Thinking Skills Assessment (TSA)

2020 explained answers

1   The 21st century is witnessing a significant rise in the proportion of people being diagnosed by medical professionals as having a mental illness. For example, at the turn of the century, the number of Canadians being treated for depression increased by over 30% in just one year. A recent study in the US found that nearly twice the number of young people there were diagnosed with a mental disorder in 2018 as compared to 2003. The World Health Organization estimates that by 2028, depression will be the second leading type of disability worldwide. It is clear that aspects of the modern world make it more difficult for people to maintain good mental health.

Which one of the following is the best statement of the flaw in the above argument?

A   Changes in health care and a decrease in stigma attached to mental illness may be responsible for higher diagnosis rates.

B   Many people with a mental health diagnosis may be able to function well in society.

C   Significant numbers of people may be hesitant to seek help for mental health concerns from doctors or other medical professionals.

D   Some physical and behavioural factors may make mental health diagnoses more difficult.

E   In some cultures people may prefer to seek help for mental health concerns from religious leaders as opposed to doctors.

The main conclusion of the argument is contained in the final sentence: aspects of the modern world make it more difficult for people to maintain good mental health. The evidence for this conclusion is that diagnoses of depression have been increasing in recent years (reflected in the statistics from Canada and America).

The problem with this reasoning is that a rise in diagnoses does not in itself tell us that the incidence of depression is increasing. It is possible that the number of people suffering from depression has remained fairly constant; it may just be that more of these people are coming forward because of reduced social stigma and that changes in health care are picking up more cases. This is expressed in option **A**.

Option **B** suggests a reason to moderate concern about the rise in diagnoses of depression. But this is irrelevant because the point of the argument is to explain why there has been an increase as opposed to judging how concerned we should be about it.

Option **C** suggests a reason for thinking the incidence of depression might exceed the number of diagnoses. If this were the case, then, with certain other assumptions, option **C** would provide some support for the conclusion.

Option **D**, like option **C**, suggests a possible obstacle to our getting an accurate picture of people's mental health. If diagnosis is difficult, then more people may be suffering from depression than we know about. Again, this might be said to support the conclusion.

Option **E** raises a possibility that could be used to criticise the strategy of the argument. If some people with mental health conditions seek help from their religious leaders, statistics from the health service may not provide a reliable picture of how many people suffer from depression.

2   In the game of tigball, two teams compete against each other to try to score points.

Points are scored as follows:

A 'penalty' scores 5 points.
A 'tigdown' scores 8 points.
A 'transformation' scores 3 points, but teams only have the opportunity to achieve a transformation after scoring a tigdown.

There are no other ways of scoring points.

Which of the following is the only one that is a possible scoreline in the game of tigball?

A   9–23

B   11–21

C   12–20

D   13–14

E   15–17

It is important to appreciate that a 'transformation' can only be scored after a 'tigdown'. As a result, possible scores for each team can only be combinations of 5s, 8s and 11s.

The five scorelines in the options have ten different team scores.

In ascending numerical order:

9 could only be achieved as 3 + 3 + 3, but this is 'transformations' only, which is not possible
11 can clearly be achieved
12 could only be achieved as 3 + 3 + 3 + 3, but this is 'transformations' only, which is not possible
13 is 8 + 5
14 could only be achieved as 11 + 3 or 5 + 3 + 3 + 3, both of which include at least one 'transformation' without a 'tigdown'
15 is 5 + 5 + 5
17 could only be achieved as 11 + 3 + 3, or 5 + 3 + 3 + 3 + 3, both of which include at least two 'transformations' without a 'tigdown'
20 is 5 + 5 + 5 + 5
21 is 11 + 5 + 5 or 8 + 8 + 5
23 is 8 + 5 + 5 + 5

The only scoreline in the options which has achievable scores for both teams is 11–21. The correct answer is option **B**.

3   In the UK we are increasingly engrossed by entertainment: we devote more time to it than sleep and spend more money on it than food and drink. The aim of entertainment is to create a make-believe situation in which emotions can be excited and discharged without affecting real life. While entertainment has its proper place, it can become a preoccupation, dominating our thoughts and sapping our emotional energy. When this happens, the 'real' world of action starts to appear comparatively dull and tedious and this, in turn, undermines social cohesion. Our increasing use of entertainment is, then, threatening our wellbeing.

Which one of the following is an underlying assumption of the above argument?

   A   Our wellbeing depends on social cohesion.

   B   People prefer entertainment to food and drink.

   C   Viewers copy the behaviour they see in entertainment media.

   D   Emotions pose a threat to society.

   E   The general public are addicted to entertainment.

The main conclusion of the argument is stated in the final sentence: our increasing use of entertainment is threatening our wellbeing. This is inferred from two claims. The first is that if we're preoccupied with entertainment, it can dominate our thoughts and sap our emotional energy. The second is that if entertainment dominates our thoughts and saps our emotional energy, the 'real' world is likely to appear dull and tedious – making us less socially cohesive.

But the conclusion only follows if there is a connection between social cohesiveness and wellbeing. Option **A** supplies this connection: our happiness or wellbeing depends on people engaging with the real world and being socially cohesive. The line of reasoning in option **A** is essential for the conclusion to be drawn.

Option **B** picks up on our relative expenditure on food, drink and entertainment, but this is beside the point. The connection between the increased consumption of amusements and social disintegration can be made without assuming any order of preference.

Although the argument raises a problem about people's use of entertainment, the issue has nothing to do with fears about 'copycat' behaviours. So the argument does not need to assume option **C**.

The argument does not depend on option **D** because it focuses on people who feel that the 'real' world is relatively uninteresting, which is distinct from any fundamental incompatibility of emotion and society.

Option **E** is a statement about the extent of the public's engrossment in entertainment. It is an (invalid) intermediate conclusion which goes too far from the statements given in support.

