its creator?

31-33  **Activity**: find out the meaning of the names of some of your favourite English-language bands by doing a web search.

38    **Speak**: A recent article in a Liverpool newspaper ([http://goo.gl/3BTFjB](http://goo.gl/3BTFjB)) commented that the Beatles had one of the smallest vocabularies in pop music. Is this limitation an advantage for Efl learners? Do you care about the lyrics of what you listen to in English? Should you?
MUSIC BY CHANCE

In *Reflections on the Musical Mind* [Princeton University, 2013] Jay Schulkin uses neuroscience to analyse our understanding of music. He explains how our musical mind is “a fortuitous accident”: the result of applying mental functions to music that evolved for unrelated purposes. Music is useful because it helps us to navigate through life. We live in an uncertain world, always needing to predict the future while relying on insufficient information. So, evolution has honed our brains so that we derive pleasure from identifying patterns and slight deviations from them. When we expect to hear music and when we are listening to it, the brain releases dopamine into areas of the brain to prepare us for intellectual action. Listening to music also causes the release of oxytocin, ‘the love hormone’. No wonder Shakespeare described music as “the food of love”.

Music stimulates memory, it makes us (and even rats) cleverer by making us feel both relaxed and stimulated simultaneously.

CREATURES PERCEIVE THE BEAT

Buddy Holly and the Crickets, The Animals, The Stray Cats, Arctic Monkeys and even our friends Track Dogs – the musical references to all creatures great and small are legion. But does the relationship between fauna and rhythm go any further than band names?

Apparently, it does. Researchers from the University of Connecticut have found that a growing number of species can dance or nod to a beat including cockatoos, macaws, budgerigars, Asian elephants and sea lions. If the rhythm is speeded up or slowed down, these animals respond accordingly. Another group of animals – such as dogs, ducks and owls – move to music but fail to keep time. Ronan the Sea Lion even showed her musical preferences – preferring Earth, Wind and Fire to The Backstreet Boys! Bono-bos go further being able to produce simple rhythms on keyboards and percussion.
A SOCIAL SKILL TO ENJOY ALONE

There seems to be a link between the ability to hold a beat and socialization. Rhythm is a question of coordination and synchronicity like other social behaviour. Rhythm is related to the heartbeat and the pace at which one is walking or running; perceiving rhythm thus helps us to understand others, their emotions and their intentions. This makes sense as we are the supreme musical species and the most social species. The pyramids were built using rhythm to coordinate great numbers of workers. Children who dance together are subsequently more cooperative. The same is true of marching soldiers and singing congregations. However, the supreme trick of music is that it is even enjoyable when we are alone. Darwin said that music was our most mysterious faculty; gradually it is becoming a little less of a mystery.

OF MATHS, MUSIC & LANGUAGE

Neural analysis has shown that new-born babies notice when a drummer skips a beat. This is unsurprising since the baby has been listening to the pulsations of its mother’s heart for months as a foetus. The brain is hardwired to recognize patterns. What’s more, according to psychologist Dr Mark Changizi, it has adapted this ability to understand language and appreciate music. Music, language, poetry and mathematics are at root a search for patterns and variations on patterns. The link between music and human movement explains why we feel compelled to dance or at least clap along. An ability to recognize subtle variations in volume tempo, rhythm and pitch come from our need to understand the meaning of noises around us. It is one thing to hear someone walking near you in the dark. It is another to be able to tell how far away he is, how fast he is moving, whether he is approaching and what his intentions are.

FINEST BIRDSONG

Researchers at the University of Vienna have found that the North American hermit thrush uses the same mathematical relationships in pitch as human music. Doubling and quadrupling sound frequencies produces an octave, while tripling gives a perfect fifth. Quintupling produces a perfect third. These relationships are behind most major chords, those that all human cultures find harmonious. The same mathematical ratios are used by the hermit thrush - one reason, no doubt, why its song has been described as “the finest sound in nature.”
The Prehistory of Music

The line between prehistory and history is drawn by the advent of writing. Similarly, we could say that the history of music starts with the arrival of a precise system of notation in the 11th Century. Prior to this, we have to rely on archaeology and a few descriptive texts. Fortunately, the last 40 years have seen massive strides in musical archaeology and especially in archaeoacoustics.

How it All Started
Singing must predate the existence of our species and is presumably at least as old as speech. Indeed, it is possible that the first musical instruments weren’t even made by modern humans. One of the oldest musical instruments to have survived is the 40,000-year-old Divje Babe flute. It was found in Slovenia among the remains of Neanderthals and may have been used by them. Other flutes of a similar age - such as the Hohle Fels flute from southwest Germany - are more clearly linked to Homo sapiens. Musical instruments probably developed from more practical tools. Percussion is a logical extension of banging rocks together to make stone tools. Lithophones are found all around the world. A cave at Fieux à Miers in the French Pyrenees contains a 2m-tall lithophone which resonates like a gong when struck. Recalified fractures on this lithophone indicate that it was struck around 20,000 years ago. Stringed instruments probably developed after someone noticed the distinctive twang made by a bow.

Good Listeners
Two things we know for sure about all prehistoric humans - they spend much more time in the dark than we do and they lived in a much quieter world. It is therefore safe to assume that sound played a bigger role in their lives than in ours and that they were much better listeners than we are. This would help to explain why Palaeolithic cave paintings tend to be found on concave rock walls in parts of caves that have remarkable acoustics.

Musicians first appear in cave paintings around 18,000 years ago around the same time as the Isturitz flutes from the French Pyrenees.
The Architecture of Ancient Music

There is increasing evidence that acoustics was an important factor in monumental architecture. The 7000-year-old Hypogeum of Ha-Saflieni, an underground tomb in Malta has incredible acoustics and an extraordinarily long reverberation time. Similar acoustic qualities have been identified in burial chambers across the British Isles from between the fourth and the First Millennium BCE.

The 4000-year-old megalithic circle at Stonehenge was designed with acoustics in mind. The interior faces of the standing stones are surprisingly smooth and slightly concave making them ideal for reflecting high-frequency sound. Indeed, archaeological evidence tells us that small stones were hit together in the circle to be able to listen to the resonance echoing around the circle of stones. The reverberation takes about 1.2 seconds to die down, which is typical of an opera house but an extraordinarily long time for a structure with no ceiling.

Old World & New

By the time of the sedentary cultures of Mesopotamia, China and Egypt such recognizable instruments as harps, lyres, trumpets, horns and pipes were well established. The Ancient Greeks gave us the word ‘music’ and in the 6th Century BCE Pythagoras discovered the mathematical relationship between the notes of the scale. Acoustic designs have been attributed to Ancient Greek amphitheatres, pre-Incan temples in Peru and Mayan structures in Mexico. If these cases are confirmed it will imply that around the world ancient people had a practical understanding of acoustics that has not been equalled until our own times. The evidence from Greco-Roman theatre design suggests that empirical trial-and-error drove the process over millennia.

Musical Interlude

Most early music almost certainly had a ritual relevance. However, religion has also been the enemy of music. The early Christians associated instrumental music (and theatre) with decadent hedonism and rejected musical instruments completely, countenancing only austere vocal music.

If you are interested in archaeoaoustics, look out for the Soundgate Exhibition which will be touring Europe in 2016 (more at www.emaproject.eu).
The Great Composers: Baroque

The first requirement for a composer is to be dead.

- ARTHUR HONEGGER

Lully's Sore Foot
Jean-Baptiste Lully (1632-87) was a French composer who was in the habit of keeping time to the music he listened to by beating his walking stick on the floor. However, on 22 March 1687 Jean-Baptiste missed the floor and pierced his foot (while listening to Te Deum). Gangrene quickly set in and Lully died from the resulting abscess!

Bach was Worse than his Bite
Johann Sebastian Bach (1685-1750) should be remembered above all because he once wrote an operetta about coffee. Of course, Bach was much more important than this. However, drinks did play an important part in his life. In fact, some of his early works were paid for in beer. However, Bach took his music very seriously. As a teenager Johann once walked 400 kilometres just to hear a famous organist; that was the furthest from his home that he travelled in his entire life! He once got into a sword fight with a student because the poor man's bassoon playing had offended the composer. When another musician played badly Bach grabbed his own wig off his head and hurled it at the organist.

Haydn & Mozart
Franz Haydn (/ˈheɪdn/ (1734-1806) had a wife, Anna Maria Keller, who had so little respect for his work that she used his scores as curling paper for her hair and even as bin-liners!

Wolfgang Amadeus Mozart (1756-91) was famously precocious. One day as a boy he was visiting the Austrian court when he fell on his bottom. A young princess rushed forward and hugged him. Amadeus kissed her back and said, “You are too kind; I will marry you!” The princess would have been happier marrying Mozart than the man she did wed – her name was Marie Antoinette.

Mozart once bet Haydn that he could write a piece of music that Franz couldn’t play. Haydn took him on but found that indeed he could not play the piece because it required him to be playing notes at either end of the piano with a single note in the middle of the keyboard. Finally, Wolfgang showed Franz how to do it. He started playing and when he came to the troublesome note he played it with his nose!
You know those crazy tramps\(^{1}\) who walk around city centres shouting at people and laughing to themselves? Well, one of them was a great composer. Ludwig van Beethoven (1770-1827) used to wander\(^{2}\) the streets talking and growling\(^{3}\) to himself and his home was a chaotic shambles\(^{4}\). To make matters\(^{5}\) worse, he used to spit\(^{6}\) all over the floor! It is just as well\(^{7}\) that Beethoven shaved\(^{8}\) every day, or he really would have looked like a wild\(^{9}\) man. His facial hair covered his face right up to\(^{10}\) his eyes!

If Bach was keen on\(^{11}\) coffee, Beethoven was even more obsessed about it. He insisted on exactly sixty beans\(^{12}\) being used for each cup and he would count them before the coffee was brewed\(^{13}\) just\(^{14}\) to make sure.

Beethoven had a filthy temper\(^{15}\). For example, he once felt insulted by a waiter in a restaurant. The waiter disappeared into the restaurant kitchen but when he reappeared carrying other customers’ dishes\(^{16}\) Beethoven picked up\(^{17}\) his own plate full of food and threw\(^{18}\) it into the defenceless waiter’s face! On another occasion, Beethoven got so frustrated with a pupil that he bit\(^{19}\) him on the shoulder\(^{20}\).

As you no doubt already know, Beethoven was deaf\(^{21}\). You knew that. But did you know that he used to put a stick\(^{22}\) on his piano and hold it in his mouth\(^{23}\) because this helped him to ‘hear’ the melody being played?

Some people mellow\(^{24}\) with age; not so\(^{25}\) Beethoven. On his deathbed\(^{26}\) his friends saw him sit up and shake his fist\(^{27}\) at the heavens\(^{28}\) just before he died.

However, the last word on Ludwig must go to Ringo Starr. When asked what he thought of Beethoven, the Beatle replied, “I love him, especially his poems.”

---

**Footnotes:**
1. tramp (UK English) - vagrant, vagabond, homeless person
2. to wander - roam, walk without an obvious purpose
3. to growl - make a noise like an angry dog
4. shambles - chaos, disorder, mess
5. matters - (in this case) things, the situation
6. to spit (spit-spat-spit) - eject saliva from your mouth
7. to be just as well - be fortunate
8. to shave - cut facial hair with a sharp instrument
9. wild /waɪld/ - (in this case) untidy, messy, unkempt
10. right up to - (emphatic) up to, until, as far as
11. to be keen on - enthusiastic about
12. beans - (in this case) the roasted seeds of a coffee plant
13. to brew - (of tea, coffee and beer) make
14. just - (in this case/emphatic) simply
15. to have a filthy temper (have-had-had) - be quick to anger, become furious quickly
16. dish - (in this case) the container on which food is served
17. to pick up - (in this case) lift, raise
18. to throw (throw-throw-throw) - toss, launch, hurl, project sth. through the air
19. to bite sb. (bite-bit-bitten) - sink one’s teeth into sb., attack sb. with your mouth
20. shoulder - the part of both sides of the body from the neck to where the arms are connected to the thorax
21. deaf - not able to hear
22. stick - long thin piece of wood
23. to hold sth. in your mouth (hold-held-held) - bite onto sth.
24. to mellow - become softer and more tolerant
25. not so - but not
26. deathbed - the bed in which sb. is about to die
27. to shake one’s fist - close your hand and move it quickly back and forth to express hostility
28. heavens - sky, abode of God
The Great Composers: Raving Romanticism

Rossini’s Hair & Chopin’s Hands

Giacchino Rossini (1792-1868) was a bit arrogant. When he wrote home he addressed his letters to "the mother of the great composer". It is ironic that the composer of The Barber of Seville was, in fact, bald. He sometimes wore three wigs at a time in winter to keep his head warm.

Frederic Chopin (1810-1849) suffered for his art as a child. He used to sleep with wooden wedges between his fingers in an effort to expand his hands’ spans. However, later in life he developed the unorthodox (though admittedly logical) habit of only shaving the side of his face that the audience would see!

Madman Schumann

Robert Schumann (1810-1856) was also a bit of a weirdo but of a different sort. He was almost incapable of social interaction and could be taciturn to unbelievable extremes. He sometimes went to visit friends but didn’t say a word until over an hour had passed.

Schumann liked a drink or two. His favourite tipples were beer and champagne, which sounds fine until I tell you that he often drank them mixed together!

Schumann had a phobia about metals and particularly hated having anything to do with keys. Unfortunately, Schumann wasn’t just eccentric, he actually went mad. He had not one but two imaginary friends called Florestan and Eusebius and later he started hearing voices and decided that he might be a danger to his wife, so he decided to commit himself to a mental asylum. He planned to come out after a couple of months cured. Unfortunately, the doctors decided that he was well out of his box and he stayed in the mental hospital for the rest of his life. The year before his death Schumann became obsessed about a ‘magic’ table. He said the table could tap Beethoven’s Fifth Symphony and could guess any number he thought of. Meanwhile, Schumann’s young protégé Johann Brahms had fallen in love with Schumann’s wife, Clara. This wasn’t the first time that Clara had gone for another great composer; she also got friendly with Felix Mendelssohn.

---

1 to be bald - have no hair on top of one’s head
2 wig - artificial hairpiece
3 at a time - at the same time, simultaneously
4 wooden wedges - triangular pieces of wood
5 one’s hand’s span - the area covered by one’s hand
6 to develop - (in this case) acquire
7 to shave - cut/eliminate the hair of your face using a razor
8 weirdo - eccentric, strange person
9 sort - kind, type
10 almost - nearly, practically
11 tipple - (colloquial) alcoholic drink
12 to have anything to do with - have any contact with
13 the metal variety, an aversion to piano keys would have been a real problem!
14 just - (in this case) only
15 actually - (false friend) really, in fact
16 to commit oneself to - to put oneself in
17 to come out (come-came-come) - leave
18 to be out of your box - be completely crazy
19 to tap - hit, strike
20 to guess - predict correctly
21 meanwhile - at the same time
22 to go for (go-went-gone) - be attracted by
23 to get (get-got-got) - (in this case) become
24 rather too - (qualifier) too
I have been told that Wagner's music is better than it sounds.

- BILL NYE

Nasty Wagner

Richard Wagner /ˈvaːɡən/ (1813-83) was so antisemitic that he once conducted the music of Mendelssohn wearing gloves. When the concert was over he threw the gloves on the floor for the cleaner to remove. Wagner was so sensitive to criticism that his friends knew that they had to choose between praising his work whenever they heard it or risking being violently threatened by the composer. All in all, a really attractive character! Having said that, Wagner was probably the most revolutionary and influential musician of all time.

Wagner has lovely moments but awful quarters-of-an-hour.

- GIACCHINO ROSSINI

Barmy Brahms

Johannes Brahms (1833-1897) was a little bit like Michael Jackson. He preferred the company of children to that of adults (in an innocent way) and had a squeaky little voice (which he tried to hide). In fact, apart from that he was absolutely nothing like Jackson. Brahms was always falling madly in love with women though he never got married. He remained a close friend of Clara Schumann for the rest of his life, though he also proposed to the Schumanns' daughter, Julie. Like Schumann he was an obsessive cigar smoker and he was also addicted to strong coffee like Beethoven. Brahms had a thing about cats. Indeed, he used to try to shoot them with a bow and arrow from his window. Fortunately for the felines, he wasn't a very good shot. Brahms was also something of a misanthrope. At the end of one dinner party he rounded off his obnoxious conduct by proclaiming, "If there is anyone here whom I have not insulted, I beg his pardon."
Modernist Madness

Igor Stravinsky (1882-1971) was the greatest composer of the 20th Century but like his predecessors he was socially challenged. He was neurotic about practically everything. He wouldn’t have got on with Beethoven (though he loved his music) because he was completely obsessive about order. He was also neurotic about health. If someone sneezed or coughed in the same room as him he would instantly leave. ‘Hypochondriac’ is too light a word to describe Stravinsky. He kept meticulous diaries of his health, including reports on all the medicines he had taken and all his real or imaginary symptoms. When his wife Catherine was dying he even wrote her a long letter complaining about his own symptoms!

Stravinsky’s parents were against his musical ambitions and forced him to study law. Curiously, exactly the same had happened to Schumann.

Stravinsky was a devote member of the Russian Orthodox Church all his life but this didn’t stop him bending the rules when he chose to. He married his cousin despite the fact that this was forbidden by the Orthodox Church. Unfortunately, Catherine was often ill and so couldn’t tour with Stravinsky. Igor solved this problem by falling in love with another woman, Vera (who eventually became his second wife). Surprisingly, the two women got on reasonably well and Catherine often had to rely on Vera for news of her own husband.

Stravinsky twice got into trouble with the authorities because of his friendship with Pablo Picasso. In Italy the two men were once arrested for urinating in the street after a drinking session. On another occasion Stravinsky was travelling with a portrait painted by Picasso in his luggage. Some customs officers saw the painting but couldn’t believe it was a portrait and confiscated it, assuming that it was a coded war-plan!

Like many of his predecessors Stravinsky was a bit of an alcoholic. He was quite open about this and once said “My name should be Stra-whisky!”

What it Takes

So, what does it take to be a great composer? Well, from the example of the guys on these five pages it seems that a heavy dose of eccentricity helps, combined with a fondness for coffee, alcohol and tobacco. Being a failed law student and a syphilitic also seems to help. So most of us are still in with a chance.
A History of Pop Music

Pop music is a little over 60 years old. In other words the whole history of pop is younger than Gordon Sumner¹, Michael Jagger², Reg Dwight³, David Jones⁴ and all the other dinosaurs who only understood the first part of “live fast, die young”. In fact, it’s only a couple of years older than Madonna⁵.

African Roots⁶

Pop music exists thanks to the Slave Trade⁷. Sorry, that sounds awful⁸, I’ll rephrase - there would be no pop music if it hadn’t been for the enormous human tragedy that was the slave trade. Slavery brought the rhythms and traditions of African music into close contact with western instrumentation. The United States was the melting pot⁹ which created modern music but the main ingredient was African American. Blacks invented country blues with its mournful¹⁰ rhythmic music, call-and-response pattern¹¹, slide guitar¹² and harmonica. It grew out of the haunting¹³ choruses¹⁴ of the Southern Slaves. African Americans invented skiffle¹⁵ with its improvised instruments such as washboards¹⁶ and spoons.

If you’ve never heard of skiffle, it was the music that The Beatles played before they were The Beatles - that’s how influential it was. Blacks, of course, invented jazz. This was originally a mix of African rhythms and country blues using western musical instruments. In some cases the freed slaves gleaned¹⁷ their trumpets, clarinets and trombones from the debris¹⁸ on Civil War battlefields¹⁹. Moreover, Gospel music emerged when African Americans took the staid²⁰ hymns²¹ of Europeans and breathed²² passion into them. And when Gospel began to be used for non-religious purposes it morphed into²³ Soul.

City blues emerged when amplifiers appeared and began to be used by urban Blacks. Then in the late 1940s the next generation of African Americans began to mix city blues with jazz to create R&B²⁴. Rhythm and Blues led directly to²⁵ rock n roll.

¹Sting, born 1951
²Mick Jagger, born 1943
³Elton John, born 1947
⁴David Bowie, born 1947
⁵born in 1958
⁶roots - origins
⁷the slave trade - commerce in people from Africa who were taken to the Americas to work in servitude
⁸awful - terrible, atrocious
⁹melting pot - (metaphorical) place where things mix together
¹⁰main - principal, most important
¹¹mournful - sad, sorrowful
¹²call-and-response pattern - repetition of what the most important singer sings by the chorus
¹³slide guitar - technique of playing a guitar horizontally using a slide (= metal or glass tube that is moved along the strings without lifting)
¹⁴haunting - evocative, emotive
¹⁵chorus - organized group of singers
¹⁶skiffle - a type of folk music with jazz elements that incorporated improvised instruments
¹⁷washboard - corrugated wooden board used in the past when washing clothes
¹⁸freed - liberated
¹⁹to glean - harvest, collect
²⁰debris / debri / (UK) /dəbri/ (US) - fragments and other things that have been thrown away
²¹battlefield - battleground, place where military conflict has occurred
²²staid - conservative
²³hymn - (false friend) Christian song
²⁴to breathe - (in this case) instil
²⁵to morph into - change into, become
²⁶R&B - rhythm and blues
²⁷to lead to (lead-led-led) - bring about, result in
Pop Music: The White Bit

OK, so there was a minor contribution from Caucasians, most of which is covered by the term ‘country’ (including hillbilly, bluegrass and country-and-western). Country music — the music of rural White people in the Southern USA — can ultimately be traced back to immigrants from the British Isles who brought with them a tradition of narrative Celtic ballads and fiddling. In the 1930s and 1940s singers like Woody Guthrie showed how country music could be the focus of popular protest. As such, he paved the way for folk protest singers such as Bob Dylan and rock protest singers like Bruce Springsteen.

The Determining Factors

Pop music conquered the world from the 1950s because a series of factors fell into place at that moment in history. For the first time in human history western societies were affluent enough in the Fifties to have a significant proportion of adolescents not working but spending money. The ‘teenager’ was born. Previously, young people left school early, entered the labour market immediately, worked long hours and earned minimal wages. In other words, they were not exactly a marketing opportunity until the Fifties.

Secondly, technological changes conspired to create the pop boom. Just as the change from viols to violins ushered in the Baroque in the 17th Century, so pop music was made possible by technological changes. The recording of sound from 1877 onwards had the same revolutionary effect on music as the advent of printing had on literature four centuries earlier. The emphasis was no longer on the moment but on hearing the same songs again and again. The audience was no longer on the moment but on hearing the same songs again and again. The emphasis was on the wall of sound.

Experimentation with electronic musical instruments began as early as the 1890s but few musicians took much notice until after the Second World War. The arrival of the portable electric guitar in the 1950s was the last element needed for pop music to take off. Despite the Decca executive who famously turned down The Beatles because “guitar music was on the way out”, electric guitars have dominated almost every single tendency in modern popular music. The electric guitar, later combined with the wall of sound and the electronic synthesizer would be technology’s great contribution to pop music.

---

1 Caucasians — white people
2 ultimately — (false friend) in the final analysis
3 to be traced back to — be found in
4 fiddling — playing the fiddle (= folk violin)
5 to pave the way for — be a precursor for
6 to fall into place (fall-fell-fallen) — (in this case) appear in an opportune way
7 affluent — rich, prosperous
8 but — (in this case) however they were
9 wages — pay, salary
10 just as... so... — in the same way that
11 viol — six-stringed instrument (predecessor of the viola)
12 to usher sth. in — make sth. possible
13 from... onwards — after...
14 to take much notice (take-took-taken) — pay much attention
15 to take off (take-took-taken) — (in the case) become popular
16 to turn sb. down — reject sb., (opposite of ‘accept’)
The Birth - and Death? - of Pop

If there has to be a date for the birth of pop music, it is 1955, the year that saw Little Richard sell a million copies of *Tutti Frutti*.¹ There were other early Black stars like Chuck Berry, but rock 'n' roll really took off² when White folk like Buddy Holly, Bill Haley and Elvis Presley began to imitate African American music.

Pop music exploded as a world phenomenon with The Beatles. Why The Beatles? Why Liverpool? Well, Liverpool was a great port full of sailors³ who brought back music from the States that wasn't available in shops anywhere else in Britain. The success⁴ of the 'Fab Four' is well known but one statistic confirms it: they are estimated to have sold over one billion records, cassettes and CDs. The Beatles' influence was as great as their success. Soon, in emulation of The Beatles, there were an estimated 10,000 pop groups in Britain. In the two years after the 1965 release of *Yesterday* 446 bands and singers recorded cover versions of the song.

Music since The Beatles has largely⁵ consisted of variations on the existing styles - with changes of haircuts. Jimi Hendrix distorted the sound of the electric guitar in rhythm and blues. Heavy metal founders Black Sabbath, Deep Purple and Led Zeppelin consciously emulated Hendrix. The raucous⁶ sound of punk was invented in New York - based on elements of city blues - but it really found a home in Britain where rising⁷ unemployment amongst the young meant that the pantomime world of glam rock was rapidly losing its appeal⁸. Punk evolved into post-punk groups such as Joy Division who morphed into⁹ New Order. When that lot¹⁰ discovered dance music and synthesizers they paved the way for¹¹ techno. Others took elements of Caribbean reggae and mixed it with punk to produce ska¹². Britpop¹³ took the lyrical¹⁴ sophistication of indie - itself an offshoot¹⁵ of post-punk - and mixed it with a nostalgia for Sixties pop. Indeed¹⁶, nostalgia seems to dominate the music scene. The last big musical shake-up¹⁷ came from hip-hop and rap but that is over two decades old.

Now in its sixties the exhausted carcass¹⁸ of pop music gets periodic infusions of new blood¹⁹ - local music from the Punjab to Brazil. However, many pundits²⁰ are now concerned²¹ that pop music is moribund. Could Jagger, Sting and Bowie really outlive²² rock 'n' roll?

---

¹ Incidentally, Jimmi Hendrix started his musical career as a backing guitarist for Little Richard. However, Richard sacked Hendrix because he refused to wear the backing band's uniform.
² to take off (take-take-taken) - (in the case) become popular
³ folk (n.) - (US English) people
⁴ sailor - seaman, mariner
⁵ success - (in this case) popularity, triumph
⁶ the Fab Four - the Beatles ('Fab' is short for 'fabulous')
⁷ largely - mostly, primarily
⁸ raucous - strident, cacophonous, noisy
⁹ rising (adj.) - increasing, escalating
¹⁰ appeal - attractiveness
¹¹ to morph into - change into, become
¹² that lot - (colloquial) those people
¹³ to pave the way for - be a precursor for
¹⁴ in Britain ska refers to the music of groups like Madness and The Specials. However, ska was also the name of the Jamaican music from which reggae evolved
¹⁵ Britpop - British pop music of the mid-1990s (e.g. Blur and Oasis)
¹⁶ lyrical - referring to the lyrics (= the words of a song)
¹⁷ offshoot - derivative, spin-off
¹⁸ indeed - (emphatic) in fact
¹⁹ shake-up - commotion, upheaval, reorganization, change
²⁰ carcass - body
²¹ blood - (literally) red liquid typically found in veins and arteries
²² pundit - commentator, expert
²³ to be concerned - be worried, be preoccupied
²⁴ to outlive - live longer than
Difficult
Music-Related Words

Which words from the world of music typically cause learners problems? We have marked the pronunciation of difficult words and names throughout this music dossier. However, you should try to learn the following words’ spelling, pronunciation and pitfalls, too:

» **acoustic** /əˈkjuːstɪk/: notice the ‘o’ in the spelling
» **bass** /beɪs/: despite the fact that the fish – bass – is pronounced /baɪs/.
  - **double bass** /ˈdʌbl ˈbeɪs/
» **cello** /ˈsɛləʊ/
» **chamber music** /ˈtʃeɪmərˌmɪk/: notice the ‘h’.
» **harpsichord** /ˈhɑːrpsɪkɔːrd/: notice the ‘h’.
» **lyre** /ˈlaɪər/: a homophone of ‘liar’.
» **oboe** /ˈəʊboʊ/
» **opera** /ˈɒpərə/: notice that in fast speech this word has only two syllables.
» **orchestra** /ˈɔːrkɪstrə/: notice the ‘ch’ and the ‘r’
» **quartet** /ˈkwɔːrtɪt/

Track Dogs: a quartet

Photo by Ronan Kirby

Harpichord

Photo by Rama

» **concerto** /ˈkʌntərəʊ/ (UK); /ˈkɔntərəʊ/ (US)
» **cornet** /ˈkɔrnɪt/
» **crotchet** /ˈkroʊʃɪt/: not to be confused with **crotchet** /ˈkroʊʃi/ or ‘croquet’ /ˈkroʊki/.
» **cymbals** /ˈsɪmbləz/: a homophone of ‘symbols’.
» **false** /ˈfɔːlsɛtəʊ/ /ˈfɔːlsetəʊ/ or ‘falta’ /ˈfɔːltə/.
» **fina** /ˈfɪnəli/ /ˈfɪnəli/.
» **guitar** /ˈɡɪtər/.
» **harmony** /ˈhɑːrəmi/ /ˈhɑːrəmi/ notice the ‘h’.
» **harp** /ˈhɑːrp/ notice the ‘h’.
» **harpichord** /ˈhɑːrpsɪkɔːrd/ /ˈhɑːrpsɪkɔːrd/ notice the ‘h’.
» **lyre** /ˈlaɪər/: a homophone of ‘liar’.
» **ostrich** /ˈɔstrəʃ/ /ˈɔstrəʃ/.
» **opera** /ˈɒpərə/: notice that in folk speech this word has only two syllables.
» **orchestra** /ˈɔːrkistrə/: notice the ‘ch’ and the ‘r’
» **quartet** /ˈkwɔːrtɪt/.

Photo by Ronan Kirby

Harpichord

Photo by Rama

1 throughout - in all of 2 pitfall - common mistake 3 crotchet (UK English) - quarter note (US English) 4 crotchet - type of handicraft using hooked needles 5 croquet - 6 cymbals - 7 harpsichord - type of primitive piano 8 quaver (UK English) - eighth note (US English). 9 especially for prepube dent boys 10 tenner - (colloquial) £10 banknote 11 tuba - 12 viol - six-stringed Renaissance predecessor to the violin
Learning English from Band Names

You can learn English just1 by looking at your CD collection.

One of the ways you can practise English (especially colloquial English and slang) is to look through2 the lyrics3 of your favourite albums (assuming4 that at least some of them are in English). You'll find the lyrics3 of almost any song on the Internet, and most well-known songs can be found on YouTube with the lyrics3 incorporated [song name with lyrics].

However, even5 the names of groups can teach you to think about vocabulary, wordplay, pronunciation, idioms6 and structure.

Pun7 Rock

One of the favourite themes of the names of pop groups is punning7. At its simplest level this can take the form of misspelling8 to create different ideas.

A good example is the name of '80s duo Soft Cell. The expression sounds the same as 'soft sell', which implies being gently9 persuasive (e.g. in advertising). 'Cell' means a room in a prison or a monastery.

Another example comes from Adam and the Ants11. The name in itself means little but it allowed12 Stuart Goddard to call himself 'Adam Ant'; 'adamant' means 'inflexible' and 'resolute'.

The origins of the name of the punk band The Sex Pistols are surprisingly complex. The 'sex' part came from the name of manager Malcolm McClaren's clothes shop on the King's Road in London. However, 'Sex' on its own was deemed13 too short. The word 'pistols' was added to contribute to the band's violent image and as wordplay on 'pistils', the sex organs of flowers. Of course, 'sex pistol' has phallic connotations.

Euphony

Another important factor in band names is euphony14. Like Adam and the Ants, bands such as Aztec Camera, The Bee Gees, Black Sabbath, China Crisis, Crowded House, The Dead Kennedys, Def Leppard, Limp Bizkit15, Massive Attack, Snow Patrol, The Stone Roses, Thin Lizzy and White Stripes offer assonance16. Like Soft Cell, bands such as The Beach Boys, The Beastie Boys, The Backstreet Boys, Counting Crows, Culture Club, The Foo Fighters, Franz Ferdinand and Nine-Inch17 Nails18 use alliteration19 to make their names memorable. Indeed20, there is internal rhyme21 in the names of Elvis Costello, Tears for Fears and Twisted22 Sister.

---

1just - (in this case) simply
2to look through - examine, look over
3lyrics - words to a song
4assuming - (in this case) I imagine
5even (emphatic) believe it or not, surprisingly
6idiom - (false friend) expression, set phrase
7pun (C) - a piece of homophonous wordplay
8punning (U) - homophonous wordplay
9misphering - incorrect orthography
10gently - not aggressively
11ant -
12to allow - permit, enable
13to deem - consider
14euphony - (in this case) the repetition of sounds in consecutive stressed syllables for mnemonic effect
15a respelling of 'biscuit'
16assonance - repetition of the vowel sound in consecutive stressed syllables
17Nine-Inch - 22.86cm
18nail -
19alliteration - repetition of the consonant sound at the beginning of consecutive stressed syllables
20indeed - (emphatic) in fact
21internal rhyme - the repetition of the vowel and final consonant sound at the beginning of consecutive stressed syllables
22twisted - (in this case) perverted
Band Names: Tributes and Idioms

Doing Homage
The most obvious example of punning is, of course, The Beatles, whose name combines the idea of a (drum) beat and the insects beetles. However, it is also an insectal tribute to the band Buddy Holly and the Crickets. There may also have been a reference to the motorbike gang - the Beatles - in the movie The Wild One (1953) starring Marlon Brando.

In 1960, when the band was known as ‘The Silver Beetles’, Paul McCartney briefly changed his name to ‘Paul Ramon’. This inspired Beatles fan Douglas Colvin to change his name to ‘Dee Dee Ramone’ and when he formed his own band in 1974 he called them The Ramones /ˈræmənз/. The ‘Dee Dee’ (i.e. D.D.) comes from the nickname of the character Dan ‘Dynamite Dick’ Clifton in the movie The Cimarron Kid (1952)

The assonant name of The Rolling Stones was, by the way, another tribute - this time to the Muddy Waters song Rollin’ Stone (1950).