4   Adults over the age of 60 are often depicted by the media as depressed, lonely and grumpy. Of course, old age is associated with physical decline, health issues become more common and memory gets fuzzier. Previously, theories of ageing assumed that emotional experiences would follow a similar pathway towards dysfunction. They were wrong. Recent research has shown that in old age negative emotions (like anger) wane, while positive emotions (like contentment) become more common. Why? Our lives undergo pronounced changes in later life. Work demands are eliminated, there is more time for leisure pursuits, and older people structure their environments in ways that reduce unnecessary stress. Time horizons shrink: people learn to spend their remaining precious time on the things that matter most.

Which one of the following best expresses the main conclusion of the above argument?

A   Not everyone experiences the negative physical decline in old age often depicted in the media.

B   In old age people experience both positive and negative emotions less strongly.

C   Being freed from the demands of work allows retired people to feel happier.

D   Older people find better ways of avoiding stress and using their time productively.

E   Assumptions that the emotional aspects of ageing mirror the physical aspects were wrong.

The main conclusion of the argument is that it was wrong to assume that the physical decline associated with ageing is mirrored by an emotional decline.

The evidence for this conclusion is that recent research shows that negative emotions wane in old age and positive emotions are more common.

The passage provides an explanation for this reasoning:

'Work demands are eliminated, there is more time for leisure pursuits, and older people structure their environments in ways that reduce unnecessary stress. Time horizons shrink: people learn to spend their remaining precious time on the things that matter most.'

Option **E** expresses the main conclusion.

Option **A** conflates the claim made in the first sentence (that the media show old people as being 'depressed, lonely and grumpy') with the fact accepted in the second sentence that physical decline is associated with old age. The argument is that the media portrayal of older people's mental states is inaccurate.

Option **B** misrepresents the statement in the passage in sentence 5, which says that negative emotions wane but positive emotions become more common. It is this change in the balance of positive and negative emotions which supports the main conclusion that portrayal of elderly people is unduly negative.

Options **C** and **D** provide explanations for the change in the balance of emotions.

5   You are allowed to vote in the general election only if you are at least 18 years old. You have reached 18 so you will be able to vote in the forthcoming election.

Which one of the following most closely parallels the reasoning used in the above argument?

   A   You cannot obtain foreign currency from this bank if you cannot produce acceptable identification. You cannot produce the required identification, therefore we cannot let you have the foreign currency.

   B   You can visit your grandmother in hospital providing you have no illness yourself. As you have no illness, you will be able to visit your grandmother.

   C   We can afford to go to America this year only if you save up sufficient money. You haven't saved enough so we will not be able to go.

   D   To win the jackpot prize in the national lottery you need a ticket with all six prize-winning numbers. When I heard you had won the jackpot, I knew you had the lucky ticket that matched all the numbers from the draw.

   E   Passport applications can only be accepted if photographs are witnessed as a likeness by someone in a professional job. Your application was refused so your witness cannot have been a professional person.

The passage and option **B** share the same underlying structure: P is necessary for Q; P is true; therefore Q must be true.

In the passage: P = 'You are 18 years old' and Q = 'You can vote in the general election'.
In option **B**: P = 'You are not ill' and Q = 'You can visit your grandmother in hospital'.

Option **A** has the underlying structure: P is necessary for Q; P is not true; therefore Q is not true.
P = 'You can produce acceptable identification' and Q = 'You can obtain foreign currency'.

Option **C** has the underlying structure: P is necessary for Q; P is not true; therefore Q is not true.
P = 'You have saved up sufficient money' and Q = 'We can go to America this year'.

Option **D** has the underlying structure: P is necessary for Q; Q is true; therefore P must be true.
P = 'You have a ticket with all six prize-winning numbers' and Q = 'You win/won the jackpot in the lottery'.

Option **E** has the underlying structure: P is necessary for Q; Q is not true; therefore P is not true.
P = 'Photograph is witnessed as a likeness by someone in a professional job' and Q = 'A passport application is accepted'.

6 A teacher is organising a trip to the local zoo for 20 students. Of the 20 students, 12 are aged 11–15 and 8 are 16–18 years of age. Tickets cost £12.95 per adult (16 years of age and over) and £9.95 per child (2–15 years of age). For every 4 students under 16 they must have one teacher supervising them. They will take the minimum number of teachers.

What was the total admissions price for the group?

A £199.00

B £223.00

C £259.00

D £261.85

E £287.75

There are 12 students who are under 16, so there will be 3 teachers.

The cost for the 12 students who are under 16 will be 12 × £9.95.

The cost for the other 8 students and the 3 teachers will be 11 × £12.95.

Calculators are not allowed, so the most efficient way of working out the total cost is:
(12 × £10) + (11 × £13) – (23 × £0.05) = £120 + £143 – £1.15 = £261.85.
The correct answer is option **D**.

7   The Pentarathon Challenge is a competition in which five athletes compete against each other in five marathon races, run on consecutive days.

Points are awarded in each race, as follows:

first place   7 points

second place   5 points

third place   3 points

fourth place   2 points

fifth place   1 point

This table shows the total points of the competitors in this year's Pentarathon Challenge after each race.

name	total points after race 1	total points after race 2	total points after race 3	total points after race 4	total points after race 5
Colin	7	9	10	12	17
Jason	1	4	6	13	14
Kyle	3	10	15	18	25
Noel	2	7	14	15	18
Ray	5	6	9	14	16

Who finished in a different position in each of the five races?

A   Colin

B   Jason

C   Kyle

D   Noel

E   Ray

There is a lot of data here, but all you need to consider is that a different position in each of the five races will result in a total score of 7 + 5 + 3 + 2 + 1 = 18 points. Only Noel has this total after race 5. The totals after each of the first four races are unnecessary information (unless you wish to reassure yourself that Noel's points are indeed different in each race). The correct answer is option **D**.

8 Between 1987 and 1992 there were four formats of singles recordings: 7", 12", cassette and CD. The accompanying graph shows how total sales of singles were split between the four different formats in the years 1987 to 1992.
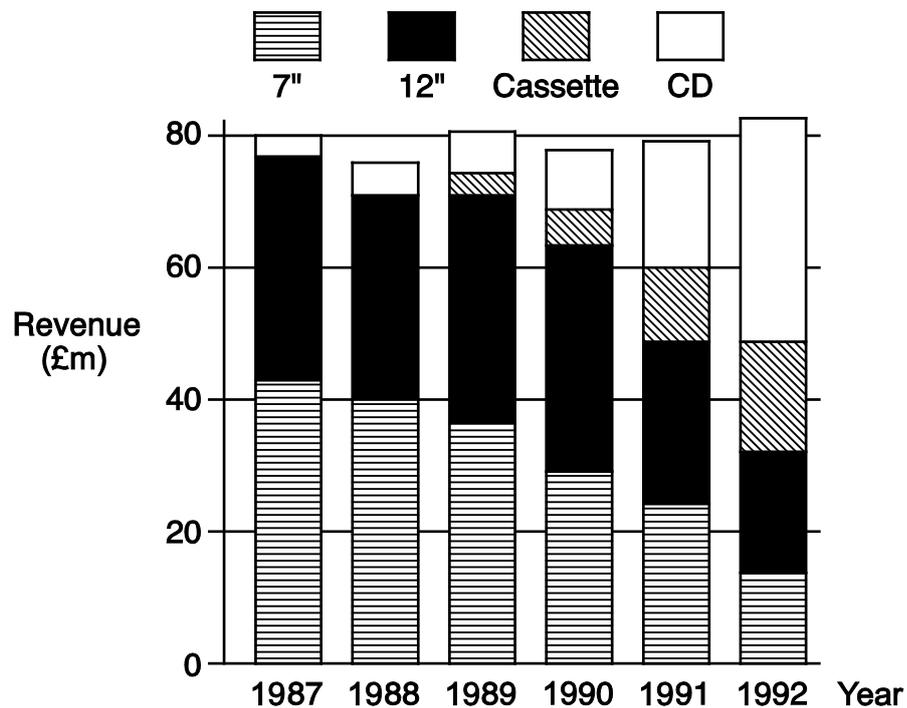
Which one of the following statements is false?

A The revenue from sales of CD singles grew every year.

B The revenue from sales of 7" singles fell every year.

C The revenue from sales of 12" singles fell every year.

D Sales of 7", 12" and cassette singles accounted for approximately 60% of the revenue from singles in 1992.

E 1989 is the first year of those shown in which 7" singles accounted for less than half the revenue from singles.

In this question you are asked to identify the statement that is false. You should notice that the black portion of the bar for 1989 (representing 12" singles) is clearly longer than the black portion for 1988, so the statement 'The revenue from sales of 12" singles fell every year' is false. The other statements can all be confirmed as true from the graph. The correct answer is option **C**.

9 Microscopic malaria parasites enter a person's bloodstream through mosquito bites and infect red blood cells. They replicate in these cells and penetrate other organs. Until recently, microbiologists sought to block the parasites from entering red blood cells. Rhode Island University studied 700 Tanzanian children infected with malaria and found the parasites use a protein, since named PfSEA-1, to escape from the red blood cells they infect. Having investigated a subgroup of children immune to malaria, the researchers realised these children were producing an antibody that locked protein PfSEA-1 into their red blood cells. Trapped in the red cells, the parasites were destroyed by immune system cells. Scientists have reproduced the antibody and successfully tested it on mice. Experts believe that, after trials, the antibody will be certified for use in the treatment of humans.

Which one of the following can be drawn as a conclusion from the above passage?

A Rhode Island University is a world leader in medical research.

B After the discovery of protein PfSEA-1, the traditional approaches to fight malaria will be abandoned as ineffective.

C The discovery of protein PfSEA-1 is likely to help scientists to develop a new way of combatting malaria.

D World leaders should support and fund the research being conducted by Rhode Island University.

E A unique feature of the Tanzanian children helped in the discovery of protein PfSEA-1 and its function in spreading malaria.

The passage describes a new method for preventing the replication of malaria parasites in red blood cells. The PfSEA-1 protein prevents malaria parasites from escaping from the blood cells they penetrate and they are subsequently eliminated by the immune system. Researchers discovered that a group of children immune to malaria had an antibody that prevented malaria parasites from accessing the PfSEA-1 protein.

From this information we can draw option **C** as a conclusion. If it's true (and sentences 4 and 5 tell us this) that the antibody limits malaria parasites' access to a crucial protein, then the ability to reproduce the antibody in a form that could be given to patients promises a treatment against malaria.

We cannot draw option **A** as a conclusion because although Rhode Island University carried out the promising research, it doesn't follow that the institution is necessarily a world leader in medical research.

We cannot draw option **B** as a conclusion because the development of a new treatment for malaria does not mean doctors will automatically abandon existing therapies.

We cannot draw option **D** as a conclusion because the passage does not make any specific claims about what world leaders ought to support and fund. This option goes beyond the factual information in the passage without support.

We cannot draw option **E** as a conclusion because the passage does not provide further information about whether what was found in the blood cells of the immune Tanzanian children was unusual or not.

10   Despite the government's promise to be more business friendly, plans have been announced to change the law regarding the paid leave that couples are entitled to take following the birth of a child. This will allow new parents to take more time off work than under the current regulations. It is claimed that the current legislation makes it difficult for those with family commitments to manage all of their responsibilities, but it needs to be recognised that businesses (and in particular small businesses) need to operate in a way that guarantees that staff are available to do the jobs that need doing. The new proposals are undoubtedly going to make the system more complicated and could dissuade businesses from employing certain groups of people. They should be opposed.