James Osterberg got his stage name, Iggy Pop, from the name of his high-school band, The Iguanas. Meanwhile, the stage name of Stefani Germanotta, Lady Gaga, is a tribute to Queen’s song ‘Radio Gaga’.

Idiomatic Bands
The name of The Rolling Stones (and the Muddy Waters song) comes from the expression “a rolling stone gathers no moss”. This is an example of another trend in pop-group names - taking part of a well-known idiom as the band’s name. A good example is Dire Straits /ˈstreɪts/. Their name comes from the expression ‘to be in dire straits’, which means to be in a desperate situation. A further example comes from Australia in the form of Midnight Oil. ‘To burn the midnight oil’ means to work late into the night.

A more complicated reference to an idiom is found in the assonant name of Led Zeppelin. Like Dire Straits, the name suggests the band’s initial probabilities of success. Someone had said that they would go down like a lead balloon. They changed the ‘balloon’ to ‘zeppelin’ because it would sound more exotic, and changed the ‘lead’ to ‘led’ to ensure that nobody pronounced it /lid/. ‘Led’ is also a reference to LZ-129 Hindenburg, the zeppelin that famously exploded in 1937.
Band Names: 
Rebus & Science

Rebus\(^1\) Rocks
Several groups have names based on rebus\(^1\). A classic example is INXS, which should be pronounced ‘in X-S’ (i.e. in excess). The wordplay in the name of this Australian band inspired that of U2, pronounced like ‘you too’, which is meant to\(^2\) sound inclusive. While on the subject of that Irish band, their singer (Paul Hewson) got his stage name\(^3\), Bono (Vox) from the name of a hearing-aid\(^4\) shop in Dublin: Bonavox\(^5\).

Rebus is also behind the name of the English band XTC, which sounds (a bit) like ‘ecstasy’. Simpler wordplay can be found in the artistic name of rapper Tracy Marrow, Ice-T is a homophone of ‘iced tea’, ice being the ultimate\(^6\) ‘cool’ substance with ‘T’ for ‘Tracy’.

History Lessons
A number of groups have historically inspired names. New Model Army took their name from Cromwell’s republican army in the English Civil War. Similarly, The Levellers name comes from the same period and refers to a republican faction. Iron Maiden’s name is more mediaeval in its inspiration referring to a torture device\(^7\) that was basically a coffin\(^8\) full of spikes\(^9\). The name of Joy Division is even more\(^10\) offensive: it comes from the prostitution wing\(^11\) (Freudenabteilung) in Nazi concentration camps, as described in the book House of Dolls (1955).

Science Lesson
Other bands have taken their names from science. The name of Eurythmics originally referred to a system of training\(^12\) through physical movement to music. REM\(^13\) (pronounced /a: ri: em/) comes from the period of rapid eye movement during dream sleep.

However, pop music can also be detrimental to science. Halley’s comet should be pronounced /ˈhæliz komit/. However, when Bill Haley /ˈheili/ formed a band in 1953 he punned on\(^13\) his surname calling the line-up\(^14\) Bill Haley and the Comets. As a result, many native speakers now mispronounce the comet’s name as /ˈheiliz komit/!

Conclusions
Here we have mentioned just a few of the thousands of pop-group names that exist. The point\(^15\) is that you should investigate the English words you come across\(^16\) in your life. This is just one part of the general process of incorporating English as a natural part of your everyday routine.

---

\(^1\) rebus - type of wordplay in which letters are pronounced according to their names in English (so ‘DV8’ represents ‘deviate’)

\(^2\) to be meant to - be supposed to

\(^3\) stage name - invented name used by a performer

\(^4\) hearing aid - apparatus used by partially deaf people to amplify sound

\(^5\) bona vox means ‘good voice’ in Latin

\(^6\) ultimate /’ʌltim ət/ - (false friend) definitive, quintessential

\(^7\) device - instrument, implement

\(^8\) coffin -

\(^9\) spike - pointed projection, stake

\(^10\) even more - (emphatic) more

\(^11\) wing - (in this case) section

\(^12\) training - preparation, practice

\(^13\) to pun on - create wordplay using

\(^14\) line-up - band, group

\(^15\) point - (in this case) crucial idea

\(^16\) to come across (come-came-come) - encounter
Nicknames of Famous Music

Popular compositions often have nicknames. This jargon is essential if you want to talk about classical music with Anglos:

Beethoven
Appassionata - Piano Sonata no. 23 in F minor (1804-5)
Archduke Trio - Trio in B flat for piano, violin and cello (1810-11)
Battle Symphony - Op 91 (1813)
Eroica Symphony - Symph. No. 3 (1803-4)
Hammerklavier Sonata - Piano sonata No. 29 in B flat, Op 106 (1817)
Pastoral Symphony - Symph. No. 6 in F major, Op 68 (1808)
Pathétique Sonata - Piano Sonata No. 8 in C minor, Op 13 (1797)
Razumovsky Quartets - String Quartets Op 59 Nos. 1, 2 and 3 in F major, E minor and C major (1805-6)

Haydn /ˈhaɪdn/ Creation Mass - Symph. No. 13 in F major (1801)
Drumroll Symphony - Symph. No. 103 in E flat major (1795)

Emperor’s Hymn to Austria - hymn (1797)
Emperor Quartet - String Quartet in C major Op 76 No. 3 (1797)
Farewell Symphony - Symph. No. 45 in F minor (1722)
Frog Quartet - String Quartet in D, Op 50 No. 6 (1787)
Horn Signal Symphony - Symph. No. 22 in E flat major (1764)
Razor Quartet - String Quartet in D major, Op 64 No. 5 (1790)
London Symphony - Symph. No. 104 in D major (1795)
Military Symphony - Symph. No. 100 in G major (1793)
Miracle Symphony - Symph. No. 96 in D major (1791)
Surprise Symphony - Symph. No. 94 in G major (1791)

1 jargon - in-group terminology, specialized vocabulary
2 dedicated to Archduke Rudolph of Austria, one of Beethoven’s piano pupils
3 flat - a semitone lower than a specified note (opposite of ‘sharp’)
4 referring to Wellington’s victory over Napoleon at Vittoria (1813)
5 Hammerklavier is simply the formal German word for a piano
6 string quartet - music for 2 violins, a viola and a cello
7 Mass - (in this case) musical setting of parts of the liturgy used in the Eucharist
8 so-called because it opens with a roll (= a rapid succession of beats, often used to introduce an announcement or event) on the kettledrum
9 referring to the Holy Roman Emperor and King of Austria, Francis II
10 hymn /ˈhɪm/ - (false friend) religious song
11 referring to the fact that it is a set of variations on the Emperor’s Hymn
12 farewell /ˈfeɪwel/ - goodbye
13 frog - (in this case) metal wind instruments (e.g. trumpets)
14 razor - so-called because it was admired by Queen Marie Antoinette of France
15 lark - (Alaudidae) species of passerine songbird
Nicknames of Famous Music (2)

Handel

The Dead March in Saul
- the funeral march from Handel's oratorio Saul (1739)

The Hallelujah Chorus
- the final movement of Part 2 of Handel's Messiah /ˈmɛsəla/

The Harmonious Blacksmith¹
- Harpsichord² Suite³ No. 5 in E (1720)

Mozart

Coronation⁴ Mass⁵
- Mass in C, K 317 (1779)

Haydn⁶ /ˈhaidən/ Quartets
- six string quartets⁷ (1782-85)

Jupiter Symphony
- Symph. No. 41 in C major, K 551 (1788)

Paris⁸ Symphony
- Symph. No. 31 in D major, K 297 (1778)

Prague⁹ Symphony
- Symph. No. 38 in D major, K 504 (1786)

Tchaikovsky

Nutcracker Suite³
- Suite³ Op 71a (1892)

Pathetic Symphony
- Symph. No. 6 in B minor, Op 4 (1893)

Little Russian¹⁰ Symphony
- Symph. No. 2 in C major, Op 17 (1872)

Mendelssohn

Italian Symphony
- Symph. No. 4 in A major (1833)

Reformation¹¹ Symphony
- Symph. No. 5 in D major, Op 107 (1832)

Spring Song
- Song Without¹² Words No. 30 (Op 62) in A major (1845)

Scottish Symphony
- Symph. No. 3 in a minor, Op 56 (1830-42)

Other Composers

New World Symphony
- Dvorák's Symph. No. 9 in E minor, Op 95 (1893)

Resurrection Symphony
- Mahler’s Symph. No. 2 in C minor (1888-94)

Rhenish Symphony
- Schumann's Symph. No. 3 in E flat¹³ major, Op 97 (1850)

Sea Symphony
- Vaughan /vɔːn/ Williams’ 1st Symph. (1903-09)

Tragic Symphony
- Schubert’s Symph. No. 4 in C minor (1816)

Unfinished Symphony
- Schubert’s Symph. No. 8 in B minor (1822)

¹blacksmith - sb. who makes ferrous objects (e.g. horse-shoes) by hand
²harpsichord - keyboard instrument that was the predecessor to the piano
³suite /swiːt/ - set of instrumental compositions played in succession
⁴referring to the annual coronation of the statue of the Virgin in a church near Salzburg
⁵Mass - (in this case) musical setting of parts of the liturgy used in the Eucharist
⁶so-called because Mozart dedicated them to Haydn
⁷string quartet - music for 2 violins, a viola and a cello
⁸referring to the fact that it was written and first performed in Paris
⁹referring to the fact that it was written in the Czech capital
¹⁰the symphony contains folk tunes from the Ukraine (known as ‘Little Russia’)
¹¹so-called because it commemorated 300 years of Lutheranism
¹²without - with no
¹³flat - a semitone lower than a specified note
Musical False Friends

The following words can cause problems:

» A conductor /ˈkʌn.dəˌktaʊ/ This is the person who directs an orchestra /ˈɔːˌkɪstrə/ (notice the spelling and pronunciation: orchestra) not a motorist:
- Many composers were also directors conductors.

» A battery This is a device for storing energy; never a drum kit:
- What’s the name of the Stones’ battery drummer?

» An accordion This is the name of the musical instrument (but notice the stress on the second syllable /əˈkɔːrdiən/ and the spelling (it isn’t accordion). However, figuratively we refer to a concertina when we talk about something that collapses in on itself:
- The car had concertinaed against the wall.

» A concertina A concertina is a small accordion as you would expect. However, notice that we don’t use ‘concertina’ to describe razor wire:
- There was a concertina razor wire along the top of the border fence.

» A compass /ˈkæmpəs/ This is a device that shows you in which direction north is. It is also the full range of one’s singing voice. It is not the beat of a song.

» A hymn /hɪm/ A religious song, not a national anthem.

» lyric(s) Outside the context of poetry ‘lyric’ has lost its connection with poetry. Lyrics are the words to a pop song and ‘a lyric’ is used colloquially for a phrase in a pop song:
- I first heard that expression in the words lyrics of a Beatles song.

» flute This is the metal instrument you play from the side. It is not a recorder.

» A bazooka You may be surprised to learn that the tubular anti-tank rocket launcher is named after a simple US musical instrument. A bazooka was originally a kazoo shaped like a trumpet.

Abbreviations
If you want to abbreviate the name of the musical genre ‘heavy metal’, it’s ‘metal’ (not ‘heavy’). Similarly, the abbreviation of the Rolling Stones is ‘the Stones’, not ‘the Rolling(s)’.

1 motorist - (false friend) driver of a car
2 device - appliance, (in this case) cell
3 to store - accumulate
4 drum kit - −
5 border fence - barrier at a frontier
6 device - (in this case) mechanism, gadget
7 recorder - −
8 the surprising name of this musical instrument refers to a mediaeval usage

of ‘record’ meaning ‘practise’
9 to name A after B (UK English) - name A for B (US English), call A B because of their similarity
10 kazoo - simple instrument consisting of a tube covered at one end with a thin surface that vibrates to make a buzzing sound
11 shaped like - in the form of
Musical Phrasal Verbs

It’s hard¹ to understand the phrasal verbs that come from the world of music without a little explanation.

» **harp on** *(about)*
  = talk or **complain**² about sth. or sb. in an annoyingly repetitive way. The expression was originally ‘to harp on the same **string**³’, which meant to play the same note again and again on a **harp**⁴. This is quite a formal/poetic phrasal verb. A more informal alternative is ‘to go on about’ [go-went-gone]:
  - The teacher is always harping on about correct pronunciation but I **figure**⁵ so long as people understand me, that’s enough.
  - He’s always harping on my mistakes. I never receive any **encouragement**⁶.

» **chime in**
  = interrupt, interject a comment. The remark tends to be enthusiastic. This is quite a formal/poetic phrasal verb. A more informal alternative is ‘to chip in’.
  - "I’d really, really want to go to the zoo, too", the little girl **chimed in**.
  - Feel free to **chime in** whenever you like if you’ve got something to add.

» **chime** *(in)* **with**
  = combine harmoniously with. The allusion here is to church bells chiming together harmoniously:
  - His ideas on **self-reliance**¹⁰ don’t really **chime** *(in)* with the philosophy of the school.

» **drum sth. into sb.**
  = teach sth. to sb. using frequent repetition. The allusion, presumably is to the repetitive nature of a **drum**¹¹ beat:
  - He drummed the **times table**¹² into the children so that they would not forget what **eight sevens**¹³ were as long as they lived.

» **drum sth. up**
  = attract people’s attention in order to **achieve**¹⁴ sth. The allusion is to a **recruiting sergeant**¹⁵ or a travelling salesman beating a drum to attract people’s attention:
  - The party will need to **drum up** more **support**¹⁶ **among**¹⁷ small businesses if they are going to have any **chance**¹⁸ of winning the elections.

» **drum sb. out**
  = (publicly) **dismiss**¹⁹ sb. in disgrace. The allusion is again military referring to the formal slow drumming played as an officer **was stripped of**²⁰ his regimental insignia:
  - He was drummed out of the school for hitting a pupil. He was lucky the parents didn’t **press charges**²¹.

---

¹ hard - (in this case) difficult
² complain - protest, object
³ string - cord on a musical instrument
⁴ harp -
⁵ to figure - think, conclude, reckon
⁶ encouragement - motivating comments
⁷ to strike - (strike-struck-struck) - hit
⁸ bell -
⁹ to add - (in this case) contribute
¹⁰ self-reliance - self-sufficiency, emotional independence
¹¹ drum -
¹² times table - multiplication table
¹³ eight sevens - 8 x 7
¹⁴ to achieve - get, obtain
¹⁵ recruiting sergeant - military official who tries to find volunteers
¹⁶ support - backing, approval
¹⁷ among - amongst, (in this case) from
¹⁸ chance - possibility
¹⁹ to dismiss - sack, fire, expel
²⁰ to strip sb. of sth. - take sth. from sb.
²¹ to press charges - take legal action, sue
Learning
Idioms with
The Beatles
by Cristian Dopazzo

The words of the Fab Four have been heard more often than those of any other native English-speakers ever. The Beatles invented very few expressions, but popularized many around the world.

A chip on your shoulder (I’ll Cry Instead – A Hard Day’s Night, 1964)
= Feeling resentful and angry because you think you have been treated unfairly. John Lennon’s line “I’ve got a chip on my shoulder that’s bigger than my feet” is said to describe his true emotional state at the time when he seemed to hold a grudge against the world.

Through thick and thin (Another Girl – Help! 1965)
= under all circumstances. Paul McCartney seems to pride himself on his many dates in this song and tries to explain to his girlfriend that he has met another girl who, through thick and thin, will always love him.

Change one’s mind (Help – Help! 1965)
= make a different decision. John Lennon once said that Help was one of his truest songs. In this introspective song, he is no longer resentful. He has changed his mind and is now crying out for help.

Hide your head in the sand (Getting Better – Sergeant Pepper’s Lonely Hearts Club Band, 1967)
= Ignore an unpleasant situation. When you hide your head in the sand, you refuse to face unpleasant facts, just like ostriches supposedly do when they are in trouble.

Make the grade (A Day in the Life – Sergeant Pepper’s Lonely Hearts Club Band, 1967)
= succeed. This song is made up of unrelated newspaper stories John had read. In the first verse, he describes the misfortunes of a lucky man who had made the grade, but died in a car accident because he didn’t notice that the traffic lights had changed.

Helter-Skelter (The Beatles, 1968)
= in a chaotic and disorderly haste. In this loud rock-'n'-roll song, Paul describes the frenzy of going on the helter-skelter over and over again with the sole purpose of seeing the girl that he fancies. Unfortunately, Charles Manson interpreted the song as a coded message inciting violence and murder.

Blow someone’s mind (Because – Abbey Road, 1969)
= make someone hallucinate (literally or metaphorically). There is wordplay in the line “Because the wind is high, it blows my mind” as the term was used to describe the effect of some popular drugs in the 1960s.

1. Fabulous
2. Unfairly
3. To hold a grudge
4. To pride oneself
5. Date
6. To bury
7. Sand
8. To face
9. Ostrich
10. To succeed
11. To be made up of
12. Helter-skelter
13. Haste
14. Frenzy
15. To fancy sb
16. To be high

Photo by Ingen Uppgift
Learning Idioms with The Rolling Stones

We couldn’t have an article about The Beatles’ influence on world English without having another one on The Stones.

» **Have had your day** *(Under My Thumb)*
- Aftermath, 1966
= be less popular or influential than before. A domineering young man has his submissive girlfriend under his thumb.

» **Off your head** *(Let’s Spend the Night Together – UK Single, 1967)*
= mad or crazy or extremely drunk or severely under the influence of illegal drugs. The title itself was so outrageous that when the Stones played it on the Ed Sullivan Show, they had to sing “Let’s spend some time together”.

» **Go up in smoke** *(Angie - Goats Head Soup, 1973)*
= be ruined. In this ballad about lost love, Jagger’s regrets that all the dreams he shared with Angie seem to have all gone up in smoke.

» **Lose your shirt** *(Hang Fire – Tattoo You, 1981)*
= lose all your possessions. This surfer-style rock song takes a bleak look at the economic decline in Britain through the 1970s. People are described as idle, on the dole and some have even lost their shirt.

» **Drive sb. nuts** *(Mixed Emotions – Steel Wheels, 1989)*
= irritate somebody. This Stones’ classic seems to be about the ups and downs in a couple and the process of burying the hatchet. However, it may also refer to some long-standing quarrels that Keith and Mick have had.

» **Between a Rock and a Hard Place** *(Steel Wheels, 1989)*
The title refers to a situation where you are faced with two equally difficult or unpleasant alternatives. *Between the devil and the deep blue sea* has a similar meaning. In this song, Mick sings about the situation in our modern world of overpopulation, poverty and inequality.

» **Lick sb’s boots** *(Highwire - Flashpoint, 1991)*
= to be excessively obsequious towards someone important because you want to please them. In this overtly political song released during the Persian Gulf War, the Stones criticize those politicians who lick certain dictators’ boots and then end up asking insistently for their annihilation.

» **Pour out your heart** *(Out of Tears – Voodoo Lounge, 1994)*
= tell someone your secret feelings and things that worry you. This is a beautiful sad song about a man who confesses that he has run out of tears. Even though he will feel hurt inside when his woman leaves him, he will endure the pain and will not pour his heart out to anyone.
Music Expressions: On the Fiddle

‘Music’ Expressions

» to be music to one’s ears
= be sth. that it is very gratifying to hear or discover:
- News of the elimination of his key rival from the tournament was music to his ears.

» to face the music
= be confronted with the unpleasant consequences of your actions, accept criticism and/or punishment for what you have done:
- He decided to face the music and make himself available to any journalist who wanted to speak to him rather than hide and hope the scandal would go away.

Fiddle Expressions

A fiddle (/ˈfidəl/) is a violin, especially when it is not used for playing classical music.

» to be as fit as a fiddle
= be in excellent health:
- He spent 40 years working down a coal mine but miraculously he seems to be as fit as a fiddle.

» to play second fiddle to sb.
= take a subordinate role in an activity:
- I’m sick of playing second fiddle to an idiot. I’m going to start my own company.

» to fiddle while Rome burns
= be worried about relatively trivial matters while ignoring the serious or disastrous events going on around you. The allusion is to Nero singing ‘The Sack of Ilium’ while part of Rome burned in 64CE. He may have played the lyre to accompany his song, but the violin hadn’t been invented yet, so he certainly didn’t fiddle.

» to hang up your fiddle (US English)
= retire from business:
- Now you’ve hung up your fiddle you’ll have more time for your golf, I suppose.

» to hang up your fiddle when you come home (US English)
= cease to be cheerful and entertaining when you are in the company of your family:
- Her father seems to be the life and soul of the party but apparently he hangs up his fiddle when he comes home. In fact, she says he’s in a filthy mood most of the time.

» to have a face as long as a fiddle =
» to have a face like a fiddle
= have a dismal expression:
- I spent the afternoon sitting with your grandmother, her face as long as a fiddle, saying nothing. How was your day?

---

1key (adj.) – principal, primary
2tournament – competition, championship
3punishment – disciplining, penalization
4rather than – instead of (+ -ing), as opposed to (+ -ing)
5to hide (hide-hid-hidden) – conceal oneself, remain out of sight
6coal mine – place where coal (= pieces of carbon) are extracted from underground
7matter – problem, question
8sack – (in this case) destruction
9Ilium – Troy. The Iliad is the story of Troy
10cheerful – happy and optimistic, positive
11to be the life and soul of the party – sb. who is fun and exciting to be with
12to be in a filthy mood – be in a bad temper, be very irritable
13dismal – depressed, disconsolate, melancholy
Trumpet & Drum Expressions

Trumpets

» to blow your own trumpet [blow-blew-blown]
= talk boastfully¹ about your own achievements². In US English the expression is ‘blow your own horn³’. The allusion is to heralds who used to announce the arrival of a knight⁴ with a fanfare:
- You have to blow your own trumpet at a job interview otherwise⁵ they won’t even consider you.

» to trumpet sth.
= tell people about sth. you are proud of (especially when you do it in an annoying way):
- They are trumpeting the fact that they have created a new version of the software but the changes seem to be only superficial.

Drums

» to beat the drum for sb. [beat-beat-beaten]
= ostentatiously support⁶ sb., campaign noisily for sb.:
- The actress plans to beat the drum for the Labour Party in the upcoming elections.

» to drum sth. home
= repeat sth. many times so that everyone understands:
- They’ve been using an advertising campaign full of shocking images to drum home the idea that it’s dangerous to talk on your mobile while you’re driving.

» march to (the beat of) a different drum(mer)
= be unconventional, consciously adopt a different attitude to the majority of people:
- Since they went to art school Jane and Martha are marching to a different drum. They don’t associate with us anymore!

¹boastfully - proudly, with pride, arrogantly
²achievement - accomplishment, triumph, success
³horn - type of trumpet
⁴knight - (historical) nobleman who fights on a horse
⁵otherwise - if not
⁶undue - inappropriate, unnecessary
⁷to put sb. off sth. - cause sb. not to be interested in sth.
⁸subject - academic discipline, (in this case) history
⁹nowadays - these days
¹⁰to support - back, defend, follow
Other Musical Expressions

» **to play sth. by ear**
  = a. perform music without reading the **score**: b. proceed instinctively according to results and circumstances **rather than** following a plan:
  - Everything depends on **whether** our flight is **delayed** or not, so let’s just play it by ear.

**Keyboard Expressions**

» **to soft-pedal**
  = act in a moderate way, make sth. seem less important or urgent than it really is. The soft pedal on a piano reduces the volume:
  - The presidential candidates both soft-pedalled the seriousness of the financial crisis.

**Tune Expressions**

» **he who pays the piper calls the tune**
  = the person who has paid for an enterprise can expect to be in control of it. From this we get the expression:
  » **to call the tune**
  = impose one’s **will**. An alternative form is ‘call the shots’:
  - You’d better do what she says. She’s paying for the course so she has a right to call the tune/shots.

» **to strike the right note**
  = ‘behave’ in a way that is **suitable** to the occasion:
  - Speaking at a funeral can be incredibly **hard**. You have to strike the right note; being **uplifting** without being **glib**.

» **to be in tune with sb.**
  = to understand sb. well:
  - The political party was in tune with the public mood in the country.

» **to the tune of ____**
  = to the excessive **amount** of ____:
  - They receive a state subsidy to the tune of €1 million a year.

---

1 **score** - (in this case) written representation of music
2 **rather than** - instead of, as opposed to
3 **whether** - ‘if’ (but ‘if’ cannot be used after a preposition)
4 **delay sth.** - postpone sth., hold sth. up
5 **piper** - sb. who plays a flute-like instrument or the bagpipes
6 **one’s will** - what you want, one’s desires
7 **to behave** - act
8 **suitable** - appropriate
9 **hard** - (in this case) difficult
10 **uplifting** - inspiring, heartening
11 **glib** - insincere, superficial
12 **amount** - quantity
The Curious Origins of Musical Terms

Whose Horns?
Bizarrely, there is a type of alto oboe /ˈouboʊ/ that is typically referred to as the cor anglais /ˈkɔr ənɡleɪ/ in English. This, despite the fact that it isn’t a horn, it’s a woodwind instrument and, if it’s anglais, then why the hell don’t we always call it ‘the English horn’? The instrument originally comes from Silesia on the German-Polish border, where it was called the engelisches Horn (= angelic wind instrument). The linguistically challenged French translated this as le cor anglais instead of le bois angélique. The even more linguistically challenged English didn’t even bother to translate the name! And, since you ask, no the French don’t call the French horn le French horn; they call it le cor d’harmonie.

Ukulele /juˈkeɪli/ The ukulele was originally a Portuguese braguinha, which was brought to Hawaii by settlers from Madeira. The Hawaiian term means ‘jumping flea’. This was either the local nickname for British officer Edward Purvis, an early ukulele enthusiast, or simply a comment on the rapid finger movements over the strings.

Jukebox
This is a word that causes problems for Anglos, who sometimes misspell it ‘jutebox’ or even ‘dukebox’. The word ‘juke’ comes from Gullah, a West African creole spoken by black people on the coast and islands of South Carolina. Juke means ‘wicked’ or ‘disorderly’ in Gullah. The word was applied to cheap roadhouses and brothels. When these establishments began to acquire coin-operated record players in the 1930s, the new music machines began to be called ‘jukeboxes’.

Jazz
Incidentally, one theory about the origin of the word ‘jazz’ is that it originally meant ‘sex’ in African-American slang. In other words ‘jazz music’ was music played in low dance halls and brothels.
If ever a life was far from boring, it was John Steinbeck’s. In the 66 years of his existence he went through every possible change imaginable, both in his private as in his professional life. He was divorced twice\(^1\), he moved\(^2\) and travelled more often than a circus and he went from total obscurity as a writer to worldwide fame. But there was one constant element in each day that kept him sane\(^3\): his desire to write.

**The Aspiring Writer**

Born on 27 February, 1902 in Salinas, California, John Steinbeck had it as easy and as difficult as your average\(^4\) aspiring writer. His parents\(^5\) were neither rich nor poor and although initially not happy with the idea of a writing career\(^7\), they left him enough room\(^8\) for independence. In order to support himself\(^9\) and gain experience he took odd jobs\(^10\), one of which consisted of working as a tour guide and caretaker\(^11\) at Lake Tahoe. During that period he wrote his first novel *Cup of Gold* and met his first wife, Carol Henning.

Whereas\(^12\) the marriage was relatively successful\(^13\) in the beginning, the sales of the early novels such as *The Pastures of Heaven* and *To a God Unknown* were not. Long years passed in which Steinbeck kept on\(^14\) writing without any sort of critical\(^15\) or financial recompense. A change came with the publication of *Tortilla Flat* in 1935, the novel that won him the Gold Medal of the California Commonwealth Club. It proved to be the beginning of a series of books that established his position as a great writer.

**The Grapes of Wrath**

The most impressive of these novels is without a doubt *The Grapes*\(^16\) of Wrath\(^17\). The title was taken from *The Battle Hymn of the Republic* by Julia Ward Howe and referred to a passage from the Bible about divine justice and deliverance\(^18\) from oppression. In four words, it captured the essence of a story depicting\(^19\) the abominable conditions of migrant farmers during the Great Depression and *The Dustbowl*\(^20\).
The Grapes of Wrath was received with great acclaim and even greater disapproval. While it won several awards, such as the Pulitzer Prize, the novel was also banned and vilified, mainly by Californian farmers who felt themselves unjustly portrayed, but also by libraries and literary critics who thought the language was vulgar and the scenes brutal. Subsequent work received even worse reviews. So when he won the Nobel Prize in 1962, many critics disagreed and Time Magazine published an article expressing its indignation. After The Grapes, however, Steinbeck’s reputation as a writer was established. His books never failed to sell and many were adapted for film. Fame became an established member of his household, opening as many doors for him as it closed.

In Love & War
A friend of politicians, actors and producers, Steinbeck tried hard to be true to himself. It wasn’t easy. As his importance grew, he had the feeling that he was less and less in control of his own decisions and when he went to Europe as a correspondent for the New York Herald Tribune in World War Two, he took a certain perverse pleasure in the risk. Things did not improve upon his return. In 1948, one of his best friends, Ed Ricketts, died in an accident and his second marriage to Gwendo-lyn Conger came to an end. In the months following the divorce, Steinbeck hit rock bottom. It took a strong, independent Texan like Elaine Scott Anderson to pull him out of this depression and his marriage to her, the third and final one, cured many of his ills.

East of Eden
In 1952, his last great novel East of Eden was published. He said that “Always before I held something back for later. Nothing is held back here.” The same could be said for the last years of his life. Even when his body began to falter, he wrote more novels, visited Europe and Russia, and in the last year before his death he worked as a war reporter in Vietnam. In between strokes he mentioned that he would rather have a full life than a long one. He got his wish dying of heart failure in 1968 aged 66.
Imran Khan
by Colman Keane

The Oxford Blue
The suave\(^1\), charismatic and fearless\(^2\) Imran Khan is without doubt one of the finest ever cricketers in the history of that sport and, very possibly, the second greatest cricketer (behind Garry Sobers) of all time. More than anyone else, the lithe\(^3\) Pakistani heartthrob\(^4\) made cricket popular. Such was his personal charisma that millions who knew next to nothing about this most Anglo of sports began to follow the fascinating career\(^5\) of the Lahore-born golden boy who, oozing talent from every pore\(^6\), would take the cricket world by storm\(^7\) and in the process become an iconic figure. Imran, who was born in 1952 into an upper-middle class Punjabi-speaking family, received a top-class education. It was while\(^8\) attending\(^9\) Aitchison College (the ‘Eton’ of\(^10\) Pakistan) and later Royal Grammar School\(^11\) in Worcester that Imran began to excel at cricket and it came as no surprise that while studying Political Science and Economics at Keble College he became in 1973 an Oxford cricket blue\(^12\).

Although Imran was selected to play in his Test debut\(^13\) against England in 1971, it was a lacklustre\(^14\) performance by the raw\(^15\), 18-year-old cricketer.

Imran Finds his Form\(^16\)
It would not be until 1976 that Imran Khan would establish himself at the highest level. That season, the man from Lahore laid claim to being\(^17\) more than just\(^18\) a permanent fixture on\(^19\) the Pakistani team by taking four wickets\(^20\) in an innings\(^21\) and making half a century\(^22\) against New Zealand. Later that same season\(^23\) Imran took five wickets\(^20\) in the second innings\(^21\) of the second Test\(^24\) against the Aussies\(^25\) before taking a staggering\(^26\) 12 wickets\(^20\) in Sydney just\(^27\) one week later. Then he took 25 wickets\(^20\) against the West Indies\(^28\) in the Caribbean.

\(^1\)suave - (false friend) sophisticated, gentlemanly
\(^2\)fearless - valiant, courageous
\(^3\)lithe /laiθ/ - agile, acrobatic
\(^4\)heartthrob - idol, attractive celebrity
\(^5\)career - (false friend) professional trajectory
\(^6\)oozing talent from every pore - being very talented
\(^7\)to take swh. by storm (take-took-taken) - (in this case) quickly conquer, rapidly dominate
\(^8\)while - (in this case) during the time that he was
\(^9\)attending - (in this case) studying at
\(^10\)the Eton of - the most elite school in
\(^11\)grammar school - (UK historical) state secondary school for more intelligent children
\(^12\)Oxford cricket blue - sb. who has represented Oxford University in a cricket match against Cambridge University
\(^13\)Test debut - first international cricket match
\(^14\)lacklustre - uninspired and uninspiring
\(^15\)raw - (in this case) inexperienced
\(^16\)to find one’s form (find-found-found) - begin to play at one’s optimal ability
\(^17\)to lay claim to being (lay-laid-laid) - demonstrate that one is just - (in this case) simply
\(^18\)fixture on - (in this case) member of
\(^19\)to take X wickets /wikits/ (take-took-taken) - eliminate X batsmen
\(^20\)innings - quarter of a match, one of the two occasions in a Test match in which a team tries to score runs (= points) before they are eliminated
\(^21\)to make half a century (make-made-made) - score 50 runs (= points)
\(^22\)season - period of several months in the year in which cricket is played
\(^23\)Test (match) - 5-day cricket match between two national teams
\(^24\)Aussies - (colloquial) Australians
\(^25\)staggering - impressive
\(^26\)just - (in this case) only
\(^27\)all the English-speaking countries in the Caribbean unite to form a single ‘supra-national’ team known as ‘the West Indies’
Captain Khan

The World Series
In 1977 Imran joined World Series Cricket where he rubbed shoulders with the likes of Lillee, Roberts, Holding and Garner. By 1982, Imran had not only become in the words of Richie Benaud “an exceptional bowler, a bowler with genuine pace, but was turning into a batsman who could play all types of innings.”

Captaincy
That very year Imran, by now approaching his peak, decimated Sri Lanka, taking an unbelievable 8 for 58 and 6 for 58, still the best-ever match statistics for a Pakistani bowler. That summer Imran took over the captaincy of the national team from Javed Miandad and went on to become Pakistan’s greatest captain. He imbued his teammates with confidence and led Pakistan with vision and authority. Graham Thorpe felt that Imran “brought to a flamboyant Pakistani team real discipline and an edge while at the same time allowing them to express their natural talent.”