Which one of the following, if true, most weakens the above argument?

A   The example given is only one of a range of measures being proposed.

B   Many businesses now allow their employees to choose to work from home.

C   The proposals from the government provide support for businesses to help with the cost of covering the work of staff taking leave.

D   The problems associated with covering the work of absent members of staff become increasingly difficult the longer the absence goes on.

E   The proposals will increase the amount of leave that employees are allowed to take in other circumstances as well as following the birth of a child.

The main conclusion of the argument is that new proposals to increase the entitlement to paid leave following the birth of a child should be opposed. The basis for this conclusion is that certainty around staffing is necessary for businesses to operate. Since the proposal would extend leave for new parents, the author draws the intermediate conclusion that the change would make staffing more complicated and might lead to discriminatory recruitment practices.

Option **C** weakens the inference to the intermediate conclusion: if the proposal includes support from government to help with covering leave, the negative effects on businesses are not inevitable.

Option **A** does not weaken the argument because it is focused on the effect of extending parental leave and not on any of the other measures being proposed.

Option **B** does not weaken the argument because the issue is not where employees are working, but whether businesses have staff available to do the work at all.

Option **D** has the potential to strengthen the argument: if the negative effect of leave increases with its duration, the proposed extension of parental leave may be more problematic than the existing arrangements.

Option **E** provides a further reason to reject the plans. The threat to business certainty may be greater if employees are entitled to take leave in a broader range of circumstances than at present.

11 As long as there is the right combination of guests, any party will be a success. The last party was great, so there must have been a perfect selection of guests.

Which one of the following most closely parallels the reasoning used in the above argument?

A As long as there is a high level of unemployment, all economies will perform below their maximum potential. Unemployment levels here have risen sharply, so our economy will perform less well than it could do.

B As long as there are good hotels, any seaside town can get on the tourist trail. Our town is a tourist hotspot, yet none of the hotels are any good.

C As long as there is somebody in charge, any project will go smoothly. James has taken firm control, so this week's project will be fine.

D As long as there are lots of security personnel around, public order is sure to be maintained. We have been having huge problems with public disorder here, so there cannot be many security people.

E As long as there is lots of water, any habitat will support life. Life is abundant in that habitat, so there must be lots of water.

The passage and option **E** both share the same underlying structure: If P then Q; Q is true; therefore P must be true.

In the passage: P = 'the right combination of guests' and Q = 'the party will be a success'.
In option **E**: P = 'there is lots of water' and Q = 'a habitat will support life'.

Option **A** has the underlying structure: If P then Q; P is true; therefore Q must be true.
P = 'high levels of unemployment' and Q = 'the economy performs less well'.

Option **B** has the underlying structure: If P then Q; Q is true and P is not true.
P = 'there are good hotels' and Q = 'a seaside town will be popular'.

Option **C** has the underlying structure: If P then Q; P is true; therefore Q must be true.
P = 'someone is in charge' and Q = 'the project will go smoothly'.

Option **D** has the underlying structure: If P then Q; Q is not true; therefore P must not be true.
P = 'security personnel are around' and Q = 'public order is maintained'.

12 A builder has 32 kg of a mix of sand and cement, of which 25% is sand. For a new job, he needs 120 kg of a mix of sand and cement in which the ratio of sand to cement is 2:1. To obtain this, he starts with his initial 32 kg mix and adds more sand and cement.

What is the ratio of the masses of sand and cement that he needs to add?

A 4:7

B 3:4

C 5:3

D 9:2

E 12:1

The builder has 32 kg of a mix made up of 8 kg of sand (25%) and therefore 24 kg of cement.
He needs his final mix to be 120 kg, made up of 80 kg of sand and 40 kg of cement (2 : 1 ratio).
This means that he needs to add 72 kg of sand and 16 kg of cement to his original mix. This is a ratio of 72 : 16, which, in simplest terms, is 9 : 2. The correct answer is option **D**.

13 I am planning to buy a new laptop. The following table shows the specifications and the prices of my shortlist.

laptop	processor speed (GHz)	memory (GB)	storage (GB)	graphics card memory (GB)	screen size (inches)	price (£)
Racer	2.7	4	500	2	15.6	600
Ledd	2.8	8	1000	4	17.3	850
SNSV	2.5	4	750	6	15.6	500
Pear	2.8	8	1000	4	13.3	1300
Elovon	3.0	16	1000	8	15.6	700

In terms of storage, the operating system and my files take up 300 GB. I would also like a laptop with a screen size of at least 15 inches. I am looking for the cheapest laptop that can run the following games (the minimum system requirements indicate the lowest possible value for each characteristic that would enable me to play these games):

MINIMUM SYSTEM REQUIREMENTS OF GAMES				
game	processor speed (GHz)	memory (GB)	storage (GB)	graphics card memory (GB)
OTAD	2.7	6	70	4
Kickman	2.5	4	80	4
Earthcraft	2.2	4	50	2
Near Scream	2.6	8	100	4

Which laptop should I buy?

A Racer

B Ledd

C SNSV

D Pear

E Elovon

The most efficient approach to this question is to eliminate the laptops that don't satisfy the essential requirements and then select the cheapest of those you have not eliminated.

Racer does not have enough memory or graphics card memory to run all of the games.
SNSV has a processor speed that is too low to run all of the games as well as not enough memory.
Pear has a screen size that is too small.
Elovon is the cheaper of the other two laptops.

The correct answer is option **E**.

14 A combination lock has three dials, each dial has eight letters. It is known that the following combinations have been used - one, who, two, bob, add, owl, fab, den, mia and tat.

Which one of the following words is not possible to use on this combination lock?

A win

B deb

C hat

D men

E bad

From the combinations that have been used, you can establish that the first dial contains the eight letters o, w, t, b, a, f, d, and m. There is no h, so it cannot be possible to use 'hat' as a combination.

It is not necessary to consider the second and third dials, though it can be confirmed from the combinations used that the other four words are possible. The correct answer is option **C**.

15   Although the Scottish Government has announced plans to ban corporal punishment of children (smacking), we must preserve the right of parents in the rest of the UK to smack their children when it is reasonable. This is not because we are violent people eager to hit our kids: we recognise that smacking is damaging to children. The point is rather that people resent being legislatively compelled to do what they would have done anyway. It only breeds contempt for the law and since the wellbeing of citizens depends on people respecting the law, we should take steps to prevent it falling into disrepute. We must, therefore, protect the rights of parents in Northern Ireland, Wales and England to smack their children.

Which one of the following, if true, most weakens the above argument?

A   No published study has identified any developmental benefits associated with smacking.

B   Respect for the law is the decisive factor that underpins social cohesion in the UK.

C   The ban is one element in a larger mental and physical health programme for children being undertaken by the Scottish Government.

D   The damage caused by smacking far exceeds the damage caused by negative attitudes towards the law.

E   Popular opinion can, in some cases, be an effective constraint on immoral behaviour.

The main conclusion of the argument is that parents in Northern Ireland, Wales and England should retain the right to smack their children. The basis for this conclusion is that people resent being compelled by law to do what they are inclined to do anyway. Any such resentment breeds contempt for the law, which is a problem because the wellbeing of citizens depends on people respecting the law.

Option **D** weakens the argument by introducing a further consideration to take into account: if smacking is worse than negative attitudes towards the law, it is far from obvious that we should prioritise respect for the law over the protection of children.

Option **A** is consistent with the claim in the passage that smacking is damaging to children and so does not affect the argument.

Option **B** has the potential to strengthen the argument: if respect for the law is necessary for social cohesion then there may be grounds to prioritise it.

Option **C** does not weaken the argument because the other aspects of the programme are distinct from the effects of this specific ban.

Option **E** might strengthen the argument: if 'peer pressure' is as good as law in controlling behaviour, there is perhaps less reason to enshrine the ban on smacking in law.

16 Sometimes we are mistreated by others, and forgiveness is one kind of response to those who wrong us. However, sometimes we do things that appear to be morally wrong but, in fact, are not. If we are reproached, we can give an explanation for our action that justifies it. In these cases, we are claiming that, despite appearances to the contrary, what we did was morally permissible. Forgiveness and justification ought to be distinguished. When conduct is justified, the implication is that it was not morally wrong, but when conduct is forgiven, there is no such implication. What we are forgiven for is the morally wrong things we do.

Which one of the following best expresses the main conclusion of the above argument?

A Sometimes we do things that appear to be morally wrong but, in fact, are not.

B Forgiveness and justification ought to be distinguished.

C What we are forgiven for is the morally wrong things we do.

D Forgiveness is one kind of response to those who wrong us.

E When conduct is justified, the implication is that it was not morally wrong.

The main conclusion of the argument is that forgiveness should be distinguished from justification.

The reasoning that supports this conclusion is:

1 Forgiveness and justification are responses to actions.
2 Forgiveness implies that an action was wrong.
3 If an action is justified then it is not wrong.
4 Sometimes a justified action appears to be wrong.

Option **B** states the main conclusion.

Option **A** expresses reason 4.

Option **C** expresses reason 2.

Option **D** expresses part of reason 1.

Option **E** expresses reason 3.

17 There has been a choral singing boom. Three hundred thousand more people sing in choirs than play amateur football, yet football receives £30 million from the government every year compared to £1 million for choirs. It is only fair that a substantial increase in funding is made that reflects the numbers of participants and thus treats choral singers fairly. The benefits for those who sing in a choir are comparable to those who play football: increased lung capacity, better posture, improvements to the immune system, and a general sense of well-being. A choir also fosters teamwork, where there is cooperation, determination, discipline and imagination, drawing the best from every individual involved and creating something much greater than the sum of its parts.

Which one of the following illustrates the principle used in the above argument?

A The better-off countries have to tackle poverty in our world when we still have over a billion people living on less than a dollar a day.

B Audience figures at regional theatres are now greater than in the capital, so they deserve an increased share of the financial aid set aside for the arts.

C The proportion of people needing treatment for mental health issues has increased by 25% in a decade and more funding is needed to deal with this crisis.

D If citizens are able to raise a large amount of money towards a community sports centre, then the local council should show good faith by matching that amount.

E Our arts sector continues to generate an increasing share of national income, so we need to keep building on this success by encouraging the next generation of young actors, musicians, and other artists.

The main conclusion of the argument is that financial support for choirs should increase. This is based on the principle stated in the third sentence that financial support should reflect participation. Since more people sing in choirs than play amateur football, it is only fair that the funding for choirs should increase.

The principle is illustrated in option **B**: if regional theatres are now attracting more people than theatres in the capital, they should receive an increased share of the financial support for the arts.

Options **A**, **C**, **D** and **E** do not contain the comparative aspect of the passage and option **B** (choirs/football and regional theatres/theatres in the capital): they simply make straightforward recommendations for areas of funding.

Option **A** states that wealthier countries have an obligation to help people who live on less than a dollar a day.

Option **C** identifies a growing health problem and recommends funding be increased to tackle it.

Option **D** recommends local councils match charitable fundraising for local projects.

Option **E** recommends support for growing areas of the economy, e.g. the arts.