1 to rub shoulders with - interact with
2 the likes of - people like
3 Dennis Lillee (1949-) A highly popular Australian fast bowler who took 355 wickets in Test cricket.
4 Andy Roberts (1951-) A West-Indian cricketer; he played for Hampshire and Leicestershire - famous for his devastating bowling.
5 Michael Holding (1954-) This West-Indian bowler holds the record for best bowling figures (14/149).
6 Joel Garner (1952-) This West-Indian bowler destroyed opposing batting line-ups (= ordered sequence of batsmen).
7 Richie Benaud (1930-) A former Australian cricketer who is now regarded as a top-class commentator on the game.
8 bowler - cricketer who bowls (= throws) the ball in the direction of the batsman/batswoman.
9 bowler with genuine pace - really fast bowler.
10 to turn into - become
11 batsman - →
12 to play all types of innings - be able to bat aggressively and defensively.
13 that very year - (emphatic) the same year
14 peak - zenith, apoee
15 to decimate sb. - (in this case) triumph decisively over sb.
16 8 for 58 - eliminating 8 batsmen while conceding only 58 runs (= points)
17 to take over the captaincy (take-took-taken) - become captain
18 to go on to become (go-went-gone) - proceed to become, become in the end
19 teammate - colleague in one’s team
20 to imbue sb. with - fill sb. with, inspire sb. to
21 confidence - belief in oneself, fortitude
22 to lead (lead-led-led) - captain, direct
24 flamboyant - exuberant, energetic
25 edge - (in this case) effectiveness
26 to allow - permit, enable
The World-Beater

Such was Imran Khan’s extraordinary presence that he managed to turn a motley crew of undisciplined players into world-beaters. In the three-Test series in England in 1982 Imran was a revelation and led his men to a great victory over England at Lord’s in the second Test, Pakistan’s first victory over their former colonial masters since 1954. This victory was a great shot in the arm for cricket in the Subcontinent. As the fantastic Pakistani left-handed fast bowler Wasim Akram has noted “Imran genuinely believed that Pakistan could beat anyone”. Michael Holding feels that over the years Pakistan had turned out many great cricketers but very few great teams because of lack of leadership. He argues that it was the man from Lahore, with his extraordinary leadership qualities, who changed that. In 1990, Imran from Lahore, who was one of the greatest all-rounders of his generation and boasted a sense of, depicted brilliantly in his batting. In the second innings, in a superb three-Test series against the West Indies, Imran led Pakistan to an historic Test-series victory over England in 1982. Imran was a revelation and had a joyous time batting at Lord’s. He produced a superb spell of 6/14 from 10 overs in a one-day international match against India at the Sharjah Cricket Association Stadium. Two seasons later a sensational Imran Pakistan to yet another sweet victory over England. In the last Test match he scored an imperious 118 in what he had decided would be his last Test match. Not surprisingly, all Pakistanis were bitterly disappointed and there was an ensuing clamour for his return. After all, Pakistanis argued, he was together with Botham, Hadlee and Kapil Dev one of the great all-rounders of his generation and felt he still had some sparkling cricket left to show off. The following year he made a glamorous comeback in a superb three-Test series against the fabulous West Indies. Pakistan was the only team in the world which could compete with the Caribbean outfit and Imran had the satisfaction of knowing that Pakistan had drawn all three Test series against the West Indies in the 1980s, a time when the rest of the world could not hold a candle against them.
Imran Khan ended his extraordinary career on a superb high note by leading Pakistan to a great victory in the World Cup against England in Australia, taking the very last wicket himself.

The Reformer
Since Imran left the crease, he has turned his back on the world of sport and has become a tireless worker for charity and a champion of the poor and underprivileged. Perhaps his greatest achievement was founding a cutting-edge cancer hospital for the poor in Lahore; the first of its kind in Pakistan. Against all the odds, the hospital opened in 1994 and has gone from strength to strength to become the biggest charitable institution in the country. It continues today to treat a minimum of 65 percent of its patients for free with another 10 percent paying only a small fraction of the cost. In an effort to break the stranglehold career politicians and political dynasties have in Pakistan, Imran set up his own political party, Tehreek-e-Insaf (Pakistan Movement for Justice) an anti-status movement, in 1996.

Imran Khan offers an alternative liberal option in Pakistan. He opposes military solutions to the Pakistani Taliban and for the Kashmir conflict with India, favouring negotiations in each case. He opposes US drone attacks in Pakistan. For many people he is the only option to prevent his country becoming another failed state – one with 200 million people and nuclear weapons.

Although he has not got into power, it would be premature and foolish to write off a man who, with his great leadership qualities, is simply a colossal figure in any field. He is immensely popular and considered the main opposition leader to the ruling Pakistan Muslim League. However, politics is a high risk profession in Pakistan and Khan’s life has been threatened both by the Taliban (because he is a ‘liberal’) and by the Muslim League.
The ‘Red’ Penns

by Marina Carresi

A Dirty Little Red
Leo Penn (1921-98) was in the Eight Air Force, stationed in England and flew 31 missions over occupied Europe in World War Two. Home on leave, he was invited to do a play at UCLA and then, out of the blue he was called by Paramount Pictures to do a screen test. He spent the last part of the war in the Air-force Motion Picture Unit.

During his early years as an actor he worked in the theatre, on the radio and did a movie. However, his career was dramatically cut short just when he was about to be cast opposite Gregory Peck in the movie The Gunfighter (1950). He found out from a friend in production that he had been blacklisted. The HUAC blacklisted him even though he was a Democrat and had never been a Communist; he was considered a “dirty little red” simply because some of his friends were Communists. In any case, he wasn’t going to do the picture. His agent advised him not to fight and go to New York, which he wisely did.

Sean’s mother, Eileen Ryan, wanted to be an actress but her mother forced her to study. After school she took a test to qualify as a registered nurse. She was in the top 10 out of 10,000 people who took the exam. However, she then told her mother, “OK, I’ve shown you I could be a nurse, but I’m going to NYU, I’m going to take all of the drama courses, and I’m going to be an actress.”

Leo and Eileen met in 1957 when they both worked in The Iceman Cometh. He had been married, didn’t have any children and was in a process of divorce; Eileen was 30 years old. Life was tough. In 1958 the blacklist still affected Leo, and Eileen had to go back to work five days after giving birth to their first son, Michael. The family went to Hollywood to try again but things weren’t easy given that Leo was still blacklisted. Soon he realized that if he wanted to work, he would have to betray his friends and “give names”. He didn’t. Finally, Eileen was cast to do a movie with Burt Lancaster; her acting dream come true. Nevertheless, she turned it down; she was pregnant again and didn’t want to be “mommy sometime.”

Sean was born 17th August 1960 in Burbank. In 1962 Leo was 40 and had to consider other options to support his family, so he start working first as a script-writer for TV and later as a TV director.

---

1. the family surname was originally ‘Piñón’ suggesting Sephardic ancestry.
2. home on leave - (in this case) in the USA on vacation from the war
3. out of the blue - unexpectedly
4. screen test - movie audition
5. career - (false friend) professional trajectory
6. to be about to - be going to... imminently
7. HUAC - House Un-American Activities Committee
8. to advise - caution, recommend
9. wisely - prudently
10. registered nurse - qualified doctor’s assistant
11. out of - (in this case) of
12. NYU - New York University
13. drama - (in this case) theatre
14. tough - difficult, hard
15. to realize - (false friend) become conscious
16. to betray - (in this case) denounce
17. one’s dream come true - what one has always desired
18. to turn sth. down - decline sth. (opposite of ‘accept sth.’)
19. mommy sometime - a part-time mother
20. years later Madonna said that Eileen was the only woman she had ever met who she found truly intimidating
21. to support - maintain
Once you look into the background of someone like Sean Penn it is easy to understand his commitment to the underdog in his work, both as an actor and as a scriptwriter and director. It also explains the many political and social causes he has espoused. However, as a child Sean “hated school every day until the end”. There was one exception; for one year in junior high Sean studied American History with a Mr Vincent. He’d do presentations about death penalty and civil rights; he’d read the newspapers to the class and ask questions. He taught them to be sceptical and read between the lines. The seed for the future dissenter had been planted.

A Disastrous Debut
At 14 Sean tried his hand as an extra in an episode of The Little House on the Prairie directed by his father. It was his acting debut and he was dressed up in mountain clothes even though it was summer. He thought it was important to remain in character so, while the rest of the cast went off for lunch and refreshments, he stayed on set under the midday sun. When they came back and Leo Penn call ‘action’ Sean almost instantly passed out from sunstroke!

The Severed Hand
Acting was not Sean’s first choice. He was, according to his mother, “rather introverted, highly intelligent, very serious and sort of shy”. It was his little brother Christo-pher Penn (1965-2006) who started making Super-8 films with Charlie Sheen. One day Sean was invited by Charlie and his brother Emilio to be in one of their movies. While recording they found a prosthetic hand that Martin Sheen had kept from Apocalypse Now (1979). Sean decided to make a movie entirely around this hand. This was the start of Sean’s filmmaking career – playing around as a late teenager with friends. They made five or six films.

Further Reading
www.yes-mag.com YES 20 | 51

Further Reading
The Sean Penn Redemption

The difference between being a director and being an actor is the difference between being a carpenter banging nails into the wood, and being the piece of wood the nails are being banged into.

Sean Penn, in *The Guardian*, 1991

The Bad-Boy Years

There is a clear discrepancy between Mrs Penn’s shy sensitive son and the ‘bad boy’ roles that Sean played in usually violent movies between 1983 and 1995. There was nothing wrong with these films and they demonstrated that Sean was a fine actor but they revealed little about the vulnerable man behind the mask.

This began to change with Penn’s Oscar-nominated performance in *Dead Man Walking* (1995). Although Sean played a racist murderous rapist the mask was gradually allowed to fall to reveal the full vulnerability of the ‘sinner’.

Delving the Depths of Humanity

This opened up Penn’s career to explore the possibilities of the actor’s versatility. Another Oscar nomination came with Woody Allen’s *Sweet and Lowdown* (1999), a comedy in which Penn plays the sociopath musician Emmet Ray. Biopics have formed an important part of Penn’s filmography.

By 2001 when Penn’s next Oscar nomination came for *I Am Sam* (in which he gives a nuanced performance as a father with developmental disabilities), Sean’s metamorphosis from bruise to character actor was complete.

When Penn’s Oscar finally came in 2003 with *Mystic River* the fact that he was playing a small-time gangster was almost completely eclipsed by the humanity he brought to the role. A second Oscar came in 2008 for the biopic *Milk* in which Penn flawlessly plays murdered gay-rights campaigner, Harvey Milk.

Perhaps Penn’s most curious film to date is *This Must Be the Place* (2011) in which Sean plays an emotionally crippled middle-aged rock star. It’s a complex tragi-comedy that you will either love or hate (I loved it) but it extended Penn’s range yet again. With well over 60 movies under his belt Penn will no doubt be on our screens for some time to come. Meanwhile, he has developed a second string to his bow as a writer and director – most notably for the biopic *Into the Wild* (2007).

---

1. *to bang* – hit, hammer
2. *nail* – nail
3. *shy* – timid
4. *epitomized by his first serious role in Bad Boys* (1983)
5. *rapist* – sexual predator
6. *to allow to* – permit to
7. *sinner* – (in religion) reprobate, evildoer
8. *to delve* – excavate
9. *career* – (false friend) professional trajectory
11. *nuanced* – subtle
12. *with developmental disabilities* – who has the mental age of a child
13. *bruise* – tough guy, aggressive individual
14. *flawlessly* – perfectly, immaculately
15. *emotionally crippled* – not able to express one’s feelings
16. *former* – ex-
17. *yet again* – (emphatic) again
18. *under one’s belt* – made
19. *to develop* – (in this case) create
20. *a second string to one’s bow* – an alternative activity
Sean Penn: the Hands-on Campaigner

Sean is not afraid of danger. After Hurricane Katrina hit New Orleans, the actor took a boat to the flooded city to help with the rescue operation. It was a beautiful day, he recalls, but the water was black. Bloated corpses floated by “all in the same position: face down, spread-eagled”... Penn rescued 40 people from the flood: he’s good at emergencies, he says, but less confident about what should happen next. “Where do they go? How do you feed them? How do you get them to start their lives again? How do you figure who’s the child molester? Now I’m as confused as the government about what to do. My mind doesn’t go far enough. I’m always frustrated by intellectual restrictions.”

John Lahr, The Observer 2006


Courting Controversy

When Joe McCarthy organized the witch-hunt against people like Leo Penn in Hollywood, the big fear was that left-wing film stars might use their position of influence to corrupt American values. In view of the negligible impact that social crusaders like Sean Penn have on the American psyche, McCarthy really needn’t have bothered.

None of that, of course, negates the sincere commitment of actors like Penn to social issues. At times Sean seems to have a checklist of issues to rile Middle America. In opposing US belligerent foreign policy he visited Saddam Hussein’s Iraq and has visited Iran. He has met with Raul Castro, Cristina Fernández de Kirchner and considered Hugo Chávez a personal friend.

It is these connections which explain why Sean is attacked even when he is unambiguously doing good – for instance after Hurricane Katrina in 2005, following the Haiti Earthquake in 2010 or in the wake of the Pakistani floods in 2012. Sean’s actions and words are not always fully thought through; as he himself says, sometimes his “mind doesn’t go far enough”. However, his heart is clearly in the right place.
How to Buy Your English Supplement (Yes)

All versions of the magazine include an hour’s original recorded material. The special collector’s edition and the digital magazine will include a special download code with each issue which will allow you to download the corresponding audio files.

Visit our on-line store: www.yes-mag.com

1. Digital magazine
   » Individual issues: €4
   » Annual subscription (10 issues): €30

2. Special Collectors’ edition (print magazine)
   » Individual issues: €9.95 + postage and packing*
   » Annual subscription (10 issues) + access to corresponding digital issues: €80 + postage and packing*
   *Free postage and packing in Spain. For more information on this special offer and all our products, please consult our webpage.

   The collectors’ edition is also available from official stockists in Spain (see our website for complete list).

3. Yes Magazine + the iPad app
   Available in the iTunes store.
   For further information on the app please visit www.yes-mag.com.

If you have any questions regarding subscriptions or would like more information about our magazine, please visit www.yes-mag.com or contact us at info@yes-mag.com.
This section of the magazine offers...

56  **Mathematics**: the universal language
57  **The Lost Art of Measuring**: at arm’s length
58  **The Lost Art of Measuring**: stretching one’s legs
59  **The Lost Art of Measuring**: the temperature of a pint of beer
60  **Maths & Religion**: when maths was magic
61  **Maths & Religion**: Christianity and the mathematicians
62  **Fun with Numbers**: off base
63  **Fun with Numbers**: curious sequences
64  **Beautiful Minds**: murderous mathematicians
65  **Beautiful Minds**: the darker side of the Enlightenment
66  **Beautiful Minds**: math man meets mass murderer
67  **Etymology**: the curious origins of mathematical terms
68  **Mathematical Anecdotes**: tales from the world of numbers
69  **Probability**: woolly thinking
70  **Probability**: on the toss of a coin
71  **Probability**: probability myths and mysteries
72  **Number 7**: Religion and Wonders
73  **Number 7**: cultural references
74  **Parabolas**: cutting up cones
75  **Parabolas**: architecture and the Catalan curve
76  **Parabolas**: riding parabolas
77  **Maths Symbols**: the origins of +, -, x, ÷, ∞, =, etc.
78  **Maths Phrasal Verbs**: everyday multiword verbs that come from maths
79  **Maths idioms**: mathematical expressions in everyday English
80  **Mathematical False Friends**: false cognates in maths
81  **Maths spelling**: deceptively familiar terms
82  **Maths pronunciation**: problems with vowels
83  **Maths pronunciation**: problems with stress

**GRAMMAR EXTENSION**

56  **Watch**: there’s a fascinating short TED presentation on the geometry of beehives at: [http://goo.gl/Y21tuJ](http://goo.gl/Y21tuJ)
62  **Watch**: can maths be beautiful? [http://goo.gl/PnJjtp](http://goo.gl/PnJjtp)
64  **Watch**: this excerpt from the BBC’s excellent series ‘The Story of Maths’: [http://goo.gl/LQIsrY](http://goo.gl/LQIsrY)

72  **Speak**: do you have a ‘lucky number’? If so, do you remember why? Do you have any unlucky numbers? How seriously do you take such notions?

**AUDIO EXTENSION**

88  **Speak**: Should there be limits to free speech?
105  **Speak**: What was useful – and useless – in your education?
Maths: the Universal Language

Maths is the key to unlocking the secrets of the Universe.

- PLATO

Maths is often described as a ‘universal language’. The epithet is appropriate. To begin with, mathematics is not a cultural construct in the sense that one culture understands it differently from another. Sure there are cultures that supposedly only count 1, 2, 3, 4, 5, many. They have very limited mathematics but even in such cases, fundamental rules of maths are not broken: 2+2 still equals four.

Secondly, our knowledge of maths is the accumulated knowledge of people from all over the world. The Ancient Egyptians invented the decimal system, binary and fractions, and discovered pi /π/. The Babylonians developed arithmetic. The Ancient Greeks advanced geometry and discovered irrational numbers. The decimal-place value system was invented in Ancient China. The Indians developed our modern number system (in the 9th Century), the number zero, infinity and negative numbers. The mediaeval Muslim world gave us the word ‘algebra’ and advanced our understanding of cubic equations. Europeans eventually imported Hindu-Arabic numerals from North Africa and developed maths still further in the Enlightenment.

New World in the hands of people like African American Benjamin Banneker. It was thanks to Hitler, however, that American mathematics really matured; the Nazis provoked the mass exodus of European mathematicians to the USA. For instance, Gödel – perhaps the greatest mathematician of the 20th Century – fled to Princeton after being beaten up by Nazi thugs. There ‘math’ flourished in the hands of émigrés and locals such as Julia Robinson. Mathematics can truly claim to be a project of the whole of humanity.

Beyond Humanity

However, maths’ claim to be a universal language goes beyond the human. Fibonacci numbers rule almost all growth processes in nature. Mathematics is behind the language of aesthetics in the phi (φ) /fai/, which determines the golden ratio. The difference between the numbers in the Fibonacci sequence tends towards phi, which is pretty awesome. Quite simply, if you ignore the universal language of maths, you can’t understand – or commune with – the universe.

1 Math (colloquial UK English)
2 construct (n.) /ˈkonstrʌkt/ – subjective idea
3 to develop – elaborate
4 eventually – (false friend) in the end
5 still further – (emphatic) even more
6 the Enlightenment – the European movement of the 17th and 18th Centuries in favour of reason, science and individualism and against tradition and superstition
7 for instance – for example
8 to flee (flee-fled-fled) – escape
9 to beat sb. up (beat-beat-beaten) – assault sb. physically
10 thug – violent stupid person
11 for more on this exodus, see Hitler’s Gift: The True Story of the Scientists Expelled by the Nazi Regime by J.
12 locals – local people, (in this case) Americans
13 truly – really
14 to claim to be – declare oneself to be
15 claim to be – (in this case) assertion that it is
16 to go beyond (go-went-gone) – be outside
17 Fibonacci numbers – the sequence 1, 1, 2, 3, 5, 8, 13...
18 to rule – govern, determine
19 golden ratio /ˈreɪʃiəʊ/ – golden section, divine proportion
20 to tend towards – approach (as a limit), converge on
21 pretty awesome – (colloquial) incredible
22 Plato said that maths, and specifically geometry, was the key to unlocking the secrets of the Universe.
At Arm’s Length
Before the advent\(^1\) of smartphones people made calculations in their heads! Moreover, because there wasn’t an app for measuring things, people used their bodies as a measure. The smallest measurement anyone could possibly need was the width\(^2\) of a finger. Anglos still occasionally measure liquor\(^3\) in fingers.\(^4\) A more useful measurement, approximately equal to two ‘fingers’ is an inch (in.\(^5\)). This word comes from the Latin uncia which means a twelfth (= 1/12)\(^6\). An inch was measured by the distal\(^7\) phalange\(^8\) of a man’s thumb\(^9\). We still use ‘inch’ in several expressions such as:
- to inch forward\(^10\)
- to be every inch\(^11\)
- He is every inch a gentleman.
Inches are still used to measure the diagonal on TV screens\(^12\) and computer monitors – even smartphone screens\(^12\):
- The Samsung Galaxy s5 has a 5.1” screen.

Measuring in inches gives us the expression ‘a rule of thumb’, which means an approximate but practical guide.

A palm is the width\(^2\) of your hand at the base of your fingers. One palm equals four fingers. A hand, by contrast is four inches (= 10.2cm). Hands are still used for measuring the height of horses.

A span, by contrast, is the maximum distance from the end of the thumb to the end of the little finger when the digits are spread apart\(^13\). This is standardized as nine inches. Two spans make a cubit, which is the distance from the end of your middle finger to your elbow\(^14,15\). Goliath in the Old Testament was six cubits and one span tall.

Fathoming it Out
Finally, there is the fathom (fm.) (= 1.829 m.), which is the distance for fingertips\(^16\) to fingertips of an adult with his/her arms outstretched\(^17\) or six feet (see p. 58). Fathoms are used to measure depth in water. For this reason to fathom means “to discover the meaning of”:
- She has been trying to fathom the meaning of these Hittite symbols.
- I can’t fathom her (out).
There are two yards (see p. 58) in a fathom.

---

\(1\) advent - appearance, emergence
\(2\) width - breadth, diameter
\(3\) liquor - strong (distilled) alcoholic drinks
\(4\) However, Scotch whisky is usually measured in ‘drams’. This is a corruption of the Greek drachma (= 1.77g)
\(5\) inches are sometimes represented by two apostrophes.
\(6\) referring to the fact that an inch is a 1/12 of a foot (see p. 58)
\(7\) distal - situated away from the centre or the body or point of attachment
\(8\) phalange - phalanx, bone in one’s finger
\(9\) thumb /θʌm/ - opposable digit
\(10\) to inch forward - move forward very slowly or in very small steps
\(11\) be every inch - be 100%
\(12\) screen - visual display unit
\(13\) to be spread apart - be extended laterally
\(14\) elbow - articulation in the middle of one’s arm
\(15\) ‘cubit’ comes from Latin cubitum (= elbow)
\(16\) fingertip - the end of a finger
\(17\) sb. with arms outstretched -
Stretching one's Legs

Your legs are just as good for measuring as your arms. A foot (ft.) equals 12 inches (30.5 cm.). Originally, the length of a man’s foot. People are measured in feet not yards. E.g. To be a policeman in Britain, you have to be at least six feet tall (not, “two yards tall”). A yard (yd.) equals three feet (91.4 cm.) and is the distance of a man’s stride. Both the Roman and the British Empires were measured out by people literally counting their steps. For instance, British surveyors from India, such as Nain Singh, were trained to take a pace that was exactly a yard long, irrespective of whether they were walking uphill, downhill or on the level. In this way they measured vast distances in Central Asia disguised as Buddhist monks with impressive accuracy.

10 chains make a furlong (fur.), which is 201 metres. Literally, a furlong means ‘a furrow long’. Furlongs are still used in some horse-races.

The Roman mille passuum was literally 1000 paces. From this idea we get the mile, which is eight furlongs (= 1.6km). For approximate calculations, remember that two miles is a little more than three kilometres and five miles is eight kilometres. Most Anglos still measure significant distances in miles. Three miles constitute a league. Iron-ically, Frenchman Jules Verne kept this word alive in the title of his classic novel, 20,000 Leagues Under The Sea.

Walking on Water?

As we have seen, the word mile comes from the idea of 1000 paces. It seems rather bizarre that we should measure distances at sea in terms of paces but the fact is that maritime distance can be measured in nautical miles; one nautical mile equals 1.853 km. The standard measure of speed at sea around the world is ‘knots’, which refers to nautical miles per hour.

Miles Out

In September 1999 NASA lost a Martian probe because the computer on board was expecting landing instructions in kilometres but they were in fact sent in miles.

---

1. to stretch one’s legs - go for a walk
2. feet are also sometimes represented by a simple apostrophe. For example, 6’ means six feet
3. stride - long step, pace
4. for instance - for example
5. surveyor - (in this case) official who measures distances
6. to take a pace (take-took-taken) - stride/step in a way
7. to walk uphill - ascend
8. to walk downhill - descend
9. disguised - in disguise, dressed, camouflaged
10. accuracy - precision, exactness
11. chain - (literally)
Weight & Temperature

Weights

- **Ounce (oz)** = 16 drams (28.35 g). (from * unus, 1 in Latin).
- **Pound (lb)** = 16 ounces. ‘Pound’ comes from the Latin *libra pondo*, which means ‘a pound by weight’. All of the weights in boxing are based on pounds. The British currency[1] - the pound (sterling) - was originally worth[2] a pound of silver[3].
- **Stone (st)** = 14 pounds (6.4 kg). Presumably, the exact weight of all stones in Britain! The plural is ‘stone’ or ‘stones’. Stone are commonly used to measure how much people weigh.
- **Ton (UK)** = 20 hundredweight or 2240 pounds. A British ton weighs one metric **tonne[4]** (convenient, isn’t it?). An American ton weighs 0.9 tonnes. A ton was the weight of a **large[5]** barrel of wine called ‘a tun’ (the three words are homophones; ‘tonne’ and ‘ton’ are directly derived from ‘tun’).

Capacity

- **Pint /paint/ (pt)** = 4 gills. A British pint is 0.6 litres, an American pint is 0.5 litres. There are 20 fluid ounces (of water) in a pint. The origin of ‘pint’ is unknown, but it is, of course, the perfect quantity of beer[6].
- **Gallon (gal)** = eight pints. A British gallon is 4.5 litres, an American gallon is 3.8 litres. Gallon originally meant the capacity of a **bucket[7]**. One gallon of water weighs 10 lb.

Temperature

Isn’t it much better to measure temperature on the basis of the approximate temperature of the human body[8] than of the **freezing point of water[9]**? Which do you prefer human body heat or frozen water? Gabriel Daniel Fahrenheit (1686-1736) was born in Danzig and lived mostly in Holland and England. He invented the first mercury thermometer. 0ºF was the lowest temperature he could achieve[10] scientifically (by mixing ice with common salt).

<table>
<thead>
<tr>
<th>Centigrade</th>
<th>Fahrenheit</th>
</tr>
</thead>
<tbody>
<tr>
<td>100°C</td>
<td>212°F</td>
</tr>
<tr>
<td>37.7°C</td>
<td>100°F</td>
</tr>
<tr>
<td>0°C</td>
<td>32°F</td>
</tr>
<tr>
<td>-17.8°C</td>
<td>0°F</td>
</tr>
<tr>
<td>-40°C</td>
<td>-40°F</td>
</tr>
</tbody>
</table>

To convert centigrade degrees into Fahrenheit, (simply!) multiply by 9 divide by 5 and add 32. (ºF = ºC x 9 + 5 + 32). And people wonder why mental arithmetic has declined since the introduction of the metric system and calculators!

---

[1]currency - unit of money
[2]to be worth - be valued at
[3]silver - (Ag) a precious metal
[4]tonne/tun/ - 1000kg
[5]large - (false friend) big
[6]Imperial measurements are no longer legally used in the UK but they can still be displayed as supplementary information next to the metric measurements.
[7]bucket (UK English) - pail (US English)
[8]carton of milk are two of them.
[9]temperature of 98ºF, which is approximately 100.
[10]the freezing point of water - when water becomes ice
to achieve - get, obtain
Maths and Magic

Archimedes will be remembered when Aeschylus¹ is forgotten, because languages die and mathematical ideas do not. Immortality may be a silly word, but probably a mathematician has the best chance of whatever it may mean².

- G.H. HARDY

In the Ancient World mathematicians were regarded as magicians with extraordinary powers because they could predict the phases of the moon and the changing seasons³. This was essential in early agricultural society, so whoever held⁵ the secret knowledge of maths was in a very powerful position. Indeed⁶, there's a strong link⁷ between the development⁸ of bureaucracy and the state, and the rise⁹ of mathematics.

The Number Cult¹⁰
The mixture of maths and religion continued in Ancient Greece. In fact, when Thales discovered that any angle drawn in a semicircle will be a right-angle¹¹, he was so pleased that he took a bull¹² to the temple and sacrificed it!

Thales wasn't the only Ancient Greek mathematician with irrational beliefs. Pythagoras believed he was the reincarnation of a Trojan soldier. Indeed⁶, he founded a maths cult¹⁰ that worshipped¹¹ numbers. The Pythagoreans murdered members who revealed their secrets and had bizarre rules such as a prohibition on eating beans¹⁴. Another Pythagorean belief was that all even numbers¹⁵ were female and all odd numbers¹⁶ were male. Quite independently, the Chinese believed (and still believe) exactly the same thing. The only exception for the Pythagoreans was '1' which was the androgynous parent¹⁷ of all the other numbers!

Even today in China people believe in the celestial/magical significance of numbers. A debased¹⁸ version of these beliefs exists in the Western tradition of people having a 'lucky number'. Likewise¹⁹, many Westerners consider 13 unlucky.

¹/īskalas/ (525-456BCE) Ancient Greek dramatist
²chance of whatever that may mean - probability of achieving immortality (however you define it)
³to be regarded as - be considered to be
⁴the seasons - Spring, Summer, Autumn and Winter
⁵to hold (hold-held-held) - have, possess
⁶indeed - (emphatic) in fact
⁷link - connection
⁸development - emergence, evolution
⁹rise - emergence, advent
¹⁰cult - (false friend) religious sect
¹¹right-angle - 90° angle
¹²bull -
¹³to worship - venerate
¹⁴beans - legumes, pulses
¹⁵even number - number divisible by 2 (e.g. 2, 4, 6, 8...)
¹⁶odd number - number that is not divisible by 2 (e.g. 1, 3, 5, 7...)
¹⁷parent - (false friend) mother/father
¹⁸debased - corrupted, simplified
¹⁹like-wise - similarly
The last great mathematician of the Ancient World was Hypatia of Alexandria. She used to attract huge crowds to her maths lectures. Unfortunately, the local Christians were envious of her popularity and murdered her. The advance of mathematics ground to a halt for a thousand years in mediaeval Europe. However, the Church in this period did not ignore numbers. Rather it placed great emphasis on the magical importance of numbers – such as three, five and seven – and shapes – such as pentagrams.

The Nadir

The low point in the interaction between the Church and mathematics came in the 10th Century. At that time Gerbert of Aurillac first introduced the Indo-Arabic number system into Christendom. He had learned it from Arab scholars in Spain. However, his promotion of the decimal number system met with great resistance – this was partly due to the fact that he had acquired this knowledge from Islamic scholars. As a result “It was widely rumoured that he was a sorcerer and that he must have sold his soul to the Devil during his travels. This accusation was so persistent that in 1648 the Papal authorities reopened his tomb to make sure that his body had not been infested by Satan!”

The Enlightenment

We tend to associate the advance of maths in the West over the past 500 years with the Enlightenment and the decline of religion but many great modern mathematicians have been devoutly religious, seeing the numerical relationships that underlie the basis of the universe as the proof of a divine hand at work (or perhaps at play).
Prime numbers

H.L. Mencken\(^1\) once explained why maths\(^2\) was the most sacred science: “It is now quite lawful\(^3\) for a Catholic woman to avoid (i.e. control her biology) by a resort to\(^5\) mathematics\(^6\), though she is still forbidden\(^7\) to resort to\(^8\) physics\(^9\) and chemistry\(^10\).”

Prime Numbers

Prime numbers have occupied a special relationship with mathematicians over the centuries. These numbers have no factors other than 1 and themselves, and the sequence of the first few is 1, 2, 3, 5, 7, 11, 13, 17, 19... A simple observation is that prime numbers sometimes occur in pairs around multiples of 6, and examples above are 5 and 7, 11 and 13, and 17 and 19 – but the ‘rule’ is not always true – just think of 23 and 25!

Some insects – such as cicadas\(^11\) – use prime numbers to appear en masse in ways that are ‘unpredictable’ for their predators.

Our Mixed-Based System

In general we use a base 10 system for most things. However, we have bits and pieces\(^12\) of other systems that have survived too. Pre-Indo-European inhabitants\(^13\) of Europe may have used a base 8 system. This would explain why there is a similarity in most Indo-European languages between the words for ‘nine’ and ‘new’\(^14\). There are remnants\(^15\) of a base 12 system too – the special word for ‘dozen’ in many languages, the 12-hour clock and perhaps even egg boxes! Gaulish\(^16\), Danish, Irish and Mayan traditions used base 20 and even English has a special word, ‘score’ for counting in 20s. The Sumerian base 60 system is reflected in our seconds and minutes. They counted using their thumbs\(^18\) and the 12 segments of the fingers on one hand in combination with the five fingers on the other. 60 is the opposite of a prime number, a highly\(^19\) composite number that divides by 2, 3, 4, 5, 6, 10, 12, 15, 20 and 30.\(^20\) The base 10 system probably came to dominate because it reflects a simpler use of the number of digits most of us have on our hands. However, there are others; the Yuki of California have a base 8 system because they count the gaps\(^21\) between their fingers!

\(^{1}(1880-1956)\) US philologist
\(^{2}\)maths (UK English) - math (US English), mathematics
\(^{3}\)lawful - legitimate, accepted, (in this case) approved by the Church
\(^{4}\)to avoid - circumvent, evade
\(^{5}\)a resort to - using
\(^{6}\)i.e. practising sexual abstinence except during the woman’s period (the Ogino-Knaus method)
\(^{7}\)to forbid (forbid-forbade-forbidden) - prohibit
\(^{8}\)to resort to - use
\(^{9}\)i.e. using condoms
\(^{10}\)i.e. using contraception
\(^{11}\)cicada /ˈsɪkədə/ - cicada
\(^{12}\)bits and pieces - fragments
\(^{13}\)inhabitant - native
\(^{14}\)French neuf/neuve and neuf, German neu and neun, Spanish nuevo/nueva and nuc, Italian nuovo/novia and nove, Portuguese novo/nova and nove
\(^{15}\)remnants - remains, ‘fossils’
\(^{16}\)Gaulish - the ancient Celtic language of France (as spoken by Asterix!)
\(^{17}\)French goes further with quatre-vingt (‘4x20’) for its basis for numbers between 80 and 99. Poetically,
\(^{18}\)thump /θʌmp/ - to mean ‘90’
\(^{19}\)highly - very, intensely
\(^{20}\)there are echoes of this system, again, in French with its soixante-dix (60+10) for 70
\(^{21}\)gap - space, void
The fact that our number system has a base 10 gives rise to a number of curious effects:

- The sum of the digits of any multiple of 9 add up to nine. For example, 18 (1+8=9), 27 (2+7=9), 36 (3+6=9), 45, 54, 63, 72, 81, 90, 108...
- An even more elementary fact is that the sum of the digits making up any number that is a multiple of 3 is itself divisible by 3. For example, 3x5=15, 1+5=6, 6 is divisible by 3; or 3x21=63, 6+3=9, 9 is divisible by 3.

Write down any three-digit number (the three digits have to be different) - say 4491. Reverse the digits to form a second number (194). Subtract the smaller number from the larger (491-194=297). Reverse the digits in this new number (792) and add together the two numbers (297+792=1089). The answer will be 1089. Try it with your own three digits.

- Write down any three-digit number (say 6684). Multiply by 7, then multiply by 11, and finally multiply by 13. The answer will always be the original sequence repeated.

**Number Sex**

In both Hebrew and Arabic the numbers three to ten take the opposite gender to that of the noun they modify. So, for example, in shlosha banim ('three sons' in Hebrew) shlosha is feminine, while in shalosh banot (= three daughters) shalosh is masculine!

**Nature’s Numbers**

Even if we choose to ignore numbers, nature doesn’t. Exponentiation may seem rather abstract but what if it’s applied to a bacterium that divides in two every 30 minutes. In a day you have $2^{48}$ (= “two to the power 48”) bacteria (that’s 281 billion). If the bacteria in question is tetanus, typhoid fever, diphtheria, syphilis, cholera, leprosy or tuberculosis that’s far from abstract!

Another fascinating set of numbers is the Fibonacci sequence because these numbers have been related to plants and their growth. The sequence is formed by adding the previous two members to form the sequence, and so beginning with 1 and 2 we are led to 3, 5, 8, 13, 21, ...

**Google & Googol**

Google’s name comes from the number ‘googol’ ($10^{100}$ = “ten to the power 100”). The term ‘googol’ was invented by nine-year-old Milton Sirotta in 1938. He was the nephew of mathematician Edward Kasner, who popularized the term.
Beautiful Minds

Anecdotes from the lives of the great mathematicians.

The oldest evidence of mathematics was found in the Democratic Republic of Congo in 1960: the 'Ishango Bone' is more than 20,000 years old and shows some simple arithmetic. Indeed, mathematics seems to have advanced in many parts of the world - China, India, the Middle East and North Africa - before Europeans took their first tentative steps towards numeracy in Ancient Greece. For most of human history mathematicians have not fulfilled our stereotype of socially inept white guys who can’t dance. Unfortunately, the names and lives of most non-Caucasian mathematicians have been lost, so we are left with the (predominantly) white guys of the last 500 years. Interestingly, many of these mathematicians don’t fulfil the stereotype either.

The Gambler & his Equations

A thousand years after the end of the Golden Age of Greek mathematics algebra became extremely popular in Italy. The hero of Renaissance maths was Lodovico Ferrari (1522-1565) who advanced our understanding of quartic equations (though cubic equations had been developed centuries earlier in China). However, Lodovico was far from being your stereotypical nerd; he was a hard drinking, gambling, swearing type, who used to get into fights. In the end his own sister poisoned him!

The Maths Mercenary

Descartes (1596-1650) gave us Cartesian coordinates - which he developed while lying in bed, watching a hovering fly - and connected geometry and algebra but maths was what he did in his free time. Professionally he was, among other things, a mercenary soldier. His interest in war was solely economic - he fought for both Protestant and Catholic armies. Unlike most soldiers, Descartes was a vegetarian. However, this was for health reasons and René was possibly the world’s one and only vegetarian vivisectionist!

---

1. bone - (UK English)
2. indeed - (emphatic) in fact
3. steps - phase in a progression, stage in a gradual advance
4. towards - toward (US English), in the direction of
5. to fulfill - satisfy, (in this case) coincide with
6. guy - (in this case) man, bloke (UK English)
7. non-Caucasian - non-white
8. gambler - sb. who risks money on games of chance (e.g. at a casino)
9. to develop - (in this case) formulate
10. was far from being - was definitely not
11. your stereotypical nerd - (in this case) a typical socially inept mathematician
12. gambling - who was a gambler
13. swearing - who used taboo language
14. to get into fights (get-got-got) - participate in physical confrontations
15. to poison sb. - kill sb. with a toxin
16. hovering - flying but not moving
17. among - amongst, (in this case) as well as
18. to fight (fight-fought-fought) - be a soldier, combat
19. unlike - in contrast to
The Darker Side of the Enlightenment

Sir Isaac, the Clairvoyant
Sir Isaac Newton (1642-1727) and Gottfried Leibniz (1646-1716) allowed us to describe the mathematics of the moving world by introducing calculus. Yet any image of a joint project to advance human knowledge is an illusion; the Englishman’s vindictive attempt to destroy the German’s reputation is the stuff of legend.

However, Newton did have a softer side. Once when a stranger mistook him for a numerologist, she began to pester him to use magic to find her lost purse. When he realized that she was not going to accept that he was just a mathematician, he drew a magic circle and intoned, “Abracadabra!”

He then told the woman to go to the third window on the south side of the façade of Greenwich hospital. There he could see a devil looking at her purse. Legend has it that the woman found her purse in precisely that location!

Like Descartes, Newton was a vegetarian. Unlike René, he was also an animal-lover. In fact, his most practical invention was the cat flap.

Unseen Advantage
Mathematics has a lot in common with philosophy and few people have shown a more philosophical spirit than the Swiss maths genius Leonhard Euler (1707-83). He celebrated the fact that he had gone blind because it meant that there were fewer distractions from his mathematics.

Lost to the World
The 19th Century saw two mathematical geniuses who never fulfilled their potential. Évariste Galois (1811-32) made some major algebraic discoveries as a teenager, though few people realized it at the time. Unfortunately, in 1832 aged only 20 Galois was killed in a duel over a woman. Half a century later British mathematician William Kingdon Clifford (1845-79) died of tuberculosis aged only 33. Professor Clifford developed a general theory of relativity in the 1870s. Unfortunately, William’s colleagues were hostile to this young genius’s ideas and ignored him. 11 days after Clifford died Albert Einstein was born in Ulm. He independently developed his own – better known – theory of general relativity in 1915.
Math Man Meets Mass Murderer

No Nobel for Maths
One of the enigmas of the modern world is that there is no Nobel Prize for maths. In 1895 Alfred Nobel specified that there should be the five annual prizes that exist today: for physics, chemistry, medicine, literature and peace. It has been suggested that he intentionally excluded mathematics because a Swedish mathematician, prof. Gosta Mittag-Leffler, had stolen the heart of Nobel’s mistress!

Boggling Beautiful Minds
The evidence suggests that modern pure maths is so mindboggling that it may be detrimental to your mental health. Georg Cantor became a paranoid manic-depressive - partly because of his mindboggling work with infinities, according to some people. Kurt Gödel also went mad, as did - famously - John Forbes Nash. As did Alexander Grothendieck and Ludwig Boltzmann, Oliver Heaviside, Paul Erdős and Grigori Perelman!

Beautiful Mind Meets Evil Mind
The Realschule in Linz was a small secondary school with just 300 pupils. Between 1903 and 1905 this small obscure institution was educating two of the most influential people in modern times. One was Adolf Hitler. The other was the genius, Ludwig Wittgenstein. The two boys had been born just six days apart, though the gay Jewish teenager was so clever that he had skipped a year while young Adolf had had to repeat a year, so they were two years apart. Even so, they must have coincided at some point. Despite the improbability, one of the greatest mathematical and philosophical minds of modern times crossed paths with the most evil man in history! What are the odds?!

In fact, both Hitler and Wittgenstein fought for the Central Powers in World War One and both were decorated for bravery, but the similarities end there.

---

1 mistress - extramarital female lover
2 to boggle - overwhelm, saturate
3 mindboggling - overwhelming, mentally shocking
4 the subject of the movie, A Beautiful Mind (2001)
5 for more on this connection between mental illness and mathematics, see the BBC’s Dangerous Knowledge (2007)
6 just - (in this case) only
7 pupil - student
8 20th and 26th April, 1889, respectively
9 to skip a year - not have to study a year in the standard educational syllabus
10 while - at the same time as
11 at some point - in some moment
12 to cross paths with - come into contact with
13 evil - malevolent, bad
14 what are the odds?! - how improbable was that?!
15 to decorate - honour, confer a medal on
16 bravery - valour
The Origins of Maths Terminology

The hidden\(^1\) stories behind half a dozen everyday mathematical terms.

**абакус /æbəkəs/**
You should have at least seen one of these (there is an abacus app if you haven’t!). The counting tool\(^2\) we know today has little to do with\(^3\) the origins of this word. The Greek word abakos came from the Hebrew term ‘abāk, which means dust\(^4\). This is because a Greek abakos was in fact a sandpit\(^5\) for drawing diagrams in. It was the Romans who reapplied\(^6\) the Greek term using it to refer to a counting frame\(^7\).

**алгебра /ældʒɪbra/**
This term comes from the Arabic al-jabr, which means ‘reunion’, i.e.\(^8\) joining things back together again. In fact, when it was first used in Europe it referred to the surgical\(^9\) setting\(^10\) of broken bones\(^11\). The mediaeval Arabs also used the term for representing numbers and quantities using symbols, our modern meaning.

**средний /əvˈridʒ/**
Originally, this word did not refer to a typical or median quantity but to maritime risk\(^12\). The Arabic term ‘awāriyyah means ‘loss at sea’. The word came into English via the French term avarie.\(^13\) When a cargo\(^14\) was damaged or lost at sea, the loss was shared out\(^15\) proportionally amongst the ship’s owners\(^16\).

**геометрия**
Literally, this means the measuring of the Earth. However, Carl Friedrich Gauss – ‘the Prince of Mathematicians’ – realized\(^17\) (among\(^18\) innumerable other things) that there were practically no straight\(^19\) lines in nature. Given that geometry deals largely\(^20\) in straight lines, you have to ask whether\(^21\) the name is fit for purpose\(^22\).

**сфера /saɪˈfər/**
This word comes from the Arabic šifr, which means ‘empty’, via the Italian zefiro. The Arabic term also gave us ‘cipher\(^23\)', via the mediaeval Latin word cifra.

See also the story behind algorithm on p. 81.

---

1. **hidden** - camouflaged, secret
2. **tool** - instrument, implement, utensil
3. **to have little to do with** (have-had-had) - be more or less unrelated to
4. **dust** - dry particles of dirt
5. **sandpit** - tray (= rectangular container) full of sand (= particles of silicon typically found in dunes)
6. **to reapply** - reuse, recycle
7. **counting frame** - abacus
8. **i.e.** - (id est) that is
9. **surgical** - in a medical operation
10. **setting** - (in this case) realignment
11. **bones** -
12. **risk** - (in this case) probability of losing money
13. **average** - proportionally amongst
14. **average** - proportionally amongst
15. **average** - proportionally amongst
16. **average** - proportionally amongst
17. **related to the Catalan and Spanish term avería (= breakage)**
18. **cargo** - (false friend) merchandise being transported
19. **to share out** - distribute
20. **owner** - proprietor
21. **to realize** - (false friend) become conscious
22. **among** - amongst, (in this case) together with, as well as
23. **straight** - not curved
24. **received** - conventional
25. **largely** - mostly, primarily
26. **to deal in** - (in this case) focus on
27. **whether** - if
28. **to be fit for purpose** - be appropriate in the way it is used
29. **cipher** - (false friend) code
Maths Anecdotes

Better Warplanes
According to Jordan Ellenberg maths is the science of not being wrong about things... Without the rigorous structure that mathematics provides, common sense can lead you astray\(^2\). He gives a good example. During World War Two the USAF were trying to optimize the armouring\(^3\) of their warplanes. When the aircraft that returned from bombing missions were inspected, the analysts observed that the majority had bullet holes\(^4\) through the fuselage, with the fewest bullets penetrating the engines\(^5\). They concluded from this data that the protection around the fuel tanks should be increased. It took mathematician Abraham Wald, who had never even seen a military plane, to point out\(^6\) the analysts' error: the engines were more vulnerable than the fuselage. Quite simply, those warplanes that were hit in the engines were the ones that didn’t make it home\(^7\). Mathematicians are trained to question assumptions\(^8\).

McMathematics
Some years ago, on billboards\(^9\) all over Britain McDonalds proudly claimed\(^10\) that the number of combinations\(^11\) that can be obtained in any one of their franchises\(^12\) was 40,312. The correct answer should have been 255. This claim\(^13\), which is over 158 times too large\(^14\), is based on the number of permutations available, not combinations. But for that figure\(^15\) to be relevant you would have to consider “One Big Mac, one large fries\(^16\) and a chocolate shake\(^17\)” as a different meal from “One large fries, one Big Mac and a chocolate shake”. I suggest that most people wouldn’t.

1729
This was one of the favourite numbers of Indian mathematician Srinivasa Ramanujan. It is the smallest number expressible as the sum of two cubes in two different ways:

\[
1729 = 1^3 + 12^3 = 9^3 + 10^3
\]

[pronounced: “one thousand seven hundred and twenty-nine equals one cubed plus twelve cubed equals nine cubed plus ten cubed”]

Moreover, if you add the digits you get 19. If you then times\(^18\) this number by 91 (the same digits reversed), you get 1729! In homage to Ramanujan the number appears regularly on the TV cartoon show Futurama.

---

1. to lead sb. astray (lead-led-led) - cause sb. to make a mistake
2. How Not To Be Wrong by Jordan Ellenberg [2014]
3. armouring - protection
4. bullet holes - motor
5. to point out - indicate
6. to make it home (make-made-made) - return home
7. assumption - supposition, premise, expectation
8. billboard - hoarding (UK English only), large board on which advertisements are displayed
9. to claim - declare
10. i.e. different meals
11. franchise - (in this case) franchised restaurant
12. claim (n.) - assertion, allegation, declaration
13. large - (in this case) high
14. figure - (in this case) number
15. fries - (colloquial) French fries (US English), chips (UK English)
16. shake - (colloquial) milkshake, flavoured milk
17. to times - (colloquial) multiply
Probability

The chance\(^1\) of winning the lottery jackpot\(^2\) is less than that of being struck\(^3\) by lightning\(^4\). I have never bought a [lottery] ticket and I plan to buy an insulating rubber helmet\(^5\) with the money I save. It will increase my life expectancy by precisely one fourteen-millionth.

- STEVE JONES (1944- )

Woolly Thinking\(^6\)

According to an international panel\(^7\) - composed of senior scientists from the Met Office\(^8\), the Hadley Centre, Edinburgh University, Melbourne University and Victoria University in Canada - the probability that global warming is anthropogenic\(^9\) is over 95%. It’s a compelling\(^10\) figure\(^11\) but what does it mean? Does it mean that if we had 20 worlds with the current conditions the climate change in 19 would be caused by humans? That 95% of the evidence suggests global warming is caused by humans? That 95 scientist out of\(^12\) a hundred believe that global warming is manmade\(^13\)? The problem with the science of probability is that in the mind of ordinary people it produces a lot of woolly thinking\(^6\).

But not in your mind, right? OK, here’s a question. I’ve tossed a coin\(^14\) four times and each time it has come up heads\(^15\). I’m about to\(^16\) toss\(^14\) it again; what are the chances\(^1\) that I throw another heads\(^15\)? And, if you toss a coin ten times, what are your chances\(^1\) of getting five heads and five tails\(^17\)? Remember your answer and I’ll come back to that one\(^18\).

Here’s another scenario\(^19\). In a British court\(^20\) a forensic scientist has just given evidence. The prosecutor\(^21\) concludes, “So, according to what you have heard from the expert, there is a million-to-one chance\(^1\) that the DNA\(^22\) belonged to someone other than the defendant\(^24\).” So, he’s guilty\(^25\), right? Then, the counsel for the defence\(^26\) gets up and concludes, “The forensic scientist’s evidence suggests that this DNA\(^22\) could have come from at least 60 other people in this country, so there is only a one-in-60 chance that my client was at the scene of the crime”. So, he’s innocent, right? Of course, both lawyers are referring to the same evidence: that 60 people in a country of 60 million share\(^27\) the DNA in question.

\(^{1-18}\) See glossary, below.

Climate change

Photo by LeoNunes
On the Toss of a Coin

If you answered the question about the coin by saying anything other than a 50% chance then you are guilty of thinking that the coin has a little brain and the ability to decide which side it will land on. Here’s some startling news; coins and dice don’t have memories. The results they have given recently don’t affect what they will produce next time. Similarly, your chances of getting exactly five heads and five tails on ten throws of a coin are less than ¼. You are much more likely to get six of one and four of the other; the odds of getting six heads or six tails are over 40%.

While on the subject of tossing coins we ought to mention Jeffrey Hamilton’s famous lecture on probability. The lecturer took a coin from his pocket and tossed it in the air as he explained that there was a 50% possibility of heads and a 50% possibility of tails. Hamilton and his students watched as the coin hit the floor, bounced, rolled, spun around and came to rest on its edge. After a stunned silence, the entire room broke into wild applause. The probability of this happening is about a billion to one. The probability of it happening in a lecture about probability is truly infinitesimal.

Breaking the Bank at Monte Carlo

The woolly thinking about probability is what allows people to have superstitious attitudes in games of chance. People believe in ‘Lady Luck’ or that they are on a winning streak because they don’t understand the laws of probability. People who believe in luck always know someone with immense good fortune; just as every smoker knows somebody who lived to 90 smoking two packets a day. Perhaps the most famous ‘Mr Lucky’ ever was ‘the man who broke the bank at Monte Carlo’. This was Charles Deville Wells who in three days in July 1891 won the equivalent of one million pounds (about €1.5 million) in today’s money. He returned in November and was similarly lucky. His feat was so famous that music-hall songs were written about him. What most people choose to forget is that he returned to Monte Carlo yet again in 1892 and lost all his money. In fact, he ended up in debtors’ prison.

1 coin 2 chance/chances - (in this case) probability, possibility 3 to be guilty of - (in this case) commit the error of 4 to land on - fall on, (in this case) end up showing 5 startling - surprising 6 die/dice (plural ‘dice’) - 7 heads - the side of a coin with a head/faces on it (as opposed to ‘tails’) 8 tails - the other side of a coin from ‘heads’ 9 24.61% to be exact. 10 you are much more likely to - it is much more probable that you will 11 odds - possibility, probability 12 41.02% to be exact. 13 to toss a coin - 14 lecture - (false friend) class at university 15 at Warwick University in England in October 1972 16 lecturer - (false friend) university teacher 17 to bounce - 18 to roll - move by rotating 19 to spin around - (spin-spun-spun) - turn round (on a vertical axis) 20 to come to a rest - (come-came-come) - stop moving, halt 21 on its edge - balancing on its thinnest part 22 stunned - astonished, shocked, caused by surprise 23 to break into wild applause - (break-broke-broken) - start to applaud enthusiastically 24 woolly thinking - nebulous ideas, confused thought 25 to allow - permit, enable 26 games of chance - game in which you risk money on a specific result (e.g. poker) 27 to be on a winning streak - be in a period when they win/are lucky 28 feat - achievement, accomplishment, triumph 29 yet again - (emphatic) again
More Probability Myths & Mysteries

Shared\(^1\) Birthdays
One of the ‘everyday miracles’ that people are often impressed by is when two people suddenly discover that they have the same birthday or that someone has the same birthday as a friend or relative\(^2\). This is actually\(^3\) much more likely\(^4\) to occur than most people think. For example if you go to a party at which there are 30 guests there is a 71% chance\(^5\) that at least two people share a birthday.\(^6\) Even if there are only 15 people there is still a 25% chance that two people share a birthday.

Lightning\(^7\) Strikes\(^8\)
The odds\(^9\) of being struck by lightning\(^7\) are 600,000 to one. The odds\(^9\) of being struck\(^10\) on several occasions should be infinitesimally small. Yet\(^11\) there are several cases of people being struck\(^10\) more than five times. This is possible because the 600,000:1\(^12\) odds\(^9\) refer to the entire population. People like park rangers\(^13\) are far more\(^14\) exposed to lightning\(^7\) than those of us living in cities full of lightning conductors, so they are struck\(^10\) much more often. A US park ranger\(^13\) called Roy Sullivan was hit seven times by lightning\(^7\), and survived every time. (Does that make him very lucky or very unlucky?). Being struck\(^10\) by lightning\(^7\) is so closely related to specific jobs and living in specific places that someone who has been struck\(^10\) by lightning\(^7\) is in fact 100,000 times more likely to be struck a second time than the average person who’s never been struck at all.

Some bad luck with lightning is, however, harder\(^15\) to explain away\(^16\). Bulgarian Martha Martika was widowed three times by lightning\(^7\). However, that’s nothing compared to what happened in the Congo on 25\(^{th}\) October 1998. All 11 players from the Bena Tshadi football club were killed by lightning during a soccer\(^18\) match. None of the opposing team were touched.

Monkey Business
One legend of probability is that “if a million monkeys typed\(^19\) for a million years they would write the Complete Works of Shakespeare”. This is only true if you are willing to\(^20\) accept the Complete Works of Shakespeare as a big jumble\(^21\) of letters that you have to reconstruct. In fact, it would take a million monkeys 28 million years just\(^22\) to write the first line of Hamlet (typing at one letter a second)\(^23\).

Computer scientist Robert Wilensky once declared, “We’ve all heard that a million monkeys banging on\(^24\) a million typewriters will eventually\(^25\) reproduce the entire works of Shakespeare. Now, thanks to the Internet, we know this is not true.”

---

\(^{1}\)shared - that two or more people have in common
\(^{2}\)relative (n.) - member of one’s extended family
\(^{3}\)actually - (false friend) in fact
\(^{4}\)likely - probable
\(^{5}\)chance - probability
\(^{6}\)to share a birthday - have a birthday in common
\(^{7}\)lightning -

\(^{8}\)strike (n.) - (in this case) hit, impact
\(^{9}\)odds - possibility, probability
\(^{10}\)to strike (strike-struck-struck) - hit
\(^{11}\)yet - however, nevertheless
\(^{12}\)“six-hundred thousand to one”
\(^{13}\)park ranger - type of police officer who protects a park or forest
\(^{14}\)far more - much more

\(^{15}\)harder - more difficult
\(^{16}\)to explain away - rationalize, make an excuse for
\(^{17}\)Martha was widowed three times by lightning - lightning killed three of Martha’s husbands
\(^{18}\)soccer - football
\(^{19}\)to type - write on a typewriter or a PC keyboard

\(^{20}\)to be willing to - be ready to, be prepared to

\(^{21}\)big jumble - chaotic mixture
\(^{22}\)just - (in this case) simply
\(^{23}\)few monkeys can type with all five fingers, though with 28 million years to practise...
\(^{24}\)to bang on - hit at, type (in a brutish way) on
\(^{25}\)eventually - (false friend) in the end
Number 7
by Cristian Dopazzo

It is fascinating how our mind comes up with multiple associations at the mere occurrence of certain words. For example, number seven seems to be a common recurrence in different times and cultures. Have you ever thought about the various associations that it can have? Stop and think for a minute, and then read the article.

Religious References
First things first, according to the book of Genesis, God rested on the seventh day from all the creation work that he had done, which in turn probably instituted the seven-day week still used today. In fact, there are plenty of biblical references to number seven; for example, Noah had to select seven pairs of every clean animal to get into his ark, and the book of Revelation includes seven seals, seven angels, seven trumpets and many other apocalyptic sevens. On top of all that, there are seven deadly sins: pride, lust, envy, greed, gluttony, sloth and wrath.

Meanwhile, Muslims walk seven times round the Ka’ba in Mecca and Buddhists have the seven symbols of Buddha. Seven was the Ancient Egyptian symbol of eternal life.

The Seven Wonders
Around the 2nd Century BCE, there were written accounts of impressive constructions that travelers had seen on their journeys. Seven of them became known as the Seven Wonders of the Ancient World: the Great Pyramid of Giza, the Colossus of Rhodes, the Lighthouse of Alexandria, the Mausoleum at Halicarnassus, the temple of Artemis, the Statue of Zeus and the Hanging Gardens of Babylon. As of 2007, the new Seven Wonders of the World have been the Pyramid at Chichén Itzá, the Statue of Christ the Redeemer (in Rio de Janeiro), the Roman Colosseum, the Great Wall of China, the Incan City of Machu Picchu, the Palace Tombs of Petra and the Taj Mahal.

The Seven Years’ War
Following the Austria-Prussia conflict in 1756, France and Britain fought over territory and influence in India and North America until 1763, and this fighting went down in history as the Seven Years’ War.

---

1 to come up with (come-came-come) - invent (in this case)
2 occurrence - (false friend) appearance
3 recurrence - reappearance
4 to rest - relax, pause
5 in turn - seriatim, subsequently
6 seal - (in this case) guarantee of authenticity (or that sth. has not been opened) usually with a symbol stamped into it
7 deadly sin - cardinal vice
8 check out David Fincher’s 1995 thriller Se7en starring Brad Pitt and Morgan Freeman
9 lust - lasciviousness, lechery
10 greed - avarice
11 sloth - indolence, lethargy
12 wrath - anger, fury, ire (poetic)
13 BCE - before Common Era, before Christ
14 account - (in this case) chronicle
15 lighthouse -
16 hanging - suspended
17 redeemer - saviour
18 tomb /tu:m/ - sepulchre, mausoleum
19 to fight (fight-found-found) - go to war
20 over - about, in relation to
Cultural Sevens

The Seven Ages
In 1599 William Shakespeare wrote As You Like It, a comedy play which contains one of the playwright’s most famous speeches “All the world’s a stage”. This speech describes seven ages of man: the infant, the schoolboy, the lover, the soldier, the justice, the pantaloons and second childishness.

Musical Sevens
The Ancient Greeks had a seven-stringed lyre reflecting the music of the seven heavenly spheres and the seven notes on the diatonic scale.

 Literary Sevens
In 1812, the German Brothers Grimm published a collection of traditional stories which included the fairy tale of Snow White and the Seven Dwarfs. In 1922, British officer T.E. Lawrence’s autobiographical book The Seven Pillars of Wisdom was published. The book provides vivid descriptions of his activities in the Middle East during the First World War.

In 1953, British writer Ian Fleming created the famous secret agent James Bond, whose code name was 007 (double-o-seven).

Myths and Superstitions
In European folklore the seven-league boots allow the wearer to take seven-league strides. Moreover, the seventh son of a seventh son is supposed to have extraordinary powers, which good and evil try to manipulate. In South America, however, the seventh son is believed to turn into a lobizón (werewolf) on full moon nights. Moreover, Japanese mythology gives us the Seven Gods of Fortune and, as regards superstitions, breaking a mirror will bring you seven years of bad luck.

In addition to this vast array of sevens, we still have the seven colours of the rainbow, the seven continents, the seven musical notes and 7-Up!

Japanese mythology gives us the Seven Gods of Fortune

In The Thousand and One Nights, the fictional hero Sinbad the Sailor embarks on seven voyages of adventure and discovery.

Musical Sevens
The Ancient Greeks had a seven-stringed lyre reflecting the music of the seven heavenly spheres and the seven notes on the diatonic scale.

Literary Sevens
In 1812, the German Brothers Grimm published a collection of traditional stories which included the fairy tale of Snow White and the Seven Dwarfs. In 1922, British officer T.E. Lawrence’s autobiographical book The Seven Pillars of Wisdom was published. The book provides vivid descriptions of his activities in the Middle East during the First World War.

In 1953, British writer Ian Fleming created the famous secret agent James Bond, whose code name was 007 (double-o-seven).

Myths and Superstitions
In European folklore the seven-league boots allow the wearer to take seven-league strides. Moreover, the seventh son of a seventh son is supposed to have extraordinary powers, which good and evil try to manipulate. In South America, however, the seventh son is believed to turn into a lobizón (werewolf) on full moon nights. Moreover, Japanese mythology gives us the Seven Gods of Fortune and, as regards superstitions, breaking a mirror will bring you seven years of bad luck.

In addition to this vast array of sevens, we still have the seven colours of the rainbow, the seven continents, the seven musical notes and 7-Up!
The two words ‘parable’ /ˈpærəbəl/ and ‘parabola’ /ˈpærəbəla/ have a common Greek source, but it is one that is not immediately obvious, given that ‘parable’ is used in a Biblical context for a story with a deeper meaning, whereas ‘parabola’ is a well-defined mathematical curve.

The parabola is a curve that has fascinated people for millennia - at least since the Ancient Greeks. As we will see, parabolas occur all around us. For example, the path of a local projectile on Earth subject to a uniform uni-directional force (namely gravity) is a parabola. In other words, if one does not take air resistance into account, that applies equally to arrows, artillery shells and tennis balls. If such things seem unimportant you should remember that it was an understanding of parabolas that allowed Europeans to defeat the Ottomans and other 'eastern' Empires: the Westerners mortars were simply more accurate.

Cutting Up Cones
A parabola is known as one of the conic sections. Circular cones are generated by a line inclined to an axis which, when subject to circular motion, generates the surface of a cone. If this surface is then intersected by a plane, the curves so made are known as 'conic sections', and they are variously ellipses, parabolas, and hyperbolas. Ellipses are closed and essentially squeezedmiddleware)circles. By contrast, parabolas are in some sense intermediate and are not closed because the plane that generates them is parallel to the generator. Hyperbolas consist of two curves which like parabolas go to infinity.

Cones are part of everyday life as evidenced by ice-cream cones, pine cones, traffic cones, and conic volcanoes. Even conifers, which produce pine cones, are themselves essentially trees with a conical envelope.

The paths of planets and comets are approximately ellipses, and that is because we are talking about bodies that are attracted by the Sun's gravitational force. On the other hand, when atomic particles interact and are of the same electrical charge they repel each other and their trajectories are hyperbolas. They come from afar and then are deflected to go away.
Parabolas in Use

Illuminating Ideas
Let us now go on to examine the many applications¹ of parabolas, and their significance in scientific development². The use of the term ‘focus’ should give us a clue³. A parabolic mirror used with a light source⁴ at the focus can give us a car’s headlamp⁵, or a searchlight⁶. Invert the process and parabolas can be used to create a telescope where the image of a distant object is to be found at the focus. It is believed that the Ancient Greeks used a parabolic mirror directed at the Sun to ignite the Olympic torch. Archimedes used a similar mirror to set Roman ships alight⁶ during the siege⁷ of Syracuse (214-212 BCE⁸).

Parabolas also have structural applications and arguably¹⁰ the most famous is Newton’s Bridge (see photo on p. 79) in Cambridge. However, all catenary¹² or suspension bridges are approximately parabolic both in the catenary providing the support¹³ and the shape¹⁴ of the road supported¹⁵. The same can be said of all arch bridges and dams¹⁶.

So are arches in churches parabolas? In most cases the answer is ‘no’. However, parabolic arches are a feature¹⁷ of Catalan modernist architecture and can be seen in many buildings in and around Barcelona.

The Whispering¹⁸ Gallery
There are several buildings around the world that make use of the way that ellipses can focus sound. One of the most famous is The Whispering Gallery in St. Paul’s Cathedral, London. Inside the dome there is an elliptical walkway that runs¹¹ right round the edge¹² passing through the focus points. Since¹³ sound waves¹⁴ all bounce¹⁵ from one focus to the other, you can hear someone whispering¹⁸ on the other side of the gallery even though he or she is 30 metres away.
Riding Parabolas

Human beings are most comfortable when undergoing uniform acceleration, so the design of roads employs parabolas when varying the elevation, but not every road designer knows that both the entry and exit to a change of elevation should be a parabola and should be taken at a uniform speed. Indeed the designers of road bumps deliberately try to ensure a lack of smoothness. Perhaps the most extreme example of the human gravitational interaction has been employed in the training of astronauts who are able for a short time to experience weightlessness when aboard an aircraft that is put into an almost vertical path following a parabola.

I wonder what the Ancient Greek mathematicians, who got such enjoyment out of the elegant results they were able to prove, would make of the modern-day world in which their knowledge has been applied to physics and to engineering.

The Serious Mathematical Bit

The mathematical equation for a parabola is \( y = x^2 \), where \( x \) and \( y \) are Cartesian coordinates. That is a special case, and to follow the particular properties of a parabola we turn the problem on its side and introduce the concepts of a focus at \( x = a \), and \( y = 0 \), and a directrix, a line given by \( x = -a \). The parabola is then defined by points that are equidistant from the focus and the directrix. It is quite a simple matter to prove that in this representation the equation for the parabola is \( y^2 = 4ax \) and that it is described by a single variable \( t \) being defined by \( y = 2at \), \( x = at^2 \).

Nesting Parabolas

All parabolas can be scaled to one another – that is, they are geometrically similar and if one varies the plane of intersection with the cone, parabolas are ‘nested’; in other words even when they are projected onto the same plane they do not intersect.
The Essential Signs of Mathematics

The Simple Arithmetic Signs
The plus sign (+) seems to have emerged in Europe around the year 1500. It is a simplification of the Latin word et (= and). It is therefore equivalent to the ampersand (= &). The minus sign (-) is probably an abbreviation of the tilde written over an ‘m’ (i.e. m̆), which represented ‘minus’ in mediaeval maths.

The division sign (٪ or ÷) was originally used for subtraction. Technically it is known as the ‘obelus’ and it began to be used for division in the mid-17th Century.

The multiplication sign (x) was introduced in 1631 by William Oughtred. It was chosen for religious reasons and represents a cross.

The equals sign (=) was invented by Welshman Robert Recorde in the mid-16th Century. They represent two parallel lines because, in the words of Recorde, “no two things could be more equal”.

From Zero to Infinity
The number zero was not part of early counting systems and was only invented in India in the 8th Century. The Ancient Indians did their calculations using pebbles in the sand (just as the Ancient Greeks did their geometry in sandpits). It has been suggested that the form of the number ‘0’ represents the mark left in the sand when a pebble was removed.

John Wallis introduced the infinity symbol (∞) in 1655. It may be a version of the Latin symbol for a thousand (CIL), which was sometimes used for ‘many’. However, the fact that the wee circuit has no beginning and no end makes the sign ideal for the purpose.