18 Every week I buy 12 cans of lemonade. The shop that I always buy them from sells individual cans for 80p each and packs of 4 cans for £2.60, so I buy three packs of cans.

Last week the shop had a special offer, as follows:

Individual cans – buy one, get another half price

Pack of 4 cans – buy one pack, get a 5th can free

I didn't want more than 12 cans, and I managed to get 12 cans for the lowest possible total price.

How much less than usual did I pay for my 12 cans last week?

A   20p

B   60p

C   80p

D   £1.00

E   £1.40

I usually pay 3 × £2.60 = £7.80 for my 12 cans.

I bought exactly 12 cans last week, so it seems likely that I bought two packs of 4 +1 and 1 can + another half price. The cost of this = (2 × £2.60) + 80p + 40p = £6.40, which is £1.40 less than usual. The correct answer is option **E**.

Another possibility would be 6 individual cans + another 6 half price, but this would cost 6 × £1.20 = £7.20, which is only 60p less than usual.

19 I have booked myself, my wife and our three children into The Wavecrest Hotel, Southbourne, for seven nights from June 19th. The hotel has sent us a 'What's on' booklet, and we are particularly keen to see *Oliver!*, the advertisement for which is shown below:

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The Southbourne Songsters present

OLIVER!

at the Pavilion Theatre

from Monday 3rd June to Saturday 22nd June

Nightly at 7.30pm

Matinees Wednesdays & Saturdays at 3pm

Adults: £12 (Matinees £10)

Children: £6 (Matinees £5)

Family Ticket: £28 (all performances)
(2 adults and 2 children)

Monday nights: £5 (all tickets)
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What is the **least** it could cost for us all to see *Oliver!* during our holiday in Southbourne?

A £25

B £28

C £33

D £34

E £35

It is important to appreciate that the last day of the show is Saturday 22nd June, so only Wednesday (which is the 19th), Thursday, Friday and Saturday are possibilities.

A family ticket plus 1 matinee ticket for the third child would cost £28 + £5 = £33, whereas the cost of individual tickets for a matinee performance would be (2 × £10) + (3 × £5) = £35. The lowest total cost for an evening performance would be £34 (for a family ticket plus £6 for the third child). The correct answer is option **C**.

20 In computer technology, a bit can take two values: 0 or 1. A byte is composed of 8 bits.

I start with the following byte: 01000111

I choose two adjacent bits and change each of them to the opposite value (that is, a 0 becomes a 1, and a 1 becomes a 0). I repeat this procedure a number of times.

Which one of the following bytes **cannot** be the result?

A 01001011

B 11111111

C 10101011

D 10111101

E 00001111

There is potentially a large amount of searching in prospect here, to eliminate the options that can be the result of carrying out the procedure required.

However, a much quicker approach is to consider that changing 01 or 10 will not change the number of 0s and the number of 1s in the byte, while changing 00 or 11 will increase the number of 1s by two and decrease the number of 0s by two or increase the number of 0s by two and decrease the number of 1s by two.

The byte 01000111 contains four 0s and four 1s, so any series of changes will always result in an even number of 0s and an even number of 1s. The byte 10101011 contains three 0s and five 1s, which is not possible. The correct answer is option **C**.

21 In real terms, spending on education in the UK is going down. But reductions in funding always mean a reduction in the quality of education provided. In the current climate, we should expect to see the quality of education in the UK diminishing.

Which one of the following most closely parallels the reasoning used in the above passage?

   A No one ever succeeds at anything unless they make an effort. But you've just won an award for your work in physics, so you must have made an effort.

   B When the water is at this level, it's either high tide or a flood. High tide is not for another eight hours. So there must be a flood upstream.

   C If you take regular exercise, you'll be fit in heart and mind. You've been working out twice a week for three months now, so you must be happy and healthy.

   D If you eat sweets every day you're more likely to need dental treatment. Sam has had a lot of dental treatment so he must eat sweets every day.

   E The car won't run without a working battery. I can't get the car to start so the battery must be dead.

The passage and option **C** share the same underlying structure: If P then Q; P is true; therefore Q must be true.

In the passage: P = 'spending on education is going down' and Q = 'a reduction in the quality of education'.
In option **C**: P = 'taking regular exercise' and Q = 'fit in heart and mind'.

Option **A** has the underlying structure: P is necessary for Q; Q is true; therefore P must be true.
P = 'making an effort' and Q = 'succeed at something'.

Option **B** has the underlying structure: If P then either Q or R; P is true and Q is not true; therefore R must be true.
P = 'water at this level'; Q = 'it's high tide'; and R = 'there's a flood'.

Option **D** has the underlying structure: If P then Q; Q is true; therefore P must be true.
P = 'eat sweets every day' and Q = 'have dental treatment'.

Option **E** has the underlying structure: P is necessary for Q; Q is not true; therefore P is not true.
P = 'a working battery' and Q = 'car will run'.

22 Maths is the most popular subject taken at A Level in the UK. Most of the best-paid jobs are in the technology and finance sectors, which tend to require maths. The majority of students achieving the best grades in maths are boys, which helps to explain the persistence of the gender pay disparity. But what explains the gender disparity in Maths A Level results – genetic inheritance or social conditioning? International studies of achievement in maths show that in some countries girls outperform boys in maths, suggesting that social conditioning is the explanation. From this we can conclude that the better achievement in maths of boys in the UK is caused by low expectations of girls in maths by teachers and parents.

Which one of the following best expresses the flaw in the above argument?

A It assumes that the only factors in social conditioning are the expectations of teachers and parents.

B It fails to explain why the relative achievement of boys and girls varies country by country.

C It fails to consider the changing picture of achievement by boys and girls over time.

D It ignores the relatively better achievement of girls in some other subjects.

E It confuses the gender pay disparity with achievement disparities.