Percentages & Square Roots
The percentage symbol developed during the Italian Renaissance. It started life as per cento. This was gradually abbreviated to ‘pcº’ which morphed into p%. Finally, the ‘p’ was dropped in the 17th Century.

‘Brackets’ comes from the Spanish bragueta, when this word referred to a codpiece – presumably a reference to the shape!

There is some controversy as to whether the square root symbol (\(\sqrt{\cdot}\)) comes from the Arabic letter ج (called ‘Jim’ to his friends) or whether it is a corruption of the letter ‘r’. The supporters of the Arab theory say that ج is the first letter of jadhur, which means ‘root’ in Arabic. Those who support the ‘r’ say it stands for radix (= root) in Latin. Take your pick.

1Weilshman – man from Wales
2pebble – small rounded stone
3sand – particles of silicon (e.g. in a dune)
4just as – in the same way that
5sandpit – area of sand
6to remove – (false friend) take away
7wee – (Scots) little, tiny
8to develop II – evolve
9to drop – (in this case) eliminate
10bracket – parenthesis (formal). We talk about round brackets: ‘( )’ and square brackets: ‘[ ]’
11codpiece – (historical) bag or container worn in the 15th and 16th Centuries over a man’s genitalia (often accentuating them)
12shape – form
13whether – ‘if’ (but ‘if’ cannot be used before ‘or’)
14to support – (in this case) back, defend
15to stand for (stand-stood-standing) – represent
16to take your pick – you choose
Maths Phrasal Verbs

There are nine maths-related phrasal verbs you should know.

» **to add up**
- In maths ‘add up’ means more or less the same thing as ‘add’. However, this phrasal verb has escaped into everyday English and means to *make sense*. It is especially common in the negative:
  - What they told us simply doesn’t add up.

» **to amount to**
- As a noun, ‘amount’ means ‘quantity’. However, we use it in this verbal structure to mean ‘be the equivalent of’:
  - His actions amounted to theft.\(^2\)

» **to factor in/out**
- include/exclude. In a mathematical context ‘factor sth. in’ means to take sth. into account when making a calculation:
  - The cost isn’t so excessive if you factor in inflation.

» **to figure sth. out**
- solve a mathematical problem; determine, understand:
  - I can’t figure out why my computer doesn’t work.

» **to multiply out**
- eliminate the *brackets*\(^3\) from an equation:
  - You made your mistake when you multiplied out.

» **to round sth. up**
- raise\(^4\) an exact number to the nearest whole number or nearest easily understandable number:
  - The result was 97.63, so I rounded it up to 100.

» **to round sth. down**
- reduce an exact number to the nearest whole number or nearest easily understandable number:
  - That’s $34. It should be $34.90 but I’ve rounded it down because you bought two copies.

» **to sum up**
- conclude a presentation. A sum is a calculation requiring addition. The allusion in the phrasal verb is to producing a result at the end of a process:
  - To sum up, I’d like to return to the problem I mentioned at the beginning of this talk.

» **to take away** [take-took-taken]
- subtract:
  - Now take six away from the total. What does that leave you with?

\(^1\) to make sense (make-made-made) - be a logical conclusion
\(^2\) theft - robbery
\(^3\) brackets - parentheses
\(^4\) to raise - augment, increase
Do the Math!

Mathematics gives us half a dozen expressions that are used in everyday English.

» Do the math (US English)
  = do the calculation for yourself, draw¹ the logical conclusion. This phrase is becoming increasingly common in the UK (both as 'do the math' and 'do the maths'):
  - Why do I live with my parents? Well, I earn $1000 a month and most rents in this town are over $900. Do the math!

» to go off on a tangent
  /ˈtændʒənt/ [go-went-gone]
  = digress /daiˈgres/, change the topic² of conversation:
  - The debate was meant to be¹ about metric measurements but we went off on a tangent and started discussing³ carpentry.

» to square the circle
  = do what is or seems impossible. Literally, the expression means 'to construct a square equal in area to a given circle':
  - They are trying to square the circle if they think they can increase government spending without increasing taxes.

» a square peg¹ in a round hole
  = a person in a situation unsuited⁶ to their abilities or character. You will occasionally encounter 'a round peg⁷ in a square hole' but this variation is less common:
  - Sam says he's not cut out⁸ to be a salesman. He feels like a square peg in a round hole at the furniture store⁹.

» to put two and two together (and make four) [put-put-put]
  = draw¹⁰ an obvious conclusion from what is known or evident. Literally, this idiom means to add 2+2 and produce the result of 4. The expression often means to draw a plausible but incorrect conclusion from the known facts:
  - He had a luxurious lifestyle but no obvious legal source of income¹¹. The police put two and two together and decided to investigate.

Wordplay on "a square peg in a round hole"
Mathematical False Friends

» **calculus** /ˈkælkjələs/  
In the context of mathematics, this refers to infinitesimal calculus (i.e. differential calculus and/or integral calculus). Some people like to add a ‘the’: ‘the calculus’. In maths calculus is uncountable and does not mean the same thing as a ‘calculation’. ‘Calculus’ can be used as a countable noun but only in medicine where it refers to a **gallstone** or a **kidney stone**.

» **radius** /ˈreidiəs/  
Don’t confuse ‘radio’ with ‘radius’. The radius of a circle is half the diameter. Moreover, the bar connecting the centre of a bicycle **wheel** to the **rim** is called a ‘spoke’.

» **billion** /ˈbiliən/  
Across the Anglosphere a billion now usually refers to a thousand million not a million million. However, if you are in the British Isles, **it’s worth checking** which is being referred to.

» **form** /fɔːrm/  
This can refer to a **polygram** but we much prefer to use the word ‘shape’. A form is usually a printed document with **gaps** in it for information to be added:
- A hexagon is a regular six-sided shape.
- Please **fill out** this form and return it.

» **cube** /ˈkjuːb/  
In geometry this word is **reliable**. However, notice that it is the everyday word we use to describe a sugar cube and an ice cube. It is not the word used for any type of container, such as a **bucket** or a **bin**.

» **matrix** /ˈmeɪtrɪks/  
This word may make you think of the movie but ‘matrix’ in maths refers to a **set** of numbers **arranged** in rows and columns.

» **arc**  
The geometrical term is spelt ‘arc’. This is a homophone of ‘ark’, the **vessel** that Noah used (i.e. Noah’s arc). ‘Arc’ should not be confused with ‘arch’ /aːtʃ/, the term for the architectural structure.

» **cipher** /ˈsaɪfər/  
This is a code and not a **figure**. Notice that we call the individual numbers from 0 to 9 ‘digits’.

» **compass** /ˈkæmpəs/  
A compass is an instrument that indicates north. The instrument for drawing circles is called ‘(a pair of) compasses’.

**to add** - include  
**gallstone** - biliary calculus (technical)  
**kidney stone** - renal calculus (technical)  
**radio** /ˈreidiəu/ - wireless (old fashioned), apparatus for receiving sound messages and music  
**wheel** - rim - periphery, edge  
**it’s worth checking** - it is a good idea to check  
**polygram** - shape with many sides, geometric figure  
**gap** - space  
**fill out** - fill in, complete  
**reliable** - (in this case) not a false friend  
**bucket** (UK English) - pail (US English)  
**row** - line, tier  
**vessel** - boat, ship  
**figure** - (in this case) number
The Letters in Maths

Double Letters
Be careful to spell the following words with -ll-: ellipse, parallel, parallelogram.

On the other hand, you would expect ‘triple’ to be written with -pp- (like ‘cripple’¹, ‘nipple’², ‘ripple’⁴ and ‘tipple’⁵, which all rhyme with ‘triple’)⁶, but it is written with only one -p-.

‘i’ or ‘y’
Words from Ancient Greek are often written with a ‘y’ instead of an ‘i’ in English (think of ‘system’ and ‘cycle’). This is true of ‘symmetry’ and ‘symmetrical’ but not of ‘arithmetic’ /əˈrɪθmətɪk/. Notice that ‘cylinder’ and ‘pyramid’ use both -y- and -i-!

Silent ‘h’
Words of Ancient Greek origin often include a silent ‘h’ which may not be included in their cognates in other languages (think of ‘rhythm’). You should be aware of the following spelling: rhombus, rhomboid.

-th- before -m
In contrast to other European languages that change the Ancient Greek spelling (-θμ-) to -tm- in a number of words, English spells these words with -thm-:
arithmetic, logarithm, algorithm

The last word has an interesting etymology. It started life as the surname⁹ of the 9th-century Arab mathematician Mohammed ibn Musa al-Khuwarizmi, whose work on algebra introduced Hindu-Arabic numerals into Europe. This entered English via French as algorisme. In the 17th Century this became ‘algorithm’ under the influence of ‘arithmetic’.

Other Problems
Notice that the preposition and adjective are spelt ‘minus’ (not menos), which is pronounced /ˈmaɪnəs/.

Discreet vs. Discrete
‘Discreet’ means circumspect or tactful¹⁰. The mathematical word is its homophone ‘discrete’¹¹. This distinction creates problems for native speakers, too.

¹to cripple - incapacitate, paralyze
²nipple (UK/US English) - teat (US English), protuberance at the apex of a mammary gland
³ripple - small wave on the surface of water
⁴tippie - (informal) alcoholic drink
⁵we double consonants in English to show that the previous vowel sound is short
⁶instead of - rather than, as opposed to
⁷cognate - etymologically related word
⁸to be aware of - be conscious of
⁹surname - family name
¹⁰tactful - diplomatic, respectful
¹¹discrete - distinct and separate, non-continuous
The Quad- Words
Maths is largely about numbers so it is unsurprising that there are a lot of mathematical words that begin quad-. In English this letter combination is pronounced /kwod/.
Practise saying: quadruple, quadrilateral, quadratic.

The Soft g
The standard pronunciation of g- before e- is /ʤ/ (‘get’ /get/ is an exception). Practise saying: algebra, tangent.

The Long e
A number of words that are easy to understand may be difficult to pronounce correctly because the -e- is long. The most obvious group is the -hedron /ˈhiːdərn/ words. Practise saying: hexahedron, icosahedron, tetrahedron, octahedron, dodecahedron.
- Perfect diamonds are octahedrons.

The corresponding adjectives end in -hedral /ˈhiːdral/:
- If you are writing a poem and you need a word that rhymes with ‘cathedral’, ‘octahedral’ is one of your few options!
The letter -e- is also pronounced /i:/ if you are talking about the most famous anecdote in mathematics: Archimedes /aːkiˈmiːdiːz/ and his ‘Eureka!’ /juˈriːka/. Finally, notice the same pronunciation of -e- in ‘trapezium’ /trəˈpiːziəm/.

No initial e
The words ‘square’ /skweə/ and ‘sphere’ /sfɪə/ shouldn’t present too many problems but be sure not to put an e- on the beginning (Don’t say ‘esquare’ or ‘esphere’).

A Perfect Circle
Make sure you pronounce ‘circle’ /ˈsɜːkəl/ correctly. The proto-Renaissance painter, Giotto, had a party trick which was to paint a perfect circle freehand. Perfect Circle is also the name of an R.E.M. song. Practise saying the assonant term ‘perfect circle’. If you prefer you could always practise saying the assonant term ‘virtuous circle’.

Rationing Ratios
If you know how to pronounce ‘ration’ /ˈreɪʃən/ and ‘patio’ /ˈpætiəʊ/, then you are likely to have problems with the illogical pronunciation of ‘ratio’ /ˈreɪʃiəʊ/.

Footnotes:
1 largely - primarily
2 from the Greek word for ‘seat’, ‘base’
3 usually called a ‘cube’
4 party trick - special ability
5 freehand - (in this case) not using a pair of compasses
6 are likely to - will probably
Pi in the Sky (with Diamonds)

Eyes
Sometimes words can throw you because an -i/-y- is pronounced as the diphthong /ai/. Practise saying:

hypotenuse /haiˈpɔtənjuːs/, sine /sain/ (which is a homophone of ‘sign’), ‘prime’ (number), ‘minus sign’, ‘binary’ and ‘isosceles triangle’ /aɪəˈsɒsəliːz ˈtraiəŋɡəl/.

The /ai/ diphthong is also present in pi /pai/ and phi /fai/. Anglos feel an irresistible urge to pun ‘pi’ with its homophone ‘pie’. For instance, there are currently four books on sale called ‘Pi in the Sky’!

The ‘You’ in ‘Cube’
Notice how we pronounce the -u- in ‘cube’ /kjuːb/ and all the words derived from it. Did you know that the one shape the Cubists never used was the cube?

Pronouncing ‘th’
If th ends a syllable and the next syllable starts with m-, then the th is voiceless: /θ/: arithmetic /ærɪθmətɪk/

However, if th forms a syllable with m at the end of a word, the combination is pronounced /ðəm/.

Practise saying algorithm /ˈælɡərɪðəm/, logarithm /ˈlɒɡərɪðəm/ (which both rhyme with ‘rhythm’ /ˈrɪðəm/).

The Lost Theorem
One expression which will come in useful if talking to mathematicians is “Fermat’s Last Theorem” /fɜːˈmaːz ləːs ˈfɜːrəm/. a calque translation of the French Le Dernier Théorème de Fermat. Notice that some people talk about “Fermat’s Lost Theorem”, which in fact more accurately describes the state of the theorem.

Stress
Many maths terms are readily recognizable but their pronunciation causes a problem because the stressed syllable is not the same one as in other languages.

For example, we stress the first syllable in words ending -agon:

hexagon, heptagon, octagon.

We also stress the first syllable in pyramid /ˈpirəmɪd/.

However, in arithmetic /ærɪθmətɪk/ it is the second syllable that we stress. This is why we talk about basic education as ‘the three Rs’: reading, writing and ‘rithmetic.
THE BOOKSHOPS
You can buy Yes at the following specialist bookstores:

Booksellers
C/ Fernández de la Hoz 40
28010 Madrid
914 42 81 04
administracion@booksellers.es
www.booksellers.es

Central Librera
C/ Dolores 2
15402 Ferrol - A Coruña
981 352 719 / 638 59 39 80
centrallibrera@telefonica.net
www.centrallibrera.com

Come In (Barcelona)
C/ Balmes 129 bis
08008 Barcelona
934 53 12 04
comein@libreriainglesa.com
www.libreriainglesa.com

Come In (Palma)
C/ Sant Miquel 58
07002 Palma de Mallorca
971 71 16 93
palma@libreriainglesa.com
www.libreriainglesa.com

Doña Revis
C/ Gernikako Arbola, N 2 local
48902 Barakaldo - Vizcaya
944 37 81 63 / 664 629 770
donarevis1@gmail.com
www.eurobookonline.com

Eurobook
C/ Fray Luis de León 23
47002 Valladolid
983 399 899
pedidos@eurobookonline.com

In Use Academy & Books
C/ Carles Riba 4
43007 Tarragona
977 29 09 31
english@inusetgn.com
www.inusetgn.com

Librería Donosti
Plaza de Bilbao 2
20005 San Sebastián
943 42 21 38 - ldonosti@telefonica.net

Herso Bookshop
C/ Dionisio Guardiola 18
02002 Albacete
967 50 71 57
herso@herso.com
www.herso.com

Librería Hojablanca
C/ Martín Gomero 6
45001 Toledo
925 25 44 06
info@libreriahojablanca.es
www.libreriahojablanca.es

Librería Pléyades
Avda.de España, 17 C.
Comercial Cánovas local 12
10002 Cáceres
927 22 80 23
libros@librieriapleyades.com
www.librieriapleyades.com

Librería Victor Jara
Calle Meléndez 21
37002 Salamanca
923 261 228 - amaru@verial.es
www.libreriavictorjara.com

Pasajes Libros
C/ Génova 3
28004 Madrid
91 310 12 45 - 1
ingles@pasajeslibros.com
www.pasajeslibros.com

Planet Book Librería de Idiomas
C/ Doce de Octubre 15
14001 Córdoba
957 49 24 86
libreria@planetbook.es
www.planetbook.es

If you would like a specialist bookshop in your area to stock Yes, tell us and we’ll get in touch with them.
THE YES TEAM
We believe this should be an interactive process and as such we welcome all feedback (good or bad!).
- Is there a subject you would like us to cover?
- Is there something we could be doing better?
- Do you simply have a question about English?

You can contact us at:
nick@yes-mag.com and nathan@yes-mag.com

And remember we regularly post follow-up information on our Facebook page (@yeszine) and on the blog on the webpage. Finally, if you want to receive an exercise every week, our monthly newsletter and our methodology pack - all absolutely FREE, please subscribe to our newsletter on the webpage (www.yes-mag.com).
Picture Description: Musicians

A

Look at the first picture again.
» What type of instrument is he playing?
» What family of instruments does it belong to?  
» What type of music do you think he is playing? Why?
» Describe what he is wearing.
» Do his clothes suit the type of instrument he is playing or are they incongruent?

B

Look at the second picture again.
» What types of instrument are they playing?
» What families of instruments do they belong to?  
» What type of music do you think he is playing? Why?
» Describe what they are wearing.
» Do their clothes suit the type of instrument they are playing or are they incongruent?

C

» Is it important for musicians playing live to dress up and 'look the part'? Justify your answer.
» Do you ever go and watch live music? If so, what kind of music do you tend to watch?
» How important is the performance? Is it secondary to the music itself?
» Do you prefer to listen to the same types of music live as recorded?

» Would you consider that classical music and popular music are a continuum or two separate genres?

Now listen to track 12 on the audio download and see to what extent your answers coincided with those of the British woman.

Afterwards, you may want to listen again as you read the audio script on p. 110.
SPOKEN-ENGLISH TIPS
Spoken English is significantly different from the written language: A more limited vocabulary is generally used and it is, by definition, more colloquial. Moreover, spoken English uses many more incomplete or badly constructed sentences. On the other hand, intonation and stress can be used in speech.

HOW TO USE THE AUDIO SCRIPTS
Follow our eight-step process to get the most out of the audio scripts:

1. Before you listen we recommend that you read through the relevant section of the footnotes (not the text itself). This should give you some idea of the subject and help you to understand the more difficult vocabulary as you listen.

2. When you listen the first time, don’t expect to understand everything; listening practice should not be a painful process. Simply see how much meaning you can extract from the recording.

3. Listen more times going back to the footnotes to integrate the information you have.

4. Once you understand reasonably well, do the relevant exercise.

5. Finally, read the audio scripts as you listen again.

6. Stop each time you get lost or encounter a structure that interests or confuses you.

7. Repeat words or phrases whose pronunciation surprises you.

8. Two or three days later, listen to the text again without reading to see if your understanding has improved.

This process is intense and time-consuming. However, it will eventually solve the problem most learners have of relating the spoken word to the written. Once you’ve done that, the rest is easy!
Mini-debates

(44m37s)

1. Debate 1: Free Speech
(18m14s)

First Englishwoman (EW1): There’s been a lot of talking in recent months about whether we should be limiting free speech, I mean, following on from what happened in France with the Charlie Hebdo events. What do you think about that?

First American Man (USM1): Well, I don’t think we should be limiting free speech. I think that people that exercise free speech in an extreme way might be cautious about what they’re getting themselves into, opening themselves up for criticism or even attack. But I think it’s a case of on their own head be it.

Englishman (EM): But also I think the answer from... certainly from the British point of view is of course we should limit free speech, we’ve always limited free speech. You’re not allowed to incite racial hatred, you’re not allowed to incite homophbic violence, you’re not allowed to incite people to gender-based violence. We limit free speech, we already do it. The fact that they don’t in France brings the problems that France is having on itself. But the normal thing to do is to limit free speech. If you’re inciting violence against people, if you are causing a breakdown in the community, then you should be stopped from doing that. That doesn’t mean I’m justifying any individual violence. I’m saying that the state should not allow people to, to avoid these situations.

Second American Man (USM2): I think don’t they actually, I might be mistaken, but I thought there were restrictions on free speech in France. Wasn’t there then the Hebdo murderers wasn’t there a French comedian that make a joke and was arrested, if I’m not mistaken?

USM1: Yes, that is correct.

EM: I don’t know about that. But anyway, I mean, normally Holocaust deniers, you’re not allowed to deny the Holocaust quite rightly.

USM2: Yeah, I think it’s a slippery slope. I mean, I think in society we should, we should not limit free speech but that in saying that both parties should be open to the other side saying that, well, what you said is stupid or it’s not funny or it’s - y’know - incorrect...

EW1: Does that mean to say that we... we don’t accept that we can influence people - particularly young people - and that we have a responsibility to protect young people from completely inappropriate, to put it mildly, points of view expressed in a public way.

USM2: Sure, sure. I think the way I see it, the problem is you have free speech and you have taste. What you decide to say, it can be horrible but I think that comes down to taste. I mean, you could probably said the same thing in a different way, express the same opinion, but - y’know - that, I think it comes down to that. You can have poor taste and get ridiculed for it. But I think restricting free speech is not the way to go.
EM: But I don’t think, I think there’s... there are two separate things here. I mean, you can attack individuals but it’s probably unnecessary, unhelpful to attack the basic tenets of a religion. Just to - sort of - show a contrast in the British way of doing things and the French way of doing things or if you like the Danish way of doing things, which is where all these things started from, one thing is to ridicule Mohamed or whatever and another thing is to ridicule Jihadists. And I don’t know if any of you have seen the film Four Lions. Have any of you seen that?

Everyone else: No...

EM: It’s an absolutely brilliant British comedy about these - sort of - innocent rather stupid young men going off in this case to Afghanistan and then coming home et cetera and - sort of - being a home-grown terrorist et cetera and it just shows quite how ridiculous the whole - sort of - set-up is. You have people who are British to all intents and purposes, they’re British, as far as I’m concerned they’re British, and - y’know - they get brainwashed if you like, go over to Afghanistan, make fools of themselves if you like over there and then come home and want to bring the - sort of - Jihadi thing home. And it is made by moderate Muslims the film and it’s brilliant in the sense of just showing up the ridiculousness of the whole of this idea rather than insulting whatever it is... you know there’s something like a quarter-of-the-world’s religion and that’s just not clever.

EW1: OK... we can draw some clear guidelines though. I mean, certainly talking about British culture we have libel laws, are we suggesting that those are inappropriate? Is it impossible to apply those things? I think most people understand that if you speak a falsehood or publish a falsehood you’re going to be - and rightly so - called to account, public account.

EM: Can libel laws be used for comedy, against comedy? If something’s clearly in a comic context.

EW1: Well that’s the difficulty, isn’t it? The “clearly in the comic”. We have, there are many, many examples where you could say, “Well, because I haven’t reached that problem in my life I can justifiably make fun of an old man stumbling in the street and forgetting his words and talk about ‘senior moments’ and it’s hugely funny.” When you get to the point of having a father who is suffering from those things, it is no longer funny. So the “clearly comic” is very much a moot point, and how we define that?

EM: I think for me that falls into the realms of taste and that is in bad taste. But I don’t... I mean, it’s not likely to cause some sort of breakdown in the community relations in the way that you wouldn’t make laws about incitement to ageism in the way we make laws about incitement to racial hatred.
EW1: OK, I’m going to pose a particular question for you to think about here and that is that when a culture, when a society is confident enough about the premises that establish comedy or learning or when there is confidence and experience then there’s a great deal more relaxation about what you can do and how far you can push things. And the problem with Islam is that relative to British culture, for example, Christian culture there’s a great deal more tension and anxiety and they’re much, much quicker to take offence because they haven’t got that same level of confidence and relaxation.

EM: But I think there’s also an element to which...

EW1: What do you think about that? Second Englishwoman (EW2): Yeah, that’s true, that’s true, but, I mean, I do feel that sometimes that - y’know - that they need to be more tolerant. You know, I mean, the Catholics, the Jews have had - y’know - umpteen - sort of criticisms The Life of Brian - y’know - the Catholics didn’t - sort of - go up in arms about that.

EM: Well, they went up in arms but they didn’t kill anybody!

EW2: But they didn’t kill anybody. Well, this is it, this is it. You know so I do feel, I understand, I see where you’re going - y’know - but I do feel there needs to be - y’know - more tolerance from every side really.

EM: I mean, there’s another question that comes out of that I think is you cannot talk about freedom of speech when you have a concept of freedom of thought. And in all forms of Sharia law you have the idea that

the apostates should be killed.

EW2: Yes.

EM: If you can’t have a concept of freedom of thought, if you can’t decide I no longer believe in this religion, there is a problem there in terms of any attempts to make those ideas conform with any sort of Western liberalism. But again, I think part of the problem is our own problem. I think we create a lot of the problems in our hypocrisy, are any of you aware of the case of Raif Badawi?

EW1: The guy who’s being, was being flogged every Friday for the...

EW2: Oh, yes. Yeah.

EM: Yeah, he’s being, he set up a blog of, for liberal thought in Saudi Arabia...

EW2: That’s right.

EM: ...which does not promote violence against anybody and is not directly injurious to anybody. And he was condemned to pay a hundred and thirty or something thousand dollar fine, a 10-year prison sentence and a thousand lashes, which are being administered in sort of - 50-lash doses. And the tyrant, the dictator, whose regime imposed that on him, all of our leaders go and commiserate over the death of this guy.

EW2: Yes.

EM: That does not send a clear message in terms of value systems. And if we were not sending a clear message, if we’re saying, look, we’re Westerners but we’re hypocrites, then that just feeds into the whole - sort of extremist end of the ideology for me. USM1: OK what about movements like PEGIDA? Are they a big threat to our way of life - more so than Jihadists? Maybe we should explain, maybe Nick you could explain what PEGIDA is.

EM: Well it’s this organization which has come out of Dresden which is ‘the Patriotic Europeans against the Islamization of the West’. I think it’s...
quite interesting the particular case because Germany is currently one of the most multicultural, one of the more successfully multicultural countries in Europe. The problem to some extent with Dresden and Saxony, as I understand it, is that they never received Western television, they were never able to tune into that, and so they’re this sort of isolated part of East Germany which wasn’t sort of, you know secretly turning on their television, their radio every night and finding out how the rest of the world lived. And the curious thing is that in Saxony the Muslim population is 0.1% of the population so basically there are no Muslims there. So this is an anti-Islamic organization, Islamophobic organization that comes out of pure ignorance. They know that there’s a lot of Muslims around in other places in Germany. Whereas in places like Frankfurt, where the population is 20% Muslims, there’s not a problem, they’re not strong there. So, it’s bizarre. I mean, it’s part... I think the bigger question if you like is the whole sort of - sort of - National Front in France question and what terrorism provokes in terms of that drift to the right and that drift of intolerance and that rejection of multicultural society.

USM1: Well, I would say they’re very similar and come out of very similar circumstances to begin with: ignorance of the outside world I would say both in the case of Jihadist as well as in the case of groups like PEGIDA and ignorance of the outside world but peppered with negative information that does get to them. EM: I think it’s negative reality, isn’t it? I mean, the Muslim population is 9% of the population of France and they’re 70% of the prison population. They are completely marginalized in France.

EW1: OK, really what was at the bottom of your question is the question of ignorance. Because if you come from a society or a group that has experience of a Muslim community and is not perturbed by it, then why is a bunch of loonies who don’t know anything going to affect you? You go, “Well they’re loonies and I don’t have to listen to them”. Why are you going to be influenced by what they will say if your experience is different? So it really is down to experience and knowledge and understanding, isn’t that? Whereas Jihad can come blow you up. I would’ve said that is a much bigger threat and needs to be dealt with a much more direct way.

USM1: But going back to - sort of - Martin Luther King Jr’s way of thinking he said actually who is most dangerous is not the extremist but the middle class because they are people that don’t speak out radically due to their education and to not be antisocial. But when it comes down to it and they vote in private they will vote the way they see fit even if... so in a sense he was saying that the middle class is subversive and has a huge powerful vote and so groups that are maybe not so
radical have... are more dangerous than extremists.

EM: But I think there is, there is a very strong argument that this is a way for fascists to get in the back door. The English Defence League's basic raison d'etre is anti... is Islamophobia. The same is pretty much true of the National Front in France. And voting for the National Front has become acceptable in France and that's the really shocking thing. You know, they run here.

EW1: OK at what point do we mention UKIP here?

EM: Yeah, also. I mean, I don't... I think it's probably unfair - sort of - a little bit too comic to describe them as fascists, aren't they? But yes, I think the UKIP comes into it.

EW1: Well, that's only because we're hanging on by our fingernails to the idea that we've got this - sort of - monopoly on how to take the Michael out of ourselves. And if we didn't have that, they would be getting to us big time. But I think the problem is that you're never ever going to get rid of those particular factions in certain societies. I'm afraid to say it's something I believe, I think that the British are close racists, the French are less closet about it but whichever way you squeeze the thing it's going to come out in the end. If it's not antisemitic, it's going to be anti-Muslim. It might take a generation or half a generation to turn around and be something else. You're not going to get rid of those fears.

EM: Sure but one thing is not getting rid of them, the other thing is them taking over the government or taking over the government of major cities.

EW1: OK, so then we come back to the original question is what should we be doing to try and safeguard the government? Should we be limiting what people can actually say?

EM: As I said in the beginning, I think we should be. I think there is a basic need to defend the need to live together and the fact that you know - you don't want to be inciting - just put... sticking fingers in people's wounds is not a good idea. And I think there also needs to be... there is a need to understand the level of victimization which the Muslim community feel. I saw a bit of propaganda on Facebook (I think it was) the other day and it said, “Christians kill Muslims, Jews kill Muslims, Hindus kill Muslims, Buddhists kill Muslims” (that - sort of - reference to Myanmar) “and then they say we are the terrorists”. And I looked at that and - y'know - worked through which countries they were talking about, but then I thought to myself, “Yeah, but you've forgotten one thing; Muslims kill Muslims”. 95% of the victims of Islamic terrorism are Muslims. Islamic terrorism affects no community like it affects the Muslim community. And I think that just going about this more intelligently and saying, look, this is what happens if you go down this road, rather than - sort of - y'know - painting them out as the - sort of - the devil incarnate and putting a huge sector of the European population in the case of Europe against the rest of the population is not gonna solve anybody's problems. And the irony of the whole thing of course is that because of the low-level constant terrorism against the French Jewish community, large parts of the French Jewish community are going and living in Israel, which is just perpetuating the problem. It’s a vicious circle, it’s madness.

USM1: Going back to the original question of this debate was whether we should think about limiting free speech or whether there should be limits on free speech, I think one thing we should differentiate between are two types of speech. And I actually don't believe that hate speech is free speech. I think it's... there are two different things and with the idea that my rights stop when they begin to encroach upon your rights. And hate speech I think is that and it's not freedom it's taking liberties.
American woman (USW): There is a lot of talk in the news about surrogate mothers and adoption, even speak about ‘the adoption industry’. Do you think this whole thing is out of control?

Irishman (IM): Invariably, yeah.

Englishman (EM): I think there’s different questions there and there are different situations. Adoption is one thing, international adoption is another thing...

IM: To call it an ‘industry’ is another thing.

EM: Surrogacy is another thing, sperm banks is another thing. I mean, are you referring, for example, to the situation with ‘Payton’ in Ohio?

USW: That’s one case, yes.

EM: Which is, I mean, the case of a couple who went to a sperm bank, asked for one type of sperm and got another type of sperm back and then – sort of – said, “We’re unhappy with the product and we want some compensation. It’s not like we’re going to take it back”, but...

American man (USM): I think it’s a little bit... there’s a little bit more to the story. But, yeah, I mean, there’s obviously negligence on the side of the sperm bank. First of all, none of it’s digitalized. Apparently, they do everything, everything is handwritten, all the records, so a problem like that, I think they wanted Donor 380 and they got Donor 330, something like that. But, if I read the report correctly, I think they knew before she gave birth that she was going to give birth to a mixed-race baby.

EM: First, coming from... from Ohio, the argument that they live in a racially intolerant part of Ohio and that is going to increase expenses and they’re gonna have to go to another part of town to get haircuts and a part of town where they’re not going to feel very welcome, does that make sense? Because from a European point-of-view, from a British point-of-view that sounds like hokum.

USM: It does... it doesn’t make sense no, but I can understand where she’s coming from.

EM: I mean, from...

IM: But it’s also - kind of - in a way though it’s slightly racist.

USM: It is, it is.

EM: But...

USW: Well, I think if you... parents of mix-raced... Mix-raced couples bring up the issue and they talk about it, what it is going to be like for their child to... so, at least knowing before it’s gonna happen, being caught with that surprise that’s a very, very unusual situation. There is some damage caused there.

IM: Yeah, it’s something to get over initially, but to sue is another thing.

EM: OK, without any wish to discriminate...

USW: Suing is the way you do things in America. Start with that.

EM: Without any wish to discriminate against anybody, isn’t this baby...
girl gonna have as much or more discrimination because she has two mommies than because she is a slightly different colour from them.

USM: That’s… I think that’s part of the case that she’s saying that she… growing up in this town it was hard enough for her, not growing up in a community where there were lesbians. And being a lesbian couple with a mix-raced child her argument is that she wanted to try to avoid as much as possible a…

EM: Surely the people who are going to discriminate on one thing, are going to discriminate on the other, and they’re not going to discriminate more. It’s not a scoring system.

USW: But it’s not immediately obvious. That’s one of the things you know. That’s part of it you… no one, when you’re a kid in a school, people don’t have to know who your parents are.

IM: Yeah.

USW: Or at least your classmates don’t understand your situation for a while. But the race issue that’s apparent all the time. There’s some… you should talk to Kim Kardashian about it. She was…

IM: Yeah. Well, I mean, I have a couple of friends in LA, they are Spanish and American. They’re gay mix-raced couple and they’ve three mixed-raced adopted children, so…

EM: Of the same mix?

IM: No.

EM: Right.

IM: I’m pretty sure they’re not all… some are Latino, others are African-American. So, you’ve got a really mixed bag there, right? And for me it was - like “Wow, this is so amazing!” at the same time because they were able to adopt three children fairly easily. And I think the adoption practices in America… Here is one good mark for America, the adoption practices in America seem to be pretty good. You know, people are allowed to adopt, they can get adoption…

USW: Were they adopting in the US or outside?