The passage considers why there should be a disparity between the A Level Maths results of male and female students. Two options are suggested: genetic inheritance and social conditioning. If genetic inheritance were responsible, the disparity in results would be found across the world. Since it isn't, the author draws the conclusion that parents and teachers in the UK do not expect female students to succeed at maths.

The error in the argument is that there is no basis to equate social conditioning solely with the expectations of parents and teachers. Other factors, such as peer pressure and the character of role models, could play a causal role. Option **A** is correct.

Although the argument depends on there being a difference in the performance of female students around the world, an explanation for this is not needed to draw the conclusion. So option **B** does not identify a flaw.

Option **C** states a new consideration – changes in male and female achievement over time. This statement potentially strengthens the case for ruling out a genetic explanation but is simply a statement of fact rather than a description of a flaw.

The argument is focused on achievement in mathematics. In the absence of further assumptions, the stronger performance of girls in other subjects is irrelevant to this, so option **D** is incorrect.

Since the argument explains gender pay disparity in terms of differences in academic grades, it distinguishes (and does not confuse) gender pay disparities and academic achievement. So option **E** is incorrect.

23 In many cultures, traditional heterosexual male preferences for spouses have centred upon a woman's preparedness – and willingness – to fulfil childcare and other domestic duties and not on her academic achievements or career potential. This kind of expectation on the part of men has served as a significant obstacle to women pursuing careers outside the home. It is for this reason that recent data on educational attainment within married, heterosexual couples is a cause for celebration. In many countries, university-educated men are now proportionally much more likely to marry university-educated women than was the case in their fathers' generation. This shows that more men are valuing the potential of their female partners to develop a career outside the home, and represents the breaking down of another barrier to equality.

Which one of the following, if true, most weakens the above argument?

A In many cultures, men now expect to have more 'hands-on' involvement with domestic duties than was the case in previous generations.

B Many more women are now earning university degrees, irrespective of whether they intend to go on to pursue careers outside the home.

C Infertility problems are on the rise among couples who focus on their careers first before trying to have children.

D The countries where more university-educated men are marrying university-educated women do not have particularly strict laws regarding gender discrimination at work.

E In recent decades, many countries have experienced a significant growth in the number of men who have received a university education.

The main conclusion of the argument is that data on educational attainment in married couples is a cause for celebration. This is based on the fact that although traditionally men preferred women who were willing to have and raise children, nowadays many more university-educated men are marrying women with university degrees. From this the author draws the intermediate conclusion that men now value the potential of their female partners to pursue careers outside the home.

Option **B** weakens the inference to the intermediate conclusion. If a woman's completing a degree does not necessarily signify a plan to pursue a professional career, we cannot straightforwardly infer that men are now marrying women with degrees specifically because they want them to pursue careers outside the home.

Option **A** does not weaken the argument. Although men doing more domestic work would be a positive step towards equality, it is irrelevant to any connection between women earning degrees and a change in male attitudes.

Option **C** identifies a potentially negative consequence of couples focusing on their careers before starting a family, but this in itself does not undermine the idea that marital choices suggest something about male attitudes.

Option **D** does not weaken the argument because there is no necessary connection between legal protections against gender discrimination in a country and the attitudes of university-educated men towards their spouses.

Option **E** does not weaken the argument, which is about the proportion of university-educated men marrying women with degrees and not the absolute number of such marriages.

24 I had planned my day trip to the stately home very carefully, but then the bus was late. I won't arrive until 11:30 am and will have to leave by 4:15 pm. There were five things that I had wanted to do and I had written these down in the table below:

activity	length of time	start times
visit the museum	55 minutes	11 am or 2 pm
visit the maze	55 minutes	every half hour (at quarter past and quarter to the hour)
take the guided tour	80 minutes	1 pm or 3 pm
walk in the grounds	75 minutes	any time
have lunch in the café	25 minutes	between 12:30 pm and 2:00 pm

Which activity should I miss out so that I can still do the other four?

A visit the museum

B visit the maze

C take the guided tour

D walk in the grounds

E have lunch in the café

The only time I could visit the museum would be at 2 pm and the only time that I could take the guided tour would be at 1 pm. Since there is an overlap between these, I will have to miss one of them out.

I need more than 2 hours to visit the maze and walk in the grounds, so one of these must be before I visit the museum or take the guided tour, but if I choose to take the guided tour I won't have time for lunch and one of the other activities before 1 pm.

The correct answer is option **C**.

25 Steven would like to book return flights from London to Pescara, Italy. He would like to spend at least 3 days in Pescara excluding the days of his flights. Steven has lectures in London every Wednesday that he must attend. However, there are no lectures during the 20th–24th April spring break.

The prices of flights between London and Pescara are shown for the time period Steven would like to make the trip. The airline does not have any flights between these destinations on Fridays.