IM: In the US. Well, they live in California. But they have three children they’ve adopted. They are helped out financially by the government, they’re given money for each child till they’re 18. The houses are fixed up to make sure that they’re properly safe for children to live in. I mean, they were explaining to me and I thought, “Wow, that’s amazing!” It should be like that everywhere because people who want to adopt and can’t because it’s too expensive. This seems like the right way to go. I’d rather see children in families than in adoption or in foster homes. But… yeah, I mean, so… I mean, but one of the things that happened to him was that he was bringing his child to school and some, and he was walking out of the school with his youngest son and an African-American guy came over and stopped him and tried to call the police because he thought he was kidnapping this small black baby. I mean, it’s just ridiculous and the guy was going, “No, it’s my son” and he’s like “How do you mean it’s your son?” You know people are just so unused to this and they’re not quite able to accept it yet. And for that to happen to me is like, come on. It’s ridiculous!

EM: I think, well… I think perhaps you’d have to have a great deal of interpersonal skills to do it properly. I’m quite pleased that somebody is - sort of, you know… seeing a child leaving an establishment with somebody who might not be his father…

IM: Fair enough.

EM: And saying, “Can we just make sure this is right?” I mean, we’re in a society where people just don’t intervene. Now…
IM: Well, at the same time though, all you have to do is ask the person. Because if he had to explain himself everyday he’d never be able to walk down the street. It’s like people have to accept that if somebody is with their kid and that kid isn’t screaming or bawling their eyes or I mean: it’s like, “Hello this is my son”, “Oh, OK sorry”. You know, I think in a way in the States that kind of thing should be more... it be less likely... you wouldn’t see it in Mullingar in Ireland probably, no.

USW: Yeah, well there’s so much panic about kidnapping.

EM: Yeah.

IM: Sure, fair enough. Yeah, I agree, I agree.

USW: In California you have these Amber alerts and things like that with missing children. So there’s no reason to think that - y’know - that might not be happening.

IM: Yeah, unfortunately it’s a reality. You’re right, yeah.

EM: Going back to the case, I think once we say the American way is litigation then - y’know - then it’s - sort of - logical. The company has clearly made a mistake and...

USM: I think, yeah, yeah. I think... for me the company made a mistake and they have to pay for it. What this couple is doing wrong, in my opinion, is making it public because once this

Payton grows up she’s going to be able to read all of this and read what they’re suing the company for and it’s not good, it’s not good for her.

IM: Yeah, it's out there and it creates a stigmatism... a stigmatism?

USW: A stigma.

IM: A stigma, yeah, that... we can edit that bit out, right?

EM: No, it’s staying in there!

IM: No, that can’t be ever - kind of - gotten rid of!

EM: They must have - sort of - weepy eyes as well! I mean: I think probably the most controversial case last year in 2014 was the whole case of ‘Gammy’ and the Australian couple who had organized a surrogate mother in Thailand and then left... she ended... it turned out that she ended up having twins and they left the boy in Thailand because he had Down’s syndrome. And I think the case is even - sort of - more complicated than that. I mean: do you just say that once you start going down the surrogate-parent path then it’s your problem and you just have to take what you get? Or how can you legislate these things?

USW: Well, that’s where there’s the rules for adoption have been very strict in some countries and you mentioned something before we started recording about laws and... what was it? ...backlash going on with the legislation on adoption. I think - y’know - being a parent is such a huge responsibility...

EM: But it’s not... it’s not quite
adoption is it?
USW: ...adoption or surrogate parents\textsuperscript{134} or anything that has to do with\textsuperscript{183} the future of a child.
IM: But at what point was the child diagnosed with Down's syndrome? Because there are tests that they can do.
USM: They knew beforehand\textsuperscript{184}, but the surrogate mother\textsuperscript{123} was Buddhist and so she refused to have an abortion.
IM: Ah, OK. So, and she has kept the child?
EM: She has kept the child.
USM: Yeah.
IM: Well, I think that's probably... I think personally that's the right thing to happen because...
EM: Right.
IM: Because whoever was adopting this child is not fit\textsuperscript{185} to be a parent\textsuperscript{182} to begin with because if you started to go down that road\textsuperscript{186} you continue down that road.
EM: Well, they have adult daughters, this Australian couple, and, I mean\textsuperscript{1}, the worrying thing... I mean\textsuperscript{2}, what I was mentioning beforehand\textsuperscript{187} was the whole process of going from - sort of\textsuperscript{25} - no legislation in the case of Thailand, to possibly overreacting. I mean\textsuperscript{2}, they're going to make surrogate motherhood a criminal offence\textsuperscript{188} as I understand it from now on.
IM: Well, I don't believe in that either.
USW: So, they're going to penalize women who are trying to...
IM: For some people is the last option to having a child.
EM: Yeah, but also I think it's a way of earning money which is, if it's done in the right way, is perfectly dignified et cetera, et cetera for Thai women. I mean\textsuperscript{2}, it's better they're doing that than - sort of\textsuperscript{25} - going into prostitution or something. But the worrying thing of the lack of\textsuperscript{189} legislation previously as I think you were saying is that the father is a convicted paedophile.
IM: Should have seen that one!
EM: So - y'know\textsuperscript{6}, I mean\textsuperscript{2} - presumably it would be illegal in Australia for him to go through the surrogate process. That maybe why they went to Thailand.
USM: No, there are some parts... I think they did it... there are certain parts of Australia where it's not illegal. I think where they live in Western Australia is, it's legal for them to do it.
EM: Anything goes in Western Australia!
IM: Yeah, yeah, you can have a... a kangaroo could have your child. I'm kidding\textsuperscript{190}. I'm in trouble now!\textsuperscript{191}
USW: My favourite scene in the movie Parenthood is where Keanu Reeves - kind of\textsuperscript{132} - blows up\textsuperscript{92} talking about his dad and he says, “You know you need a license to carry a gun, you need a license. You even need a license to own a dog, but they'll let any bleep bleep bleep\textsuperscript{93} be a father!”
IM: Yea. What was that film?
USW: ...and that's kind\textsuperscript{169} of the thing. Parenthood, a movie called Parenthood.
IM: Oh, yeah. Yeah, I mean\textsuperscript{2}, I don't know it's a difficult one because at the end of the day\textsuperscript{194} it's hard\textsuperscript{195} to put... in a way to put certain laws on parenting, you know? And who's fit for parenting\textsuperscript{96}, who isn't fit, is anyone fit for parenting?\textsuperscript{96} You know it gets down to\textsuperscript{97} that because you can't make a decision as to who...
EM: I think a convicted paedophile...
IM: Certainly a convicted paedophile. No, a convicted paedophile, yeah, absolutely. It's like...
EM: It's on the other side of the line!
IM: Yeah. It should be the first box\textsuperscript{98} on the...
USW: Yeah, but then other people would say that two women wouldn't be good parents\textsuperscript{199}, I know that's...
EM: I wouldn't.
USW: You wouldn't but some people might.
IM: What? You wouldn't what?
EM: I wouldn't say that two women... that two people are not fit\textsuperscript{200} parents\textsuperscript{134} just\textsuperscript{24} because they're two women or two men.
IM: Oh no, not at all.
EM: But, I mean\textsuperscript{2}, the weird\textsuperscript{201} and to some extent\textsuperscript{71} this - sort of\textsuperscript{25} - rounds the whole thing off\textsuperscript{202} with the whole... getting back to\textsuperscript{203} the whole situation in America and the litigation and everything. The end of the story is that this thing was made public because baby Gammy, the baby with Down's syndrome, needed medical treatment\textsuperscript{204}. The thing went public\textsuperscript{205}, went global and $250,000 was collected, which I imagine in Thailand is a fortune.
IM: A lot of money.
EM: And so - y’know^18 - you - sort of^25 - end up with a situation where probably the baby, once it’s diagnosed with Down’s^178 syndrome, is going^10 have the best possible treatment available.

IM: Well, if that woman knows... is using her money correctly and is not, I don’t know, I don’t know what happened to the money, but if the money is there and they use it properly^164, great.

EM: I think given the fact that this is somebody who for religious convictions decided to confront a situation of having a baby with Down’s^178 syndrome, I imagine she’s probably...

IM: But is there a trust^206, is there a fund where the money is used for... are they - kind of^132 - “Here you go.

Here’s a quarter of million” or is it like the money is being used in the right way because obviously we don’t... I don’t know anything about this person’s background^207.

EM: I imagine it’s being collected by more than one organization and probably there are people who have collected it in a better and in a worse way but I just^24 don’t know.

IM: Yeah, I mean^2, it’s wonderful, you really... the outpouring^209 of help from people is always amazing^209. I think it shows what people are really like and that’s great. In that case I hope it goes to the right use definitely.

EM: But it’s a complicated issue^136.

IM: It’s a complicated issue^136, yeah. At the end of the day^104 if people really want to be parents^134 they should be allowed to^3 find a way to be parents^134. It’s filtering those who aren’t fit^200 to be parents^134 along the way^10. That’s the important thing.

EM: But, I mean^2, that includes a significant proportion of heterosexual biological parents who are not fit to be...

IM: Oh, absolutely, there are people who might... but sometimes you don’t know what kind^169 of parent^182 you are until you become one and then it’s too late!

EM: What kind^169 of parent^182 are you?

IM: I’m doing my best. It’s a day by day thing you know. But it’s a great experience.

EM: Excellent.

3. Debate 3: Metric (12m00s)

First American Man (USM1): OK, guys, how metric are you? Do you think in miles or kilometers? I know, I know myself I still think in miles^211 and feet^212 and inches^213. Having been out of the States for some time now, I have gotten accustomed to baking^214 and using grams and kilos for weight, but anything with distance I’m still - kind of^132 - locked into^215 the miles^211 and feet^212 and inches^213.

Second American Man (USM2): Well, It’s funny^26 you say that because I still... I’ve actually^1 transferred to being more metric having also been outside of the US for quite some time, but when I was studying biology everything that we had to do in weights and measures was metric.

USM1: Was metric, yeah.

USM2: But the fact that... like in your case, you don’t normally drive a car, whereas^26 I drive a car a lot an so now... and I’m living outside the States now I’m used to^217... living in Europe I’m used to thinking more in kilometers.

USM1: In kilometers, yeah.

USM2: But when I go back^218 to the States I still imagine the distances there in miles.

USM1: In miles, yeah.

USM2: It’s, it’s like, it’s unique to each region. I couldn’t tell... I don’t have a clear concept of how far it is between European cities in miles.

Englishman (EM): What’s your weight?

First Englishwoman (EW1): Because you don’t have a clear concept of distance anyway. You only talk about time. I’ve had this problem over and over and over again^219. You ask an
Second Englishwoman (EW2): But, you know, I've... from living - *y*know18 - from living in a metric society for so many years I really feel - *y*know18 - much more metric.

EW1: Oh, me too.

EW2: I really do, and when I'm in the UK and it's - *y*know18 - it's miles and I might even think, oh, you know how many kilometres is that?

EM: I do220 both miles and kilometres in my head...

EW2: Yeah.

EM: ...but I prefer to drink a pint221.

EW2: Well, this is it.

USM2: I don't drink a liter.

EW2: I don't think we'll be asking for 575 millilitres of Guinness!

EM: No, but it's not a huge91 difference with the litre, with a half a litre, is it?

EW2: Yeah.

EM: But, no. I mean2; it's weird222 the things that are hangovers223.

EW2: Yes.

EM: And I think all over the place224 like horses. Are horses measured in hands all over the world?

USM2: In the States they are.

USM1: Yeah.

USM2: Well...

EW2: Why? What are they measured in?

EM: Hands.

EW2: In hands, yes.

USM2: You know where things are funny is now you, Susie, you say that you're metric but when you make weight-loss225 goals226 you talk about half stones and stones and things like that.

EW1: No, I don't!

USM2: Oh, I've certainly heard you say stones. You could tell me what stones are but I had no idea how much. I hadn't even heard of stones.

But where it's really funny is Ireland because they go back and forth227 between... it depends on what you're talking about. They're always... temperature is always metric but weight can be - sort of228 - stones, in fact I remember I was a teenager, I was metric system arrived and I can remember I was a teenager, I was hugely44 relieved229 because everything was in, on the basis of ten and you could count and it was all very sensible230 and it made sense31 from that point in231.

USM1: Sure. I'll give you that234.

EW1: And the whole thing revolves around235 whether you can drink pints222! Well, what's a bottle? What's a bottle of wine?

USM2: Bottle of wine is 750...

EM: More than a pint221.

USM1: Milliliters.

EW1: 750 what?

USM2: Milliliters.

EW1: Exactly, exactly so, do you drink wine or do you drink pints222? I mean2, this is what it's all about really, isn't it?

EM: But Fahrenheit's still quite strong in America, isn't it?

USM1: Yeah, yeah, yeah.

USM2: Oh, absolutely. I mean2, the metric system is relatively secondary in the US. I mean2, it's... it's, yeah, it's completely secondary.

EM: So we're actually13 quite a long way down236, we're quite progressive in Britain even though it's taken...

USM2: Oh, absolutely.

EM: ...in 30 years we progressed a little bit in terms of getting rid of237.
these things.

**USM2:** Oh, yeah, absolutely. In the States it’s completely standard.

**EM:** Should we go for a metric decimal world in everything that is reasonable? I mean, should we stop buying half a dozen eggs? Should we, I mean, obviously we can’t, you can’t change minutes and hours and days.

**USM1:** Well, what you would buy if you didn’t buy a half a dozen?

**EW2:** What would you buy eggs in, tens?

**EM:** Tens, why not?

**USM1:** OK.

**EW2:** Now that’s strange because we actually bringing up about that - y’know - eggs. I mean, in every country - y’know - be it metric or otherwise it’s always half a dozen.

**EM:** The boxes grow naturally on the tree with that form!

**USM1:** Well, what... I’ve got a question for you then, what would the baker’s dozen be?

**EM:** 13.

**USM1:** Still? You wouldn’t change that.

**EM:** Well, if you’re saying dozen.

**USM2:** Unless you had a metric bakers’ dozen in which case it’d be eleven.

**EM:** It wouldn’t be a dozen, would it?

**USM2:** It would be eleven.

**EW1:** OK, I think there are a couple of lines being crossed here.

**EM:** Uh oh!

**EW1:** Being someone who is - kind of - interested in cooking and I do like the metric system but I loathe having to follow recipes, especially when it goes, “Make sure to the nearest gram”. The nearest gram is just a silly... it’s just a silly amount of weight. I like using cups, now what is cups?

**USM1:** Well, it depends on what we are talking, yeah, you have to differentiate between cooking and baking.

**EW1:** Is cups metric, nonmetric?

**EM:** It’s nonmetric.

**USM1:** Cups is not metric.

**EM:** It’s not imperial, but is not metric.

**EW1:** Well, I’m not sure what it is though because it changes all the time. How can you... I made pancakes the other day, how can you mix a cup of flour and a cup of milk? I mean, what are you mixing?

**USM1:** Well, there’s liquid, there’s liquid...

**USM2:** It’s volume.

**EW1:** It’s volume, isn’t that? It’s nothing to do with it.

**USM1:** Yeah, but there’s liquid cups and for dry ingredients.

**EM:** Yeah, it has to do with your litres which is volume rather than to do with your pints or your weight.

**EW1:** It feels more traditional. I have to say I quite like the cup system because it feels quite traditional and cooking is about being traditional as far as I’m concerned and not about being technical I don’t like being technical when I cook.

**USM2:** You say traditional, I think that’s one thing. I don’t think that we should impose metric on everything because things like dozen or half dozen or stone they’re not just measures they’re also words which is language and language is culture. I think they’re equivalent. And I think the more that we impose metric on everything the more that we homogenize everything and take out regional idiosyncrasies.

**EM:** This to me sounds like a hideous excuse, having imposed the English language on the world, having imposed GMT on the world, having imposed Anglo holidays on the world, we are now going to say, “No, no we want... we’re going to keep our gallons because that...
I think we better stop this. But what's the problem with having Fahrenheit in the States? It's not hurting anyone.

EM: Because when the BBC, when the BBC World man, the nice man on the weather goes around the world and gives the temperature everywhere and then in a different coloured thing, in a different, in a whole different system in just that part of the world. Everywhere else in the world is based on Celsius, is based on Centigrade.

USM1: Well, is he giving that information to people living in the States? If so, that's the correct thing to do.

EM: Yeah, but given the fact that the rest of the world has given up so much in globalization to our advantage if you like in terms of accepting English and Anglo holidays and now we're having things like Thanksgiving all over the place and blah, blah, blah, blah to sacrifice your gallons or sacrifice measuring your horses in hands or whatever is a pretty small sacrifice by comparison, isn't it?

EW1: Yeah, but if you follow your logic, we should be... we should be forcing everybody to think in terms of gallons then.

USM2: No, the opposite.

EM: No, I'm saying... I'm saying. No, what I'm saying is that we forced everybody to make English the lingua franca. EW1: Yeah, yeah.

EM: We've forced everybody to accept that Greenwich defines the time in the world. We've forced to everybody to accept that the world... you know if you go to Rabat you still have people celebrating Christmas and you have - sort of - Father Christmases on the streets in Rabat, which I've seen with my own eyes. You still have all of these holidays which come from the Angloosphere. Christmas trees, all of this rubbish.

EW1: So?

EM: And... but he's saying, no, no we have to defend the idiosyncrasies when the idiosyncrasies are our own, even though we've destroyed the idiosyncrasies of everywhere else in the world.

EW2: No, we haven't destroyed, we've enhanced, we've added to...

EM: Imperialist, typical American!

USM1: Well, they've accepted it, those societies have accepted those things. It wasn't by imposition.

EM: Right, yeah, but if the idea is that the way the world economy grows is by globalization, an important part of globalization is homogenization, standardization. And having - y'know - having a situation where marking road distances in miles makes traffic and everything more difficult. And the same with everything else, marking everything in fluid ounces or whatever makes things more difficult. It'd be much simpler if everybody used the same system.

USM2: So, you don't want me to get all imperial on you, but you want to be imperial on me. I don't want your, I don't want your kilometers.

EM: Oh, you don't want my kilometres. OK, well, you can do without them. But do you think in inches?

USM1: I do.

USM2: Yeah.

EM: I do but that's because I worked a lot... when I used to work as a carpenter.

EM: Carpentry.

USM2: That's a funny one. For example, in general around the house I think about things in - kind of - metric, but if you were to ask me about size of lumber, pieces of lumber, I would only think in inches.

EW1: I think we better stop this debate right now!

USM2: No, no. I think in terms of two-by-fours, not by whatever it is. I don't know what...

EM: A two-by-four is what exactly?

USM2: Oh it's...

EM: Two inches by four inches?

USM1: Not necessarily.

USM2: Actually, it's 1¼ by 3½ or something. Yes, that's the idea.

EM: There's something, what is it? One of the measurements... there's avoirdupois and there's two different things. It's not... is not tons. It's...

USM2: What? Tons, the metric tonnes?

EM: No, there's the tons and metric tonnes. No, but there's something else where it's not... there isn't actually the same... there's two different measurements, there's an American measurement and a British measurement for... is it a yard or something. I think they're slightly different or quite a lot of them are slightly different. But anyway...

USM2: British and Americans are slightly different in general so...

4. Maths Pronunciation (5m56s)

Commentary: listen to the article on the pronunciation of mathematical terms (pp. 82-83)
Improvisation: Soft Pawn
(11m59s)

Sean King (SK): How you doing?
Welcome to Soft Pawn. My name is Sean King. I’m your ‘King Pawn’ so, what have you got for me today?
Dean (D): Hey! Hey, Sean. I’m Dean.
SK: Dean, nice to meet you.
D: Nice to meet you, too. Hey, I’ve got something I think you might be interested in.
SK: Great! Let’s hear it.
D: Well, you see, here I’ve got a pair of Nike Air Jordans. They’re sneakers.
SK: Ah! Interesting...
D: They’re not – y’know – your ordinary pair of Jordans. They’re collector’s items really because they were worn by the man himself: Michael Jordan.
SK: Wow! Now you’re talking!
D: Yeah, and they’re signed by him.
SK: Ah! They’re signed as well?
D: Yeah.
SK: But do you have any proof now that they’re actually his? Do you have any, anything beyond... I mean, is the signature valid? We’ll have to look at that.
D: Well, I’ve got a picture I took with him when he signed the shoes and the shoes are in the picture. So I don’t know, we could, we could...
SK: So, you’ve a picture of him signing the shoes that you say are the shoes you have with you. Well, is that all you have in... regarding proof?
D: It’s a bit tenuous if you don’t mind me saying so.
SK: Well, yeah I don’t have any more than that but I think that’s enough. The shoes haven’t been washed. I mean, we might be able to get some DNA off them.
SK: Well, yeah but that’s gonna cost money and no one wants to spend money on DNA testing. I mean, come on! We don’t have all day really. What I can do here... I hope you don’t mind the cameras by the way.
D: Yeah, I was just gonna ask you, you’re filming this?
SK: Oh yeah. You know those... it’s one of those reality shows. Y’know, they came in and asked me would I mind filming in the shop. So if it brings in more people, I’m happy and I’ll be back to you right then.
D: Sure.
SK: But, in the meantime... hello, first time in the shop?
Lady Customer (LC): Hi, hi. How you doing?
SK: How you doing?

1 ‘how you doing?’ - (informal) how are you doing?, how are you?
2 ‘wordplay on ‘king prawn’ (= big crustacean)
3 ‘sneakers’ (US English) - trainers (UK English), running shoes
4 ‘y’know’ - (pause filler) like, sort of, kind of, I mean
5 ‘item’ - article, artefact
6 ‘to wear sth.’ (wear-wore-worn) - put sth. on, use sth.
7 ‘now you’re talking!’ - excellent, cool!
8 ‘as well’ - too, also
9 ‘proof’ - evidence
10 ‘actually’ - (false friend) really, in fact
11 ‘I mean’ - (pause filler) y’know, kind of, sort of, like
12 ‘signature’ - autograph
13 ‘regarding’ - as regards, in terms of
14 ‘gonna’ - (slang) going to
15 ‘just’ - (in this case) simply
16 ‘a hand’ - handshake
17 ‘waiver’ - document renouncing one’s personal rights
18 ‘just’ - (in this case) simply
19 ‘shake of the hand’ - handshake
20 ‘to get sb. on sth.’ - (get-got-got) - ask sb. to investigate sth.
21 ‘just’ - (in this case) simply
22 ‘in the meantime’ - meanwhile

Photo by Joe Mabel
**LC:** Oh, are you Sean?

**SK:** Sean King here. King Pawn, Soft Pawn. Yeah.

**LC:** Hi Sean, nice to meet you. I've heard great things about you.

**SK:** Really from who?

**LC:** Yes. I read them in the paper.

**SK:** Oh, don't believe everything you read.

**LC:** Oh, OK.

**SK:** And half of what you see!

**LC:** I've brought in something. I was gonna ask though, do you carry Wild West memorabilia anywhere?

**SK:** We certainly do.

**LC:** What have you got?

**SK:** What have you got?

**LC:** What do you, what have I got? I was asking what you've got?

**SK:** Are you bringing something to me or I'm giving something to you?

**LC:** I'm asking, I'm just asking, I'm looking around.

**SK:** Whatever you want, we got it. I've been collecting Wild West things... since I came here to America I've been collecting Wild West stuff, absolutely love Wild West stuff.

**LC:** Can you show me some knives or some guns?

**SK:** I'll show you whatever you like.

**LC:** Oh, let's have a look at what you have.

**SK:** Well, we've got a wide selection of Remingtons and we have some old Colts. So, we have a lot of pistols and guns. Some of them work, some don't, you know yourself. And we've got, well, we've got everything really. We've got a lot of memorabilia, some is expensive some isn't. It depends on what kind of collector you are.

**LC:** What's this Remington here go for?

**SK:** That's about $8,000, that one there.

**LC:** $8,000?

**SK:** Oh yeah!

**LC:** Really?

**SK:** That's fully working. It's in perfect nick... and absolutely.

**LC:** And how is it $8,000? I saw it two blocks down for $6,000.

**SK:** Ah, now. I wouldn't say you saw the same thing. Remington's all look alike, you've got to remember but the actual... what you're talking about here is the serial number, the year and in what condition they're in. And on the outside they might look like they look the same but the inner workings of a Remington are very delicate. You gotta take all that... when you've been in the business as long as I have you've got to know what you're talking about.

**LC:** You do, you do. Well, what do you think about this here?

**SK:** What is that?

**LC:** These are teeth, Sean.

**SK:** I can see that.

**LC:** You can see that and here is the certificate. Can you see the certificate of authenticity? These are Billy the Kid's wisdom teeth.

**SK:** Billy the Kid's wisdom teeth?

**LC:** Yes, they were pulled out by Doctor Euphrasius Abernuckle.

**SK:** Well, I've heard some stories in my life, but that one's gonna take the biscuit. I was gonna say, I'd give my eye teeth for them but let's not joke around until we know exactly what we're dealing with here. Are you kidding me? These are his wisdom teeth?

**LC:** These are his real wisdom teeth. I bought them on e-Bay for $50,000 and I'm ready, I'm ready to give you a good price on it.

**SK:** I bet you are! Trying to make back some of your hard lost money.

**LC:** They come with a certificate.

**SK:** 50,000! Are you kidding me?!

**LC:** No, I'm not kidding you. They're real.

**SK:** You weren't very wise buying those wisdom teeth.

**LC:** They're real, they're real. I can assure you, they're real.
SK: Well, have you had DNA test done? Then again do we even know if we have a DNA test to work it against. Do we have Billy the Kid’s real DNA on record?
LC: Read the certificate, read the certificate.
SK: Yeah, but who signed the certificate?
LC: Look at the signature right there.
SK: What was his name again?
LC: The doctor? That’s the Doctor A… I can’t even read it. It’s an old piece of paper.
SK: There you go. Yeah, it’s an old piece of paper. You’ve got to remember, they were selling all kinds of things back in those days. Sure, they were trying to sell you all these kinds of elixirs that would make you live longer and stuff like that. No, no. You’ve got to be very careful. There’s a lot of charlatans in the

Wild West memorabilia field. And you know, really, I’ve seen it all. I’ve seen it all.
D: Yeah, Sean, I think you should be…
LC: So have I and that’s why I know that your Remington’s not worth $8,000.
SK: Well, I’d rather pay 8,000 for that than 50,000 for those teeth.
LC: Well, I’ll take them to the next shop. But they’ll be able to appreciate it.
SK: That’s OK. That’s a wise move there.
D: I think a wise person would buy my Air Jordans, I think.
SK: Well, yeah, well I’m just waiting. Joey, have you got those Air Jordans for me yet? Oh come on! Right, thanks, sorry. My name is Sean King, King Pawn of the Soft Pawn store. How’s it going? How can I help you?
British Customer (BC): I’ve been waiting quite a long time actually.
SK: I’m sorry about that. I’ve just had to get some...
BC: Do I notice an Irish accent?
SK: You do indeed, yeah.
BC: Which part of Ireland do you come from?
SK: All over.
BC: You hail from all over, do you?
SK: Yeah, a bit of the mixed bag. The accent started off one way and ended up the other.
BC: And looking around your shop it’s a bit of a mixed bag as well, isn’t it?
SK: Well, there you go. That was the original name of the shop actually, Mick’s Bag. Yeah, but you know Soft Pawn was a little bit more ‘risqué’, you know what I mean? And then… and my own name being Sean King. I like a bit of curry, King Pawn curry.
BC: But it was “Mick’s Bag”, was it?
SK: Well it was “Mick’s Bag”. Yeah, but “Mick’s Bag” was a bit...
BC: That clever!
SK: I just wanted… you know when they came to me with the TV show idea we were looking for a name you know? And you know how difficult it is finding a name for a business you know? But Sean King, King Pawn. Soft Pawn. I mean, ‘y’know’… it’s all right, I like a bit of porn. It works.
D: It works.
SK: Yeah.
BC: And will I have a chance to see the editing of this camerawork?
SK: No, no. In fact you just have to behave yourself and you’ll be on TV.
BC: I’ve got quite a reputation… I got quite a reputation of the collectors’ elite of this country and, in fact transatlantic-ly.
SK: Really, well there you go. You behave yourself and you’ll come across very nicely. It’s that even a word?
BC: …and I don’t what to be portrayed in a way ridiculously.
SK: Don’t worry about that. Listen, the only person here looking ridiculous is me. So, you have nothing to worry about.
BC: Right, OK.
SK: What have you got for me? Hope is not teeth.
BC: Well I have a piece of… actually, it is. It’s curious you mention that. I have…
SK: Don’t tell me you’ve got his front teeth to go with her back teeth.
BC: Whose back teeth?
SK: Jesus! Just bring me the whole, the whole jaw.

46 There you go - here are
47 there’s - (informal) there are
48 is not worth - should not be valued at
49 I’d rather - would prefer to
50 wise move - intelligent decision
52 all over - many different places
53 to hail from - come from, be from
54 mixed bag - assortment, miscellaneous collection
55 there you go - (in this case) that’s right!
56 ‘risqué’ - suggestive, titillating
57 curry - spicy Indian food
58 ‘porn’ (‘pornography) and ‘pawn’ are homophones in British English
59 It works - (in this case) the wordplay is successful
60 to behave oneself - act in an acceptable way
61 to come across nicely (come-came-come) - seem presentable
62 jaw - mandible (technical)
63 go on - (imperative) continue what you were saying
The same bloke68 who signed her certificate?

BC: No, no, no. It’s done at Harvard.

SK: All right, where?

BC: Harvard.

D: How could you possibly DNA test...

SK: Harvard. Oh, if it’s done at Harvard then it must be right. Listen...

BC: Sorry. Who are you?

D: Hi, my name’s Dean.

BC: Do you work here or...?

D: No I came to see if...

SK: Does he work here? He wouldn’t get a job here. Why? Sorry, Dean, no offence.

D: No, no offense taken.

BC: What are you doing? Why are you intervening?

D: He’s checking out to see if I can sell him my...

BC: Would you like to buy my tooth?

D: No, it seems a bit fishy69. How can you test DNA something that belonged to70 Billy the Kid?

SK: Don’t look a gift horse in the mouth71 now.

BC: Well, I don’t see the problem.

LC: May I point out72 that Billy the Kid’s real name was William Bonney not William Brodie?

SK: Here we go. See I just16 let you fight amongst73 yourselves then at the end of the day74 I’ll take what’s good.

BC: William...

LC: Well, that doesn’t matter ‘cos75 I took my business to the store next (door) and I just76 sold one of the teeth.

SK: Oh, very good.

LC: You have one left for $25,000. Do you want it?

SK: Are you sure it’s not the one... hang on77 a second78 here. Y’man’s79 just80 walked in with the same tooth that you brought to the other shop. What’s going on80 here? Did you buy that at the pawn shop81 down the road? How much you pay for it? $30,000? I think you’ve just86 been done82, mate83.

BC: Oh dear!

SK: Because she tried to sell it to me a few minutes ago, and you’ve just86 come back here with the other tooth. This is a joke!

BC: Oh dear!

SK: Bloody hell84 Right, all right, listen - hang on77 a second78. Joey have you got those Air Jordan’s. Come here. Let’s have a look at them.

D: Yeah, Joey is gonna14 be...

SK: Yeah, all right. Well, Dean, fair balls85. This is looking good. Right, I could probably give you... I can only give you $500 for them.

D: Uff.

SK: It’s the best I can do, man. I’ll give it to you here right now cash in a hand86. You go home with $500 in your hand.

BC: You’re rejecting William Brodie’s authentic tooth even if he wasn’t Billy the Kid for 20,000 but you’re willing to67 pay him 500 for some dirty trainers88?

SK: I don’t really... I don’t really do89 teeth, man. You know what I am saying?

D: Yeah but they’re authentic, signed
by Michael Jordan and worn by Michael Jordan.

BC: But he had nothing to do with the Wild West!

SK: Yeah, bring me his gun.

BC: Who’s Michael Jordan?

SK: Bring me his gun, that’s another thing. Or bring me... I don’t know, bring me his...

BC: Do you have his 10-gallon hat?

SK: I don’t think so. I don’t think we’ve got... we haven’t got any of Billy the Kid’s stuff.

BC: Michael Jordan’s Remington?

SK: Yeah, I have a lot of those. Well, y’know, we have some of his work but it’s very expensive now. That’s top-end stuff now. You’re more talking galleries than you’re talking...

BC: Would you be interested in an authenticated set of George Washington’s false teeth made out of mahogany?

SK: Oh, here we go. What was is going on with the teeth?

D: What’s with the teeth?

BC: I’m a collector. I specialize in teeth. What’s the problem?

SK: Wooden teeth, yeah?

BC: George Washington’s wooden mahogany teeth.

SK: Well you know what? They wouldn’t sell.

BC: George Washington’s...

SK: Well, I believe... I read that he didn’t have wooden teeth. That was all... that was actually a lie and he didn’t have wooden teeth at all.

BC: Hey! You said these were authentic!

SK: You guys need to get your stories straight the next time you came in here. But this is going to make for a great episode. What do you think, lads?

BC: Cut!

---

**Monologues: What I Learned at School**

(20m07s)

---

**6. Monologue 1**

*(US English)*

*(4m14s)*

**Overall,** I have fond memories of the time I spent at school and college. I believe I was lucky to have been in the school system that I was in. There were excellent teachers and, in my opinion, the curriculum offered students a well-rounded liberal-arts education that was equal parts practical and traditional. To tell you the truth, I can’t really remember having learned something at school that was completely useless. Of course, many years have passed since I was in middle school and high school. I do remember having a class called ‘home economics’ when I was in middle school. In this class we learned the basics of cooking, baking and sewing. I do recall not being very interested in the class at the time. But I must say that it was very practical and taught us very useful skills for the real world.

We also had a technology class in which we learned about the basics of carpentry, electricity
and photography. This was a bit of a hodgepodge\(^{14}\) of a class but very practical. While\(^{15}\) I didn’t find it very useful at the time, I realized\(^{16}\) I acquired some solid real-world skills\(^{17}\), I learned how to work wood, how to wire\(^{18}\) a lamp and how to develop\(^{19}\) photographs the old-school\(^{20}\) way in a dark room. Of course, with the advent\(^{21}\) of digital photography, very few people still develop\(^{22}\) photographs. So, I guess\(^{23}\), while\(^{24}\) I find it interesting, knowing how to do this is a pretty\(^{25}\) useless skill\(^{26}\) nowadays\(^{27}\).

I also had art classes throughout\(^{28}\) my education. We learned about drawing, painting, some color theory and composition. I’m sure I did pick something up\(^{29}\) from these classes, but I was never really totally engaged\(^{30}\). The reason is because I’ve always been horrible at drawing and painting. I never got past the stick-figure\(^{31}\) stage\(^{32}\) really. If the project was more abstract or involved\(^{33}\) building something like a ceramic cup or something like that, I was OK. Like I said, some things from those classes must have stuck\(^{34}\) with me, but I can ensure\(^{35}\) you, the world is a better place without me attempting to\(^{36}\) be an illustrator or a painter.

In elementary school we had music class and in high school I played guitar in the jazz band. I really enjoyed being in a jazz band and studying guitar and music theory in high school. Me and some buddies\(^{37}\) would get together\(^{38}\) and jam\(^{39}\), mainly\(^{40}\) heavy-metal music which is what we were into at the time. While\(^{41}\) having received a solid musical foundation at school hasn’t ended up being extremely useful in the real world for me, in the sense that I’m not a professional musician, it did indeed enrich\(^{42}\) my life overall\(^{43}\). After high school I went on to study some jazz theory, blues, flamenco guitar and even classical Turkish music just for kicks\(^{44}\). Music in general has been and will always be an interest of mine.

Math was probably the subject\(^{45}\) I was least interested in during high school. Apart from basic algebra and geometry, what I learned seemed to be useless at the time. However, the more I study computer programming the more I realize\(^{46}\) I could’ve benefitted from paying more attention in class! I really enjoyed physics and chemistry, though I can say that what I learned in chemistry has yet to be\(^{47}\) very valuable in my life.

So, in my opinion, I think that any subject\(^{48}\) can be interesting and useful if taught correctly. In many circumstances where children and adolescents become bored in a subject\(^{49}\) it is likely\(^{50}\) due to\(^{51}\) how the teacher presents the material. If the subject\(^{52}\) and material covered in class is presented in a way that engages\(^{53}\) students, the students are much less likely to lose\(^{54}\) interest. Of course this is not an easy task\(^{55}\), especially in school systems that lack\(^{56}\) sufficient funding\(^{57}\) and whose teachers are poorly compensated. But it is possible.

### 7. Monologue 2

(\(^{\text{UK English}}\) (1m15s)

When I was at school, particularly at secondary school, we had a lesson which was called needledwork\(^{58}\). Nowadays\(^{59}\) it would be referred to as sewing\(^{60}\) class. And we spent a year learning how to make button

---

\(^{14}\) hodgepodge (US English) – hotchpotch (UK English), mixture

\(^{15}\) while - although

\(^{16}\) to realize - (false friend) be conscious

\(^{17}\) to wire - to organize the cables in sth.

\(^{18}\) to develop - process

\(^{19}\) old-school - old-fashioned

\(^{20}\) advent - arrival, emergence

\(^{21}\) I guess - I suppose

\(^{22}\) pretty (adv.) - rather, reasonably

\(^{23}\) nowadays - these days

\(^{24}\) throughout - during all of

\(^{25}\) did pick up - (emphatic) picked up, learned

\(^{26}\) engaged - committed, concentrating

\(^{27}\) stick figure -

\(^{28}\) stage - level

\(^{29}\) involved - required

\(^{30}\) to stick - (stick-stuck-stuck) - remain

\(^{31}\) to ensure - promise, guarantee

\(^{32}\) to attempt to - try to

\(^{33}\) buddy - friend

\(^{34}\) to get together - gather, congregate

\(^{35}\) to jam - (colloquial) improvise

\(^{36}\) mainly - primarily, principally

\(^{37}\) did indeed enrich - (emphatic) enriched, enhanced

\(^{38}\) just for kicks - for pleasure, for fun

\(^{39}\) subject (n.) - academic discipline

\(^{40}\) to realize - (false friend) become conscious

\(^{41}\) has yet to be - has still not been

\(^{42}\) likely - probably

\(^{43}\) due to - because of

\(^{44}\) to engage - interest, motivate

\(^{45}\) are much less likely to lose - have a much lower probability of losing

\(^{46}\) task - job

\(^{47}\) to lack - not have

\(^{48}\) funding - financing

\(^{49}\) needledwork - sewing
holes\textsuperscript{150} and facings\textsuperscript{151} for collars\textsuperscript{152}, I really do feel\textsuperscript{153} that that wasn’t the most useful thing to have spent a whole year doing. I feel it would’ve been so much more useful learning how to knit\textsuperscript{154}, turn up\textsuperscript{155} trousers, take in\textsuperscript{156} trousers, turn up\textsuperscript{155} skirts\textsuperscript{157}, take in\textsuperscript{156} skirts or even just\textsuperscript{158} make a simple dress. Also there were moments when I thought that perhaps my Latin classes were a waste of time, although I did have\textsuperscript{158} a very good teacher. And it wasn’t until later in life with language learning that I realized\textsuperscript{160} just how\textsuperscript{159} valuable a basic knowledge of Latin really is.

8. Monologue 3 (UK English) (4m43s)

I’m afraid that I have a very negative overall\textsuperscript{160} memory of my years at school and university. I was neither challenged\textsuperscript{161}, nor stretched\textsuperscript{162}, nor motivated, nor satisfied in any aspect of my studies and endlessly sought\textsuperscript{163} escapes into different worlds, acquiring along the way such unhelpful labels\textsuperscript{164} as “in need of remedial\textsuperscript{165} studies”, daydreamer\textsuperscript{166} and “lacking in\textsuperscript{167} vision and imagination and basic writing ability”. The first of these, coming from my earliest days in preschool, when I was considered in need of remedial\textsuperscript{165} maths teaching after school, might have allowed\textsuperscript{168} me some little satisfaction in proving them all wrong as I ended up with\textsuperscript{169} a BSc in Pure Mathematics from London University. If only any of those responsible for my mislabelling\textsuperscript{170} had been still around to defy\textsuperscript{171}! Whilst the put-downs\textsuperscript{172} of my English and history teachers took me some 25 years before I had the determination to try out journalistic\textsuperscript{173}, and script-writing\textsuperscript{174} skills\textsuperscript{172}, which led to\textsuperscript{175} me being published in a national newspaper and directing a large-scale\textsuperscript{176} cast for a reputable local theatre company. Let alone\textsuperscript{177} the artistic skills\textsuperscript{172}, which have since given me my most meaningful\textsuperscript{178} career path\textsuperscript{179} in the last 15 out of 36 years of work!

At bottom\textsuperscript{180}, the problem was that both my school and university were products of the ancient system. They taught you to fear and kowtow\textsuperscript{181} to figures of authority and never question precepts. Uniforms taught us to undervalue our sense of self-image and shrink away from\textsuperscript{182} being out in the world - the order of the day was “fit in\textsuperscript{183} at all costs”. And the enforced study of antiquated topics\textsuperscript{184} like religious education only helped to drive home\textsuperscript{185} wedges\textsuperscript{186} between the established majority and the minorities. Of course, this could also have been an aspect of my own school’s very narrow\textsuperscript{187} religious vision – being High Church of England - but it didn’t help that my parents\textsuperscript{188} set out to\textsuperscript{189} send their Jewish child there in the hope that it would help me integrate and ended up with me losing\textsuperscript{190} any sense of spiritual value for the next 30 years.
As far as actual subjects were concerned, I remember titles but very little content. English-language studies gave me a ridiculous and redundant idea that language is static. Literature taught me to hate the classics - again, a situation that took me many, many years to turn around to my benefit. I cannot to this day remember one single useful thing I ever learnt in geography or physics or chemistry, although I now believe I have quite a keen scientific mind.

Whilst not asked of me, the topic begs for a list of what I think was missing and probably still is in our education system - in a phrase - life skills. The ability to think and stand up for ourselves, to speak in public, to mend a leaking pipe (if you're a girl) and cook a stew or sew a hem (if you're a boy!), business acumen, engineering and building skills. Let alone the skills that come from a study of the arts and music - from a premise that we all have something to gain and not just those who have special artistic qualities from birth. How many times have I heard friends say (even believed of myself) that I am tone-deaf - a totally nonsensical and meaningless phrase, so capably defied by the likes of Gareth Malone in recent years.

What little of benefit if any I took from school came from my days at junior school. Because through from school came from my days in secondary school where being 11 years of age, naturally meant I had nothing of value to give to the world. I wonder if anything has changed.

9. Monologue 4
(4m40s)

All in all, I am very satisfied with the education I received throughout my childhood and into university. I was taught to think for myself and question received ideas. Generally speaking, I was encouraged to be creative and sociable. There are a number of things I studied that most people would consider of no use in the modern world. For instance, I studied Ancient Greek for a couple of years and Latin for many more. Similarly, I studied my fair share of history, literature and comparative religions, which if I remember correctly was called - rather pompously - divinity.

Dead languages are a classic example of what is considered 'useless'. I could've spent my time learning Spanish and German rather than the classical languages but I didn't. However, since I went on to be involved in my professional life in studying, writing about and teaching English, Greek and Latin have in fact been quite useful. In any case I went on to learn Spanish and some German as an adult, so the classical languages didn't impede me from expanding my horizons beyond English and French.

Since I teach English literature at university, the literature I learned at school has certainly been useful and the history helps to put it in context. Religion could be a completely useless subject. However, I was
lucky to be in classes that always had one or two Catholics, Muslims, Hindus or Jews so we were never taught why Anglicanism is ‘right’ and all the other religions are wrong. Rather, we learned about what beliefs are shared by different religious groups and what differentiates them. I am not a religious person but I am fascinated by belief, so I don’t regret anything about studying ‘divinity’. Moreover, I think that an understanding of belief systems is fundamental to comprehending our modern world. More than anything else, religion is the excuse for what divides us. If you don’t have the means for analysing religion, you can’t hope to see why modern conflicts arise.

There are many things I was taught that I have never used but ironically they tend to be at what is usually considered the practical end of the spectrum. For one thing, more advanced maths: trigonometry and calculus. What was all that about? I remember really suffering over those subjects; perhaps more so because my father is a mathematician so I really should have been able to master them. Anyway, it turns out that you can happily go through life without grasping the essence of such things.

Another thing I have found particularly useless is economics. I studied economics at school and particularly useless is economics. I’m not a mathematician so I really should have been over those subjects; perhaps more so because my father is a mathematician so I really should have been able to master them. Anyway, it turns out that you can happily go through life without grasping the essence of such things.

What conclusion do I draw from all this? You never know what is going to be useful one day and what isn’t. Try to take advantage of every learning opportunity because you never know if one day it will be useful — if only to give you something to talk about in a monologue!

10. Monologue 5 (US English) (5m15s)

OK, what I learned at school that ended up being useless. Well, kind of as a rule I don’t believe that anything you learn is useless. One thing that could be described as useless nowadays would be that we actually learned, we were taught how to use the card catalogue and the Dewey decimal system at the library. Now the Dewey decimal system I do believe still exists but the card catalogue, the subject cards, we learned how to find books we were looking for based on subject words. But even that was not completely useless because subject words on card catalogue index cards are very much like metadata nowadays, the key words that you use to make something findable, searchable on the internet.

Let’s see, what other things? Oh, something else, one of the things that I don’t use at all really is mathematics. I don’t use mathematics really in a practical sense. However, I don’t think that using mathematics and, say, becoming a mathematician is necessarily the goal of using mathematics. I believe that it develops your mind in a certain way and I think you could argue that music would be just as useful.

---

221 lucky - fortunate
222 rather - by contrast
223 to share sth. - have sth. in common
224 to regret - (in this case) feel negative about
225 the means for - a way/method to
226 to arise - (arise-arose-arisen) - appear, emerge
227 for one thing - first, firstly
228 to master - learn
229 it turns out that - I have discovered that
230 to go through - (go-went-gone) - live without - (in this case) not
231 to grasp - understand, comprehend
232 nonsense - rubbish, (in this case) tendentious notions
233 to strengthen - reinforce
234 to come rushing to - come running to
235 hand-draw plan - diagram created without using a computer
236 to draw - (draw-drew-drawn) - (in this case) reach, come to
237 as a rule - usually, generally, in general

227 Monologue 5 (US English) 5m15s

228 card catalogue - index system in which entries are organized systematically on cards (= pieces of rigid paper)
229 Dewey decimal system - a classification system used in US libraries since 1876
230 library - (false friend) institution that lends books
231 do believe - (emphatic) believe, think
232 subject word - heading, title, topic word
233 findable - retrievable, easy to find
234 say - (in this case) for example
235 goal - (in this case) objective
236 to develop sth. - improve sth., enhance sth.
237 to be just as - be equally
as studying mathematics. I think a lot of people would say that they studied music and now they do nothing with it. They took piano lessons for several years and now they don’t do anything with it, so - what a waste! But I don’t believe it’s totally true because it develops different parts of your brain and develops your brain in different ways. And I don’t think you need to study music in order to become a musician. I don’t think you need to study mathematics in order to just to become a mathematician.

Let’s see. On the other hand I think probably the most useful thing of school was learning how to communicate with the written word. Now we don’t use handwriting so much anymore, but certainly everyone communicates by email. And so learning to express yourself clearly, precisely on paper or in an email I think has been hugely useful. For one thing written word lacks intonation, so if you’re not careful your words can be interpreted differently just by your interpretation. So, it’s very good to know how to express yourself absolutely precisely.

Now a lot of the stuff that I studied in biology, one could argue, has been useless to me because I’m not a biologist, I’m a musician. But what I did take from that was an approach to problem-solving which is the scientific method. And I find that hugely helpful even in music. Like, for example, the concept in scientific method of isolating one variable. Well, in the music world when you’re mixing sound if you raise the volume of one instrument in a recording and lower the volume of another instrument because one sounds too loud and the other sounds not enough, if you move both then suddenly the other one’s going to be too loud and the other one’s not going to be heard enough. But if you just move the one instrument, either one, up or down then you test to isolate exactly where the problem is. And it’s... the scientific method I’ve found has been hugely useful for problem-solving. Identify a problem, come up with an idea, a hypothesis, then come up with a plan of how to solve the problem, an experiment, and then analyse the results. I think the scientific method and written communication are probably the most important things I’ve learned.

11. Music: Difficult Words (1m27s)
Commentary: Listen to these terms from the article about problematic musical words (p. 30).

12. Picture Description (2m38s)

Examiner (British English): Please, would you compare and contrast the following two photographs?
Examinee (British English): Well, both pictures show musicians, but there are certain differences. In the first picture you can see just one musician playing what seems to be a banjo and perhaps the style of music that he would be playing would be folk or country. While in the second picture it shows three musicians and it also looks as if it’s an orchestra. Perhaps one difference from the first and the second picture is also that the second picture seems to be perhaps a painting. The foreground looks rather like oil painting, whereas in the foreground of the first picture it could be a curtain. Another significant difference in the second picture is that there are three, as I mentioned before, and they are playing wind instruments and percussion.
Examinee: Would you consider that classical music and popular music are a continuum or two separate genres?
Examinee: Oh, I would consider classical music as being a continuum because music is a language and all languages evolve. And I really feel that music does progress. For example, even in the 18th Century the Russians and French started to introduce new instruments, new sounds into their music. Here in Spain there was Falla who brought in new sounds. And then... and even Duke Ellington, the famous jazz musician, he even says that there are two types of music: the good music and the other stuff.
EXERCISES

1. Illustrations round-up: see if you can identify some of the objects and actions mentioned in the footnotes of this issue.

2. Title Tag: can you match these alternative titles to the news and science news articles on pp. 7-11?


4. Word Search: find music-related terms from the dossier (pp. 18-43).

5. Idioms: read the articles on expressions used by The Beatles and The Rolling Stones in their songs (pp. 38-39) before doing this exercise.

6. Literary influences. Match these song titles to their literary sources.

7. Crossword for revision of vocabulary from throughout the magazine.

8. Homophones: correct the homophones in this text about the connection between maths, music and language.

9. Debates: listening comprehension for audio tracks 1-3 (pp. 88-100).

10. Match the names of musical instruments to the illustrations.

11. Anagrams: read the article on nicknames for famous pieces of classical music (pp. 34-35), then try to work out what these anagrams stand for.

12. Parabolas: choose the best answer in this exercise relating to pp. 74-76.

13. Maths Pronunciation: an exercise relating to the article on pp. 82-83.

14. Pronunciation: revision of the difficult words from throughout the magazine.


18. Maths Phrasal Verbs: this exercise tests for the verbs presented on p. 78.

19. Phrasal Verbs Round-up: how many new phrasal verbs have you learned this month?

20. Music False Friends: did you learn the music-related false cognates on p. 36?


22. False Friends Round-up: test to see if you learned the false friends marked in the footnotes throughout the magazine.

23. Wordplay: another word game – relating to the maths spelling article on p. 81.

24. Internet Listening: test your listening comprehension with this fascinating talk about mathematics.

25. Sevens: read the article on pp. 72-73 and then match the terms to the definitions.

26. Music - difficult words: have you learned to pronounce these musical words correctly? (p. 30)

27. Visualizing Vocabulary: match these pictures of maths equipment to their definitions.

28. Maths Idioms: did you learn the mathematical expressions on p. 79?

29. Prepositions: fill the gaps in this text about probability. (pp. 69-71).

30. Monologues: a true-false listening comprehension on audio tracks 6-10, pp. 105-110.


32. Music Idioms: check that you have learned the expressions on pp. 40-42.

33. US vs. UK: matching words in British and American English from throughout the issue.

34. Sentence transformation: revise structures from throughout the issue.

ANSWERS
1. Illustrations Round-Up. Many of the definitions in the footnotes are illustrated. Test how well you have learned the meanings of these words by matching the pictures to their definition. Notice that we have changed [many] of the pictures to help you fix the concept in your mind:

1. bone  
2. bottom  
3. to bounce  
4. bow and arrow  
5. bucket  
6. bullet holes  
7. chain  
8. coins  
9. cricket [C]  
10. die/dice  
11. flea  
12. gloves  
13. knot  
14. lightning  
15. sword  
16. tear  
17. thumb  
18. wheel

a. a series of connected metal rings  
b. buttocks, bum, the part of the body one sits on  
c. circular object on an axle that permits a vehicle to move  
d. covering for one’s hand  
e. cutting and stabbing instrument similar to a big dagger  
f. high-voltage electrical discharge from the sky  
g. holes created by projectiles from a firearm  
h. (Gryllidae) insect that is similar to a grasshopper that produces a characteristic sound  
i. archery equipment  
j. ligature in a piece of rope (= cord)  
k. opposable digit  
l. pail (US English), more or less open container with a handle  
m. piece of (typically round) metal money  
n. piece of osseous skeletal material  
o. repeatedly hit a surface and ascend into the air again  
p. small cube with one to six dots on each face  
q. small jumping flightless insect  
r. small quantity of saline liquid secreted from one’s eye
2. **Title Tag.** Read i. the News (pp. 7-9) and ii. Science and Technology News (pp. 10-11) articles. Then try to match the alternative titles given below to the originals, without looking at the magazine. This can be one or two exercises:

### i.
1. The Ultimate Answer
2. Never a Truer Word
3. British Funerals
4. Motto Typo
5. Is it Better to Share?
6. Asking for Trouble
7. The Changing Face of Adoption
8. Current Controversies

### ii.
1. The Haunted Lab
2. Déjà Vu Again
3. Singing Genes
4. Good News on Antibiotics
5. Warning to Parents
6. It's the Couch more than the Potato

### iii. Sports Cloze.** Read the article about Imran Khan on pp. 46-49. Then choose the best answer (a, b, c or d):

1. The article suggests that Khan was undoubtedly:
   a. the greatest cricketer of all time
   b. the second greatest cricketer of all time
   c. someone who spread cricket’s popularity
   d. only popular with those who were ignorant about cricket

2. As regards Imran’s education
   a. he was so poor he received none
   b. he was educated entirely in England
   c. he was schooled entirely in Pakistan
   d. it can best be described as ‘privileged’

3. Imran’s first experience in international cricket
   a. was as a teenager
   b. was as brilliant as the rest of his career
   c. was especially impressive
   d. was against New Zealand in 1976

4. When he joined the World Series, Imran was
   a. captain of Pakistan
   b. primarily considered a bowler
   c. primarily considered a batsman
   d. already a great all-rounder

5. In 1983 Imran
   a. was captain of Pakistan
   b. didn’t play any professional cricket
   c. won all his international games
   d. was given the title of ‘Lord’

6. At the cancer hospital in Lahore
   a. three quarters of patients receive subsidized treatment
   b. treatment is free
   c. only members of Tehreek-e-Insaf are treated
   d. Imran was treated

7. Khan’s political position can be characterized as
   a. pro-Western
   b. belligerently anti-Taliban
   c. pro-dialogue and anti-war
   d. out-of-touch with Pakistani voters
4. The **wordbox** contains 21 music-related words from the dossier (pp. 18-43). Use the definitions and clues to find the words.

1. an electrical musical keyboard that produces a wide variety of sounds
2. an elaborate musical composition for full orchestra, typically in four movements
3. a person who directs the performance of an orchestra
4. a musical instrument similar to a large concertina
5. a person who writes music
6. a bass woodwind instrument similar to an oboe
7. a treble voice
8. a coin-operated record-player
9. (of musical instruments) that has cords
10. a brass musical instrument with three valves
11. a small four-stringed Hawaiian guitar
12. a composition for an instrumental soloist, often with a piano accompaniment
13. violin used for folk music
14. the words to a song
15. an itinerant musician who plays a pipe or the pipes
16. a set of instrumental compositions, originally in dance style, to be played in succession
17. a wind instrument now made of brass but originally made from one of the hard protrusions on an animal's head
18. a large violin (tuned a fifth lower than a violin)
19. a written representation of a musical composition
20. a type of music of black American origin which emerged at the beginning of the 20th century, characterized by improvisation and syncopation
21. a musical instrument consisting of a frame supporting a graduated series of parallel strings, played by plucking with the fingers
5. Idioms used by the Beatles and the Rolling Stones. Read the article on pp. 38-39. Then, without looking back, try to complete the following sentences with expressions from the texts:

1. I'm always polite and respectful to people who treat me with respect but I hope he doesn't expect me to l__________________ his boots.
2. The movie's special effects will b__________________ your mind.
3. That noise in the street is d__________________ me mad - What is it?!
4. When he first arrived here he had a c__________ on his shoulder that didn't help his integration with the other students.
5. You're not the only people who have l__________________ their shirt in this recession, you know?
6. Jessica m___________________ the grade and was admitted to the MBA course.
7. His plans went up in s__________________ when he couldn't find the financing for his project.
8. He promised to support me through t__________________ and thin but at the first sign of trouble he caved in!
9. Twice a week he p__________________ his heart out to a therapist and that lets him be as cool as a cucumber the rest of the time.
10. You have to stop hiding your h__________________ in the sand. There's clearly something wrong with you and you need to see a doctor about it.

6. Music Title Exercise. Below we offer 10 song titles that come from book titles. Try to match the songs (1-10) to the descriptions of the original books (a-j):

1. ‘Billy Budd’ by Morrissey
2. 'Catch-22' by Pink
3. 'Dead Souls' by Joy Division
4. 'Grapes of Wrath' by The Spear of Destiny
5. 'Imitation of Christ' by The Psychedelic Furs
6. 'In a Lonely Place' by New Order
7. ‘Stranger in a Strange Land’ by U2
8. ‘The Big Country’ by Talking Heads
9. 'The Passionate Friends' by The Teardrop Explodes
10. 'Wuthering Heights' by Kate Bush

a. a novel (1842) by Nikolai Gogol attacking the feudal order in the Russian Empire.
b. a novel (1847) by Emily Brontë about the passionate love between a girl and her adopted brother.
c. a novel (1913) by H.G. Wells about a love triangle.
d. a novel (1939) by John Steinbeck about the Oklahoma Dust Bowl.
e. a novel (1958) by Donald Hamilton about a land feud in Texas.
f. a novel (1961) by Joseph Heller about the Korean War and the absurdities of all wars.
g. a novel by Dorothy B. Hughes (1947) that was turned into a movie starring Bogart.
h. a posthumous novel (1924) by Herman Melville about a sailor who is condemned to death.
i. a religious tract (c. 1418) by Thomas Aquinas.
Crossword

Test how well you have retained the vocabulary from this issue of Yes by doing the following crossword.

If you find the crossword difficult, do the easy clues (in bold) first. This will make the rest of the words much easier to find.

Across

1. keyboard instrument predecessor to the piano
2. Straight line joining the ends of an arc. Notes sounded simultaneously. Homophone of ‘cord’.
6. large paddle. Homophone of 53 ACROSS.
7. whether. Conjunction that introduces a conditional.
9. Egyptian polyhedron
12. in the middle of. Anagram of maid’
14. primitive mind. Identity (abbreviation)
15. as well, too.
17. therefore. Homophone of ‘sew’
18. watering hole in a desert. Britpop band
19. wind instrument
20. classical stringed instrument. Homophone of ‘loom’
21. three-sided figure; percussion instrument
22. space between two intersecting lines. Anagram of ‘glean’ and ‘angel’
25. feline.
26. @
27. Edward, Edmund or editor (abbreviation)
28. breastbones. anagram of ‘astern’
30. same as 26 ACROSS
33. Centre for the Study of European Contract Law (initialism)
35. you and me. American?
37. stature. Anagram of ‘eighth’
38. number. Homophone of 44 DOWN
40. regretful
43. the basic monetary unit of Iran. Anagram of ‘liar’
46. follow, transpire
47. litigate against
48. industrious insect. Anagram of ‘tan’
49. possessive adjective. US exclamation
50. US petrol
51. since; simultaneously
52. rim, margin
53. conjunction. Homophone of ‘ore’
54. ball. Anagram of ‘herpes’
55. in this place. Homophone of ‘hear’

Down

1. the longest side of a right-angle 21 ACROSS
2. Atlantic fish
3. exclamation; hectare (abbreviation)
4. spoken (adj.)
5. the length of space between two points
8. post-embryonic (UK spelling)
10. three feet. US garden
11. repetitive strain industry (initialism)
12. Aerospace Industries Association (initialism)
13. Microsoft Network (abbreviation)
14. consumed food. Anagram of ‘eat’
16. Mammon. Anagram of ‘cruel’ and ‘ulcer’
17. posture
19. retrieving; attractive (adj.)
23. Lesotho (internet address)
24. engraving, print
29. tract of land. Anagram of ‘tea set’
31. songbird; candida
32. 3.141529. Homophone of ‘pie’
34. country, nation. Anagram of ‘taste’
35. utilize
36. ditties; lyrics. Anagram of ‘snogs’
38. ocular organ
39. mark, score. Anagram of ‘raged’
41. remote service access point (initialism)
42. hurry. A Canadian rock band
44. consumed food. Anagram of ‘eat’

3. exclamation; hectare (abbreviation)
4. spoken (adj.)
5. the length of space between two points
8. post-embryonic (UK spelling)
10. three feet. US garden
11. repetitive strain industry (initialism)
12. Aerospace Industries Association (initialism)
13. Microsoft Network (abbreviation)
14. consumed food. Anagram of ‘eat’
8. Homophones – Two Universal Languages & Language. The following text discusses the major themes of this issue of Yes. However, we have changed 71 words for their homophones. Try to find them and change them back so that the text makes sense:

How can eye justify this issue of the magazine? Of coarse, on a practical level it is an attempt to offer something to too divergent groups of readers - mathematicians and musicians seem to be at too different ends of the spectrum. But, to my mined at least, their is moor to it than that; maths and music do have things inn common. For won thing their are shared foundational figures; Pythagoras discovered the harmonic series and Euler developed a theory of music, though both men are better known as mathematicians. Inn part because of this, maths and music share vocabulary - both have ‘cords’, both have ‘triangles’! Maths has it’s cymbals, music has it’s symbols! For me it is know coincidence that the most popular English-language book on mathematics inn recent years is called The Music of the Primes. Inn essence both disciplines are a search for patterns and variations on patterns.

However, eye am at hart a linguist and as such eye sea the meeting point of maths and music inn language. Mathematician Ian Steward compares learning maths to learning a language - but a language that, thanks to it’s inbuilt logic, rites itself. “Yew can start righting things down without knowing exactly watt they are, and the language makes suggestions to ewe.” Like human language, there is a moment after U have learned the basics when maths suddenly gets much easier. The problem with maths as with language learning is knot that most peepul have know aptitude but that they don’t give it enough thyme to get over the hard part and passed the plateau, according to mathematician Alex Bellos. Most peepul think of maths as having an ion logic but inn fact mathematics - like language - often resorts to analogies. Both disciplines require yew to think of won thing inn terms of another. “A lot of mathematicians say its important to be able to think vaguely”, concludes Ian Stewart.

Eye realized how similar maths and language whir won day observing my mathematician farther ‘playing’ with numbers. His search for underlying relationships between numbers closely paralleled my fascination with how words are linked buy sound and etymology.

The connection between music and language is perhaps moor obvious but aisle spell it out anyway. Spoken language often depends on intonation to determine precise meaning. Phrasal languages like English are melodic, witch incidentally is Y English generated bye a computer sounds sew unnatural. Indeed, getting the musicality of English wright is sow important that variations on it can cause resentment, irritation and incomprehension - as Australians learn to there cost when they travel elsewhere inn the Anglosphere.

My personal linguistic obsession is with chiming; the repetition of sounds in collocations and idioms. Eye believe that such euphony binds language together much like major cords unify music. Moreover, most music and language are carried along buy rhythm. The peculiar cadence of English comes from the fact that we tend to try to space stressed syllables between moor or less regular time intervals. This of coarse is most marked inn metric poetry, witch is baste on variations around a metre. As with music – and especially jazz – if the variations predominate, the metre collapses. However, if their is two much metric regularity, the poetry (or the music) becomes monotonous and uninteresting.

When you have finished and have corrected your mistakes, re-read the article. You should find it interesting.
9. **Debates: Varied Listening.** Listen to the **Mini-Debates** (audio tracks 1-3) and answer the questions **according to what the speakers say.** Obviously, this can be done as three separate exercises:

**A. Debate 1:** Listen to the first debate and, as you do, answer the following questions:

1. What examples of limitations on free speech that already exist in Europe are given?
2. Which two movies are mentioned?
3. What proportion of the world’s population is Muslim?
4. In what way is freedom of thought incompatible with Sharia law?
5. Who is Raif Badawi?
6. What is ironic about Pegida?
7. What percentage of the French prison population are Muslims?
8. Which is the most dangerous part of society, according to Dr King?
9. On what grounds is it suggested that it is ‘unfair’ to associate UKIP with extreme right continental movements?
10. What was incomplete about the Muslim propaganda the speaker saw on Facebook?
11. Why is Jihadism in France “perpetuating the problem”?

**B. Debate 2:** Listen to the second debate. What do the following numbers refer to:

1. 380
2. 330
3. 3
4. 250,000

**ii.** Listen again and answer the following questions:

1. Who comes from Ohio?
2. Who comes from Thailand?
3. Who comes from Western Australia?

**C. Debate 3:** Listen to the third debate and, as you listen, fill the gaps in these sentences according to what you hear. They are in the order in which you will hear them:

1. I have ___________ accustomed to baking and using grams and kilos for weight
2. When I was studying ___________ everything that we had to do in weights and measures was metric.
3. I don’t think we’ll be asking for 575 millilitres of ___________!
4. When you make weight-loss ___________ you talk about half stones and stones.
5. The metric system arrived and I can remember I was a teenager, I was hugely ___________
6. Should we stop buying half a dozen ___________?
7. Cooking is about being ___________ as far as I’m concern and not about being technical.
8. We should be forcing everybody to think in terms of ___________ then.
9. We’ve forced everybody to accept that ___________ defines the time in the world.
10. An important part of globalization is homogenization, ___________.

10. Visualizing Musical Instruments. Logically, throughout the music dossier musical instruments are mentioned and defined in the footnotes. To see how many you have learned, match the names to the illustrations:

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. bassoon</td>
<td>b. bell</td>
<td>c. cymbals</td>
<td>d. drum kit</td>
</tr>
<tr>
<td>e. French horn</td>
<td>f. harp</td>
<td>g. horn</td>
<td>h. kettledrum</td>
</tr>
<tr>
<td>i. keyboard</td>
<td>j. lyre</td>
<td>k. recorder</td>
<td>l. tuba</td>
</tr>
</tbody>
</table>

11. Symphony Anagrams. Read the page on "nicknames for famous music" (p. 51). Without looking at that page, re-order the letters in CAPITALS to make the nickname of the piece of music given in brackets:

1. REACTION Mass - Haydn’s Mass No. 13 in B flat major (1801)
2. TABLET Symphony - Beethoven’s Op 91 (1813)
3. PAIRS Symphony - Mozart’s Symphony No. 31 in D major, K 297 (1778)
4. RECLAIM Symphony - Haydn’s Symphony No. 96 in D major (1791)
5. HANDY Quartets - Mozart’s six string quartets (1782-85)
6. KARL Quartet - Haydn’s String Quartet in D major, Op 64 No. 5 (1790)
7. SHORN ALIGN Symphony - Haydn’s Symphony No. 31 in D major (1765)
8. The EDDA CHARM in Saul - the funeral march from Handel’s oratorio Saul (1739)
9. PREMORSE’ Hymn - ‘(Austria’) Haydn’s hymn (1797)

12. Parabolas. Read the article on pp. 74-76. Then, without looking back, choose the best option so that the sentence makes sense:

1. I’m always suspicious when there’s an (ellipse/ellipsis) in the middle of a controversial quote.
2. The space probe came under the gravitational influence of Saturn and its trajectory became a (hyperbola/hyperbole).
3. All I could see was telephone wires but he described them in terms of (parables/parabolas).
4. The two companies operate out of the same office building but they have (discrete/discreet) identities.
5. He called it a spot of bad weather and I called it a hurricane. If you accuse me of (hyperbola/hyperbole), his description was clearly litotes.
6. A good personal assistant needs to be very (discrete/discreet).
7. The company logo is a ram’s head on a red (ellipse/ellipsis).
8. That story reminds me of the (parable/parabola) of the Prodigal Son.
13. Read and listen to the pronunciation article on pp. 82-83. Then, without referring back to the article, answer the following questions:

1. Which of the following words is a homophone of pi? a. pea b. pee c. pie
2. Does ‘magnesium’ rhyme with ‘trapezium’?
3. Which of these words does ‘Eureka!’ rhyme with? a. breaker b. wreaker c. wrecker?
4. Which of the following words is a homophone of ‘sine’? a. sin b. sign c. scene
5. Underline the stressed syllable in the following words:
   a. octahedron b. arithmetic c. algebra d. Archimedes e. pyramid

14. Pronunciation Round-up. Throughout the magazine we provide the phonetic transcription of the words that cause the greatest pronunciation problems. Practise these words from Yes 20 by answering the following questions:

1. How many syllables are there in ‘recipe’ (p. 8, n. 13)?
2. How do we pronounce ‘meant’ (p. 8, n. 20)? a. /mi:nt/ b. /ment/ c. /meint/
3. Which is a homophone of ‘bury’ (p. 11, n. 6)? a. berry b. very c. Barry
4. Which rhymes with ‘rely’ (p. 20, n. 4)? a. belly b. relay c. belie
5. Which rhymes with ‘stringed’ (p. 20, n. 18)? a. winged b. singed c. tinged
6. Which rhymes with ‘sword’ (p. 22, n. 11)? a. warred b. word c. herd
7. Which is a homophone of ‘wild’ (p. 23, n. 9)? a. willed b. whiled c. guild
8. Which rhymes with ‘stringed’ (p. 20, n. 18)? a. winged b. singed c. tinged
9. Which is a homophone of ‘wild’ (p. 23, n. 9)? a. willed b. whiled c. guild
10. Which rhymes with ‘lead’ (Pb.) (p. 32, n. 17)? a. lead (v.) b. lied c. led
11. Is ‘façade’ (p. 65, n. 12) pronounced a. /ˈfæsid/, b. /fəˈsaid/ or c. /fəˈsaːd/?
12. Does ‘blind’ (p. 65, n. 18) rhyme with a. kind, b. finned or c. wind (n.)?
13. Which rhymes with ‘blind’ (p. 65, n. 18)? a. kind, b. finned or c. wind (n.)?
14. Is the first syllable pronounced the same in ‘radio’ (p. 80, n. 4) as in ‘radium’ and ‘radius’?