London to Pescara

Pescara to London
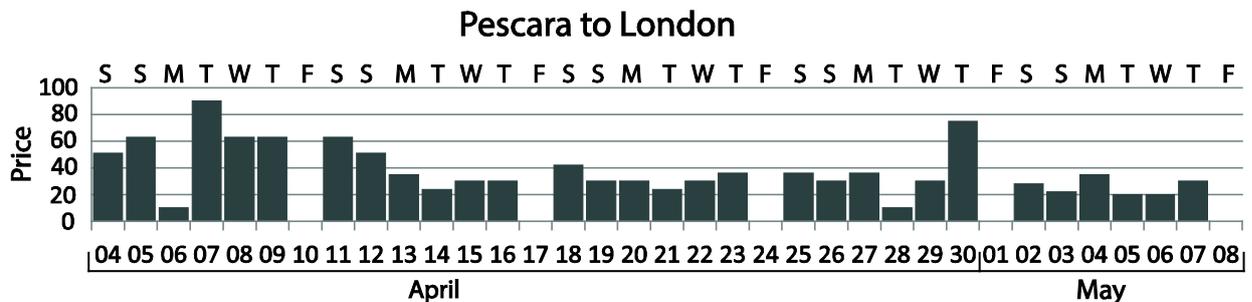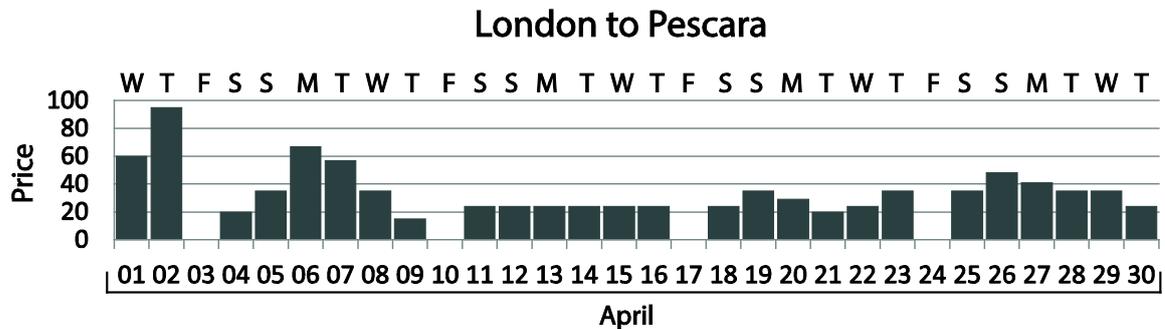
If he books the cheapest flights possible to allow him to travel according to his requirements, on which days will he depart and return?

A   Depart: Saturday 04 April; Return: Monday 06 April

B   Depart: Thursday 09 April; Return: Tuesday 14 April

C   Depart: Thursday 09 April; Return: Tuesday 28 April

D   Depart: Tuesday 21 April; Return: Tuesday 28 April

E   Depart: Thursday 30 April; Return: Tuesday 05 May

The graphs show that the lowest possible cost would result from flying out from London on 09 April and returning on 28 April. The cost is less than £20 in each direction. However, this is not possible because Steven must attend his lectures in London on Wednesday 15 April.

It would cost less than £40 to fly out on 04 April and return on 06 April, but that would only allow him one full day in Pescara.

The lowest cost option that will allow him to spend at least three days in Pescara between dates of lectures is to fly out on 21 April and return on 28 April. The correct answer is option **D**.

26 The current 'Special Offer' gimmick at Fareprice involves putting a band marked 'TWINPACK - 25% OFF' around pairs of selected items, such as washing powder.

Which one of the following 'Special Offers' is exactly the same as Fareprice's?

    A   'Buy one - Get a second for half price.'

    B   A larger packet containing 50% extra for no extra cost.

    C   'Three for the price of two.'

    D   A coupon on each packet which gives 25% off the cost of the next packet.

    E   'Five for the price of four.'

The important word in this question is 'exactly'.

Options **C** and **E** can be eliminated because you cannot buy exactly two packets for less than full price. Also, 'three for the price of two' is the equivalent of a 33% (1/3) reduction and 'five for the price of four' is the equivalent of a 20% reduction.

Option **B** can be eliminated because 50% extra in one packet is only the equivalent of 1 ½ packets. Also, it is the equivalent of a 33% reduction.

Option **D** can be eliminated because only one coupon could be used on the first two packets bought, so the reduction would only be 12.5% on the total cost of the two packets.

Option **A** gives a reduction of 25% per packet. The correct answer is option **A**.

27 People are understandably suspicious of big, centralised governments – government by people based a long way away from them, who seem disconnected from their lives and concerns. Instead there is a movement to give local people more control over what goes on in their area. The trouble with this is that people will always choose to protect their local interests over those of the wider group. Take energy: no one wants wind farms, fracking, solar power units or any sort of power station near them. It is always local groups that fight to stop them being built. Highly localised politics is not the solution. By ensuring that each small group wins its own little local battle, we are guaranteeing that everyone loses.

Which one of the following best expresses the main conclusion of the above argument?

A People's suspicions of big, centralised governments are understandable.

B People will always choose to protect their local interests over those of the wider group.

C It is typically local groups that campaign to prevent new developments from happening.

D Highly localised politics is not the way to solve the problems our political system faces.

E Ensuring that each small group wins its own local battle means that everyone ultimately loses.

The main conclusion of the argument is that highly localised politics is not the solution to the problem of centralised government.

The reasoning for this conclusion is:

1 People are suspicious of big, centralised governments.
2 There is a movement to give local people more control.
3 Local people always prioritise local over national interests.
4 Local groups prevent new developments, e.g. wind farms, from happening.
5 By ensuring each local group wins, at a national level everyone loses.

Option **D** is a statement of the main conclusion.

Option **A** is a statement of reason 1.
Option **B** is a statement of reason 3.
Option **C** is a statement of reason 4.
Option **E** is a statement of reason 5.

28 Some property developers have discovered that designing energy-efficient buildings can provide them with a 'green premium'. The government-backed Energy Star programme has been designed to identify and promote products that reduce greenhouse gas emissions. Researchers found that the positive impact on the selling prices of 'green buildings' was around 16%. The value of rents was also significantly enhanced by the Energy Star label. If taking advantage of the green premium to increase a company's profits has positive consequences for the environment, then it is all to the good. Outcomes are all that matter, contrary to the view of many green campaigners that, unless a policy is motivated purely by environmental concern, there is no virtue in it.

Which one of the following illustrates the principle used in the above argument?

A Unless a firm makes fair pay and good conditions a top priority for its workers, it cannot be judged a good employer.

B Awards should only be given to individuals or organisations that intentionally put the good of others before their own advantage.

C Reductions