15. Improvisation: Soft Pawn. Listen to audio track 9 and, as you do, answer the following questions:

1. What is Dean trying to sell?
   a. some shoes worn by Neil Jordan. b. a signature c. some trainers worn by a famous sportsman d. a pair of knackers
2. Why does the Remington cost $8000? Because
   a. it works b. it was owned by Jesse James c. it was owned by Billy the Kid d. of the serial number and the condition.
3. What does the lady customer want to sell?
   a. a famous cowboy’s wisdom teeth b. Billy the Kid’s death certificate c. a Remington pistol d. Dr Euphrasius Abernuckle’s tooth
4. How much did she pay on eBay?
   a. $50,000 for the certificate b. $25,000 for each of the teeth c. $50,000 for each of the teeth d. $6000 for the revolver.
16. **Reading Multiple-Choice.** Read the article on **Probability** on pp. 69-71. As you read, choose the best alternative (a-d) for each sentence, according to the text:

1. The writer mentions the statistic about the probability of climate change because  
   a. he doesn’t believe that climate change is caused by humans.  
   b. he thinks scientists have problems agreeing about anything.  
   c. it illustrates how we accept probability statistics without really understanding them.  
   d. he believes in parallel universes.

2. The anecdote about the trial illustrates  
   a. how easy it is to manipulate probability statistics in one’s favour.  
   b. the fact that forensics is not an exact science.  
   c. how dishonest lawyers are.  
   d. how few people in Britain share the same type of DNA.

3. The article suggests that the probability of throwing heads on the toss of a coin  
   a. is exactly 50% whatever you throw on previous tosses.  
   b. is very slightly less than 50% because of the possibility of the coin landing on its edge.  
   c. increases with the number of heads you have thrown on previous throws.  
   d. decreases with the number of heads you have thrown on previous throws.

4. The anecdote about the ‘Man Who Broke the Bank at Monte Carlo’  
   a. illustrates how people have lucky streaks when Lady Luck is on their side.  
   b. illustrates how the laws of probability can’t explain how some people are especially lucky.  
   c. shows that people tend to have selective memories about luck.  
   d. is included to dissuade people from gambling.

5. The article says that  
   a. if you go to a party where there are 30 people, it is more probable than not that someone else at the party has the same birthday as you.  
   b. for every four parties at which there are 15 people that you go to, on average you will meet one person who was born on your birthday.  
   c. the average person these days knows more than 365 people.  
   d. your shouldn’t be surprised when two people you know share a birthday.

6. The article suggests that  
   a. around a hundred people in the UK have been struck by lightning.  
   b. it is impossible to explain why some people survive multiple lightning strikes.  
   c. once you have been struck by lightning, the probability that you will be struck again is much less than 600,000:1 unless you are a park ranger.  
   d. the Bulgarian and Congolese cases mentioned can be explained by the laws of probability.

7. The idea that literary masterpieces can be produced randomly  
   a. has been demonstrated on the Internet.  
   b. requires too many monkeys for it to be practicable.  
   c. does not take into account the infinitesimally small probability of typing a specific sequence of letters by means of an arbitrary process.  
   d. is unlikely to be proved or disproved in our lifetimes.
17. Music Phrasal Verbs. Read the article on p. 37. Then, without looking back, fill the gaps with a base verb to form phrasal verbs from the article:

1. Wally is always _______________ on about immigrants taking all the jobs; it’s a perfect way for him to cover up for his own inadequacies.
2. Jules was _______________ out of the regiment when he hit one of his soldiers. There was quite a scandal.
3. The new building doesn’t _______________ in with the architecture in the rest of the square.
4. “Don’t talk to strangers” was something that was _______________ into us as children, so childhood can’t have been as carefree decades ago as some people claim.
5. Is an advertising campaign on Facebook the best way to _______________ up custom for this product?
6. Please save your questions until I’ve finished rather than _______________ in while I’m speaking.
7. I wish he’d stop _______________ on about me smoking. I know it’s bad for me but I’m not going to give up – not yet, anyway.
8. Howard was _______________ out of the company when it was discovered that he had been intentionally overcharging customers and pocketing the difference.

18. Mathematical Phrasal Verbs. Fill the gaps with phrasal verbs from the article on p. 78 to form meaningful sentences. The initial letters have been given to help you.

1. The police can’t f_________________ o___________ where he hid the body. It seems to have vanished into thin air.
2. 12 t__________________ a_____________ seven is five, right?
3. Five kilometres is three miles if you r_______________ it d_______________ a little.
4. Once you f_______________ o___________ things like age, sex and social class the results no longer seem so significant.
5. Don’t forget to m_______________ o___________ what’s in the brackets first before you solve the rest of the equation.
6. He sincerely believed his actions would save the country but as far as the government was concerned, they a_______________ t___________ treason.
7. The lecturer s_______________ u_______________ by reiterating the main points again.
8. There’s something about his alibi that simply doesn’t a_______________ u_____________. Let’s go over the facts again.
9. If we f_______________ i___________ the seasonal fluctuation in employment at this time of year, we can expect an improvement in the jobless figures this month.
10. By r_______________ u_______________ all the prices for the items in the list he was able to significantly increase the total.

Look, if you add all the figures and then round up the final result, it works out as significantly less.

19. Phrasal Verbs. Throughout the magazine phrasal verbs are identified and explained in the footnotes. Fill the following sentences with phrasal verbs from Yes 18. The first letter of the base verb and the particle are given to help you. The page (p.) and footnote (n.) reference is also given:

1. Could you l_________________ t_______________ this letter and tell me what you think? (p. 27, n. 2)
2. Her criticisms of the way things were run w_______________ d_______________ very badly. (p. 28, n. 17)
3. I c_______________ a_______________ an old friend of yours yesterday. Guess who? (p. 29, n. 15)
4. Avant-garde Austrian composer Alban Berg died after he was bitten by an insect and septicemia s_______________ i_______________ ! (p. 22, n.6)
20. **Music False Friends.** Read the article on p. 36. Then, without looking back, correct the underlined word in the following sentences:

1. Jack is into reggae but his elder brother likes **heavy**.
2. The **flute** is considered an ideal primary-school instrument because it is cheap, hard-wearing and easy to play.
3. The palace perimeter is protected by a high wall topped with **concertina** wire.
4. Mrs Phillips, I'm afraid your son is not musical. He can't even hold a **compass**.
5. The respect that people show for their national **hymn** varies enormously from one country to the next.
6. You can't have a pop group without a **battery** and electric guitars!
7. For some reason the **director** is considered the most comic figure in an orchestra.

21. **Maths False Friends.** Read the article on p. 82. Then, without looking back, decide if it contains a misused false cognate. If so, correct it:

1. In English we don't use Roman numbers for writing the names of centuries.
2. The article is about parabolas, hyperbolas and other arcs.
3. Islamic art delights in heptagons, pentagrams and other regular forms.
4. It was so hot that I asked the waiter for another ice cube in my drink.
5. There are over thirty radios on this bicycle wheel.
6. Your password must contain at least six ciphers.
7. If you haven't got a pair of compasses you can always use a CD to draw your circle.
8. The world is around 4,470 million years old.
9. In which year of school do children learn the calculus in your country?
10. The radio of a circle is half its diameter.

22. **False Friends Round-up.** Throughout the magazine false friends are identified and explained in the footnotes. The following sentences contain false friends from Yes 20 that are incorrectly used here. Correct the underlined words in the following sentences so that they make sense. The page (p.) and footnote (n.) reference is given:

1. Daphne is a polyglot. She can speak four **idioms**. (p. 31, n. 6)
2. Who ate the **ultimate** chocolate? I was saving that. (p. 33, 5)
3. **Motorists** have far fewer problems parking than people who take their cars. (p. 36, n. 1)
4. I went for my annual check-up and the doctor says I'm completely **sane**. (p. 44, n. 3)
5. This blanket is so **suave**! Where did you buy it? (p. 46, n. 1)
6. The judge decided that calling someone “a lazy good-for-nothing” didn’t constitute an **injury** and dismissed the case. (p. 48, n. 16)
7. You can’t go into places of **cult** dressed like that – it’s disrespectful. (p. 60, n. 10)
8. When I was a **scholar** we had to wear a blazer, a tie and shorts to school. (p. 61, n. 8)
9. **Strangers** are fearful that Golden Dawn could get into power as a result of the debt crisis in Greece. (p. 65, n. 7)
10. She has occupied a number of executive **cargos** in the USA. (p. 67, n. 14)
11. Did you know that Sean Penn had worked as an actor on the **scenario** before becoming a film star? (p. 69, n. 19)
12. His **occurrence**, like most such comments, contained a grain of truth. (p. 72, n. 2)
23. Wordplay. Read the article on spelling and maths (p. 81). Then, without looking at the article, find eight words from the article. Use the clues and the numbers; each number represents a letter:

```
1  2  3  4  5  6  7  8  9
10 4  5  4  1  1  11  1  2  3  5  4  9
5  8  2  9  12  13  14
14 15 9  9  11  7  5  6  16  4  1
4  5  6  7  8  9  11  7  6  16
11 1  1  6  10  14  11
10 15 5  4  9  6  17
16 15 1  6  18  17  11  5
```

```
a quantity representing the power to which a fixed number (the base) must be raised to produce a given number.

a quadrilateral all of whose sides have the same length

made up of exactly similar parts facing each other or around an axis

the branch of mathematics dealing with the properties and manipulation of numbers

a regular oval shape

a solid with a square base and triangular sides

a solid geometrical figure with straight parallel sides and a circular or oval cross section
```

24. Internet Video Listening. This exercise is based on the insightful TED Talk by Hannah Fry about what maths can tell us about love. As you watch the video - (http://goo.gl/G7BBYs) - answer the following questions. If necessary listen a second time:

1. What was the name of Peter Backus’s paper?
2. How many eligible women are there for Peter in the UK?
3. What’s the difference between Portia de Rossi and Sarah Jessica Parker?
4. What is the secret to internet-dating success?
5. What practical consequences does this imply?
6. Who wrote, “An unmarried woman of seven and twenty (=27) can never hope to feel or inspire affection again”?
7. What does optimal stopping theory say you should do with the first 37% of marriageable partners you encounter?
8. What should you do after that?
9. What will you probably die surrounded by if optimal stopping theory goes wrong?
10. What type of animals use optimal stopping theory in the wild?
11. What percentage of US marriages end in divorce?
12. With what percentage accuracy could Gottman predict a divorce?
13. The equation to predict marital breakdown is also valid for predicting what else?
14. Are compromise and patience good for a marriage?
15. What was Hannah’s goal in the presentation?
25. **Matching Exercise.** Read the article about the number seven on pp. 72-73. Then, try to match the following 'seven' expressions (1-10) with their meanings (a-j):

1. Sevens  
2. The Seven Seas  
3. The seven-year itch  
4. The Seven Sisters  
5. The Pleiades (or the Seven Sisters)  
6. The Magnificent Seven  
7. Be at sixes and sevens  
8. Be in seventh heaven  
9. The Seven Samurai  
10. The City of the Seven Hills

---

a. All the oceans in the world.  
b. Be disorganised and confused.  
c. Seven chalk cliffs located along the English Channel in East Sussex.  
d. The popular belief that married couples start to lose interest in each other in their seventh year of marriage.  
e. The most visible cluster of seven stars in the constellation of Taurus.  
f. Be extremely happy.  
g. A variant of rugby played by teams made up of seven players, instead of the usual 15.  
h. An informal name for Rome  
i. A 1954 movie classic by Akira Kurosawa  
j. The 1960 US remake of Kurosawa's film as a western

26. **Difficult Music Terms.** Read the article on p. 30. Then, without looking back at the article, find the incorrectly spelt word in the following sentences and correct it:

1. I would have loved to have been a musician but I have no sense of rithm and in fact I'm tone deaf!  
2. A lot of his music was actually written for the arpsicord and it doesn't convert so well to the piano.  
3. The Albert Hall is a magnificent concert hall but the acustics are pretty awful.  
4. He wrote seven simfonies and five concertos.  
5. He's a percussionist so he should know how to play the xilofone.  
6. The brass wind instruments include things like the French horn, the trompet and the tuba.  
7. They say that Nero played a lire while Rome burned, not a violin.  
8. I can knock out a few cords but I would hardly say I can play the guitar.  
9. He plays cello in an orchestra.

---

ii. Give musical homophones for the following words:

1. tenner  
2. liar  
3. symbols  
4. cord
27. **Mathematical Equipment.** Match the words on the left to the pictures on the right:

1. a calculator

2. (a pair of) compasses

3. dividers

4. a protractor

5. a ruler

6. a 60-30 set square (UK),
   a 30-60-90 degree triangle (US)

7. a 45 set square (UK),
   a 45-90-45 degree triangle (US)

8. a slide rule

---

28. **Mathematical idioms.** Read the article on p. 79. Then without looking back, put one word from the box into each gap in the following sentences so that they make sense:

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. circle</td>
<td>b. math</td>
<td>c. peg</td>
<td>d. tangent</td>
<td>e. together</td>
</tr>
</tbody>
</table>

1. They are trying to reduce unemployment while introducing austerity measures. Talk about wanting to square the ________!
2. He is meant to be teaching us Latin but he’s always going off on a ________ telling us about quirky aspects of the Roman way of life. It’s fascinating stuff but I’m not sure we’re going to pass the exam.
3. He came home late every night but was never available when she called his office. In the end she put two and two ________ and realized he was having an affair.
4. Antwon was the only non-white student in the class and he initially felt like a square ________ in a round hole. However, when he discovered some other kids were also into paintballing he quickly blended in.
5. There are four of us who have been preselected for the two openings and the other three candidates have MBAs. Do the ________: I have no chance of getting a job here.
29. **Prepositional Cloze.** Read the Probability article on pp. 69-71. Fill the gaps in the following text with an appropriate preposition. Sometimes no preposition is needed:

1. ___ the probability article we argued that people often get probability wrong because they assume that things like coins have memories (and therefore, implicitly little brains). However, this is only partially true. There are situations 2. ___ which probability is affected 3. ___ what has gone before and some 4. ___ these situations can even trip mathematicians up. A classic example is the ‘Monty Hall problem’ - named 5. ___ the US game-show host. 6. ___ *Let’s Make a Deal* Mr Hall would present contestants 7. ___ three closed doors. 8. ___ one there was a car, 9. ___ the other two there were goats. Anyway, Monty first asked you to choose a door. Then, 10. _____ opening that door, Monty opened one 11. ___ the other two doors to reveal a goat. 12. ___ order 13. ___ win the car, should you stick 14. ___ your original chose or should you change to the other remaining door?

One line 15. ___ reasoning would say that there is a 50% chance of either door hiding the car. Moreover, you’d hate yourself if you change your choice only to find that your original door was the right one. No, better to stay 16. ___ your first choice; that way 17. ___ least you will seem resolute instead 18. ___ indecisive 19. ___ front 20. ___ the audience of millions. 21. ___ all, doors - like coins - don’t have memories, right?

Wrong. 22. ___ fact, if you want the car, you should change your door. Initially, the chances 23. ___ you choosing the correct door were 1/3 and that probability doesn’t change whatever happens afterwards. The host then revealed 24. ___ a goat. This means that the probability that the car is now behind the remaining door is 2/3, so you should change your choice 25. ___ door. 26. ___ course, the doors don’t really have memories, it is just that the host isn’t going to reveal the car so, 27. ___ revealing a goat he has narrowed the odds.

However, you have to be sure 28. ___ how Monty is playing this. He may only open a door and reveal a goat if the contestant chooses the right door, 29. ___ which case you would be crazy to change. The one third, two thirds probability only holds if the first goat is always revealed 30. ___ you’ve made your choice.

There is a more practical application 31. ___ this than *Let’s Make a Deal*. People are increasingly examined using multiple-choice tests. If you can, look 32. ___ past exams. Are the answers evenly spaced between the alternatives (e.g. three A’s, three B’s, three C’s and three D’s) with no clusters 33. ___ the same answer? If so, the answers are being chosen 34. ___ a person and, if you have no idea which answer to choose, you should take 35. ___ account the answers 36. ___ the previous and subsequent questions. However, if there are clusters and an uneven distribution, then the answers are truly random and you can’t infer anything 37. ___ the answers around the question that is causing a problem.

30. **Monologues.** Listen to audio tracks 5-8 and decide whether these statements are true (T) or false (F):

1. The first speaker’s perception of which subjects were useful and which were useless has changed significantly since he left school.
2. The second speaker resents the fact that she learned how to mend clothes at school.
3. The third speaker was never successful at maths because she was put off it early on.
4. The central value in the institutions in which she studied was conformity.
5. Those subjects considered the least practical have been the most useful for the fourth speaker.
6. The fifth speaker has found things he learned in biology useful in his career as a musician.
7. What skills are mentioned that have become useless because of technological change?
31. Wordplay - Class Activity. In this activity you have to find words in a box of letters. Words are formed by a series of adjacent letters. A word can twist and turn provided that each letter is adjacent to the previous letter in the word. You cannot use the same letter-square twice in the same word (but you can of course use the letter again in your next word). Words must have two or more letters and be found in a Standard English dictionary. Past forms, plurals and so on are valid. You get one point for each word you find in the word square which no other player also has. You have three minutes to find the words.

Practice square:

```
MINUS
FLUTE
CELLO
MUSIC
ANGLE
```

i. In this practice square you should be able to see the words MINUTE and LUNGS. Can you find any more? There are at least another 58 words!

ii. Now you should be ready to play against each other. Each player in turn should choose a letter to fill the letter-boxes in the square below. We recommend that you mix vowels and consonants - otherwise it’s more difficult! **We suggest that you photocopy this page and use the photocopy - if you don’t, then you can only play once!**

Make a note of any new vocabulary you have found in the course of the exercise. Try and use each word several times in the course of the next few days.
32. Idioms. Read the article on pp. 44-45. Then, without looking at the article, fill the gaps in the following sentences with a word that begins with the letter given:

1. I see you pulled out all the s______________ for your granddaughter's wedding.
2. I'm sick of studying about wool production in the 14th Century - what was so bad about t_______-and-d_____ history? I prefer 'Hitler-and-the-Henrys'!
3. Has McCain decided to hang up his f__________ and retire from public life?
4. Don't expect Collin to show any interest in taking out a pension fund. He m__________ to the beat of a different drum.
5. It can be difficult to s____________ just the right note at a job interview - keen yet not desperate.
6. I've been drumming h____________ to the students the need to write a well-structured composition but some of them only seem capable of writing a sort of PowerPoint presentation.
7. Euthanasia is a sensitive issue, so you'd better soft p__________ on that one for the moment.
8. If you ask me, your only option is to confess to doing it and then f__________ the music like a man.
9. He's always b__________ his own trumpet - a little more modesty would make him a lot more likeable.
10. The Vice-Chancellor likes to think he's in t__________ with the students and the academic staff but in fact he has no idea how low morale is in the university.
11. I just did my annual check-up and, fortunately, it seems I'm as f__________ as a fiddle.
12. Emma Thompson has b______________ the drum for a number of causes over the years - from the CND to Amnesty International.
13. When I heard the election results it was music to my e__________.
14. The Welsh Arts Council has financed the project to the t__________ of five million pounds.
15. You'd better do what Head Office wants. After all, he who pays the p__________ calls the tune.
16. The Opposition has accused the Government of fiddling while Rome b__________ but I'm not sure there is much they can do unless policy is coordinated internationally.
17. We can't plan our summer holidays because Bev never knows when she'll be free until the last minute. We'll just play it by e__________ like last year.
18. What's wrong with you? You've got a face like a f__________!

33. US vs. UK. Fill the gaps in the following chart. We give the page (p.) and footnote (n.) reference of where you should have encountered the terms in Yes 20:

<table>
<thead>
<tr>
<th>Definition</th>
<th>UK</th>
<th>US</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. in the direction of</td>
<td></td>
<td>toward</td>
<td>(p. 64, n. 4)</td>
</tr>
<tr>
<td>2. man (informal)</td>
<td>bloke</td>
<td></td>
<td>(p. 64, n. 6)</td>
</tr>
<tr>
<td>3. entrance for a domestic animal</td>
<td></td>
<td>pet door</td>
<td>(p. 65, n. 17)</td>
</tr>
<tr>
<td>4. homeless person, vagabond</td>
<td></td>
<td>bum, hobo</td>
<td>(p. 23, n. 17)</td>
</tr>
<tr>
<td>5. note with the time value of ½ a minim</td>
<td></td>
<td>quarter note</td>
<td>(p. 30, n. 3)</td>
</tr>
<tr>
<td>6. note with the time value of ½ a crotchet</td>
<td>quaver</td>
<td></td>
<td>(p. 30, n. 6)</td>
</tr>
<tr>
<td>7. open container with a handle</td>
<td>bucket</td>
<td></td>
<td>(p. 80, n. 12)</td>
</tr>
<tr>
<td>8. mathematics (colloquial)</td>
<td></td>
<td>math</td>
<td>(p. 62, n. 2)</td>
</tr>
<tr>
<td>9. soil, humus</td>
<td>earth</td>
<td></td>
<td>(p. 11, n. 7)</td>
</tr>
<tr>
<td>10. rectangular pieces of deep-fried potato</td>
<td></td>
<td>(French) fries</td>
<td>(p. 68, n. 16)</td>
</tr>
</tbody>
</table>
34. **Sentence Transformation.** Complete the second sentence so that it means the same thing as the first sentence. The word in **bold** must be one of the words you use to fill the gap; do not change the form of this word. Each gap requires between two and five words. Page (p.) and footnote (n.) references for each structure are given:

1. The recession has generated a number of neo-Nazi movements.
   **rise** (p. 11, n. 8)
   The recession has __________________________ a number of neo-Nazi movements.

2. It’s fortunate you didn’t say that to him.
   **just** (p. 23, n. 2)
   It’s __________________________ you didn’t say that to him.

3. Kevin is very enthusiastic about Formula One, isn’t he?
   **keen** (p. 23, n. 11)
   Kevin __________________________ Formula One, isn’t he?

4. Emma is quick to anger.
   **filthy** (p. 23, n. 15)
   Emma has ____________________________.

5. Once I got to know him I realized he was completely crazy.
   **box** (p. 24, n. 18)
   Once I got to know him I realized he was ___________________________

6. You’ll have to leave Rex outside because she hates dogs.
   **thing** (p. 25, n. 15)
   You’ll have to leave Rex outside because she ___________________________ dogs.

7. If they keep their cool, they still have some hope of winning.
   **chance** (p. 26, n. 24)
   If they keep their cool, they’re still ___________________________ of winning.

8. Xavier is proud of his English accent.
   **prides** (p. 38, n. 4)
   Xavier ___________________________ his English accent.

9. They seem to have finally reached a reconciliation.
   **hatchet** (p. 39, n. 9)
   They seem to have finally ___________________________

10. The meeting was definitely not a success.
    **far** (p. 64, n. 10)
    The meeting ___________________________ being a success.

11. Legend has it that his helicopter was shot down in the Balkans.
    **story** (p. 65, n. 14)
    His helicopter was shot down in the Balkans, so ___________________________

12. I have come into contact with her several times in my career.
    **paths** (p. 66, n. 12)
    I have ___________________________ with her several times in my career.
You’re playing with numbers. His father, a linguist and as such a musician, remarks, ‘triangles’! Maths has its symbols, music has its symbols! For me it is no coincidence that the most popular English-language book on mathematics in recent years is called *The Music of the Primes*. In essence both disciplines are a search for patterns and variations on patterns.

However, I am at heart a linguist and as such I see the meeting point of maths and music in language. Mathematician Ian Stewart compares learning maths to learning a language — but a language that, thanks to its inbuilt logic, writes itself. "You can start writing things down without knowing exactly what they are, and the language makes suggestions to you." Like human language, there is a moment after you have learned the basics when maths suddenly gets much easier. The problem with maths as with language learning is not that most people have no aptitude but that they don’t give it enough time to get over the hard part and past the plateau, according to mathematician Alex Bellos. Most people think of maths as having an iron logic but in fact mathematics — like language — often resorts to analogies. Both disciplines require you to think of one thing in terms of another. "A lot of mathematicians say it’s important to be able to think vaguely," concludes Ian Stewart.

I realized how similar maths and language were one day observing my mathematician father ‘playing’ with numbers. His search for underlying relationships between numbers closely paralleled my fascination with how words are linked by sound and etymology.
The connection between music and language is perhaps more obvious but I’ll spell it out anyway. Spoken language often depends on intonation to determine precise meaning. Phrasal languages like English are melodic, which incidentally is why English generated by a computer sounds so unnatural. Indeed, getting the musicality of English right is so important that variations on it can cause resentment, irritation and incomprehension – as Australians learn to their cost when they travel elsewhere in the Anglosphere.

My personal linguistic obsession is with chiming; the repetition of sounds in collocations and idioms. I believe that such euphony binds language together much like major chords unify music. Moreover, most music and language are carried along by rhythm. The peculiar cadence of English comes from the fact that we tend to try to space stressed syllables between more or less regular time intervals. This of course is most marked in metric poetry, which is based on variations around a meter. As with music – and especially jazz – if the variations predominate, the meter collapses. However, if there is too much metric regularity, the poetry (or the music) becomes monotonous and uninteresting.

9.
A.
1. In some parts of Europe it is illegal to 1. incite racial hatred, 2. incite homophobic violence, 3. incite gender violence, 4. deny the Holocaust.
2. *Four Lions*, *The Life of Brian*
3. A quarter. The exact figure is 28.36% of the world’s population.
4. Sharia law dictates that apostates should be executed.
5. A Saudi blogger who has been imprisoned and tortured for promoting liberal thought.
6. They come from the part of Germany where there are fewest Muslims.
7. 70%
8. The middle class
9. Because they are too comical to be considered Fascists.
10. It mentioned that Muslims were being killed by other communities (Christians, Jews and Buddhists) but did not say that Muslims were being killed by Muslims.
11. Because it is forcing French Jews to emigrate to Israel.

B.
1. The sperm donor Payton’s parents wanted.
2. The sperm donor Payton’s parents got.
3. The number of adopted children the couple in LA have.
4. The amount of money – in dollars – collected globally for baby Gammy.

ii.
1. Payton’s adoptive parents.
2. Gammy’s mother.
3. The couple who rejected Gammy.

C.
1. gotten 2. biology
3. Guinness 4. goals
5. relieved 6. eggs
7. traditional 8. gallons
9. Greenwich 10. standardization

10.
1. i, 2, j, 3, l, 4, a, 5, c, 6, f, 7, k, 8, h, 9, g, 10, e, 11, b, 12, d

11.
1. Reaction = creation
2. Tablet = battle
3. Pairs = Paris
4. Reclaim = miracle
5. Handy = Haydn
6. Karl = lark
7. Shorn align = horn signal
8. Edda charm = dead march
9. Premorse’ = emperor’s

12.
1. ellipsis 2. hyperbola 3. parabolas
4. discrete 5. hyperbole 6. discreet
7. ellipse 8. parable

13.
1c. 2 Yes, 3b, 4b.
5. a. octahedron, b. arithmetic, c. algebra,
d. Archimedes, e. pyramid.

14.
1. 3, 2b, 3a, 4c, 5a, 6a, 7b, 8c, 9c, 10a, 11c, 12a, 13c, 14. Yes.

15.
1c. 2d, 3a, 4b.

16.
1c, 2a, 3b, 4c, 5d, 6a, 7c

17.
1. harping 2. drummed 3. chime
4. drummed 5. drum 6. chiming
7. harping 8. drummed

18.
1. figure out 2. take away
3. round... down 4. factor out
5. multiply out 6. amounted to
7. summed up 8. add up
9. factor in 10. rounding up

19.
1. look through 2. went down
3. came across 4. set in

20.
1. metal 2. recorder 3. razor 4. beat
5. anthem 6. drummer 7. conductor

21.
1. numerals (numbers) ✔
2. "shapes" sounds more natural than forms ✔
3. "shapes" sounds more natural than forms 4. ✔
4. spokes (circles) 6. digits (ciphers) 7. ✔
5. spokes (circles) 6. digits (ciphers)
8. formally correct in the UK but better as 4.47 billion years old
9. ✔ (most people would omit the ‘the’)
10. radius (radio)

22.
1. languages 2. last 3. Motorcyclists
4. healthy 5. soft 6. an insult/libel
7. worship 8. schoolboy 9. Foreigners
10. positions 11. stage 12. witticism
logarithm  parallelogram  rhombus  symmetrical  arithmetic  ellipse  pyramid  cylinder

1. Why I don’t have a girlfriend.
2. Everyone thinks Portia is attractive but Sarah provokes extreme reactions/divides opinion.
3. being attractive for some people but not everybody.
4. You should post photos that highlight your potentially unattractive idiosyncrasies.
5. Jane Austen
6. Reject them all.
7. Pick the first person you encounter who is better than everyone you have meet before.
8. cats.
9. some fish.
10. 50%.
12. 90%
13. The likelihood that two countries will go to war.
14. No.
15. To encourage people to love maths.

1a, 2d, 3e, 4c, 5e, 6j, 7b, 8f, 9i, 10h.

1. rhythm  2. harpsichord  3. acoustics
4. symphonies  5. xylophone  6. trumpet

1. tenor  2. lyre  3. cymbals  4. chord

1. In, 2 in, 3 by, 4 of, 5 after/for, 6 In, 7 with, 8 Behind, 9 behind, 10 without, 11 of, 12 In, 13 to, 14 with/to, 15 of, 16 with, 17 at, 18 of, 19 in, 20 of, 21 After, 22 In, 23 of, 24 -, 25 of, 26 Of, 27 by, 28 of/-, 29 in, 30 after, 31 for, 32 at, 33 of, 34 by, 35 into, 36 to, 37 from.

1T, 2F, 3F, 4T, 5T, 6T

an, angle, cell, cello, Celt, coil, colt, cot, else, fell, felt, flint, flute, gill, gull, gun, gun, ice, ill, is, lest, lice, lot, lots, lull, lug, lung, lute, man, mangle, melt, mint, minus, mill, muse, music, name, nil, null, nut, oil, sell, set, sic, sife, sil, sit, slice, slug, sum, sun, tell, to, toe, toil, toll, us, use.

1. stops  2. trumpet-and-drum  3. fiddle
4. marches  5. strike  6. home
7. pedal  8. face  9. blowing
10. tune  11. fit  12. beaten
STAFF

Anglo Files, S.L. (publisher)

Nicholas Franklin (editor)
nick@yes-mag.com

Marina Carresi
(artistic director and photography, proofreading)
marina@yes-mag.com

Nathan Burkiewicz
(sub-editor, page-design, webmaster)
nathan@yes-mag.com

Fabiola Vieyra (promotion)

Josh Tampico (sound engineer)

Gonzalo Cohen (legal)

WRITERS, VOICES, INVALUABLE SUPPORT & HELPING HANDS

Douglas Jasch, Silvia Gimeno Siehr, Prof. Raoul Franklin, Colman Keane, Miles Pratt, Almudena Cáceres, Susannah Jones, Robbie K. Jones, Garrett Wall, AmyJo Doherty, James Duggan, Jim Trainor, Rod E. Musselman, Adrian Hall, Paul Thomas, John Adedoyin, Hamish Binns, Lois Humphrey, Julie Davies, Irene Tremblay, Dave Mooney, Howard Brown, Bea Alzona, Saskia Eijkins, Cristian Dopazzo.

PHOTOGRAPHY

Cover photo: Ji Hae
Marina Carresi, Almudena Cáceres, Natalia Auffray, Mario Herrera, Raul Puy, Jose Moreno, Ronan Kirby
In the Next Volume of Your English Supplement

**ASTRONOMY**
- The end of the world: death from space
- The mythology of the stars
- The problem with science fiction
- English and astronomy
- Astronomical idioms

**HOW TO PASS EXAMS**
- The secrets of exam success

**Economics**
- Are corporations the new trade unions?

**Internet**
- Skeuomorphs vs. digital authenticity

**Symbols**
- The retro signs in our lives

**THE VIKINGS**
- Myths and realities of the Norsemen

Plus loads more stuff on society, science, news, language etc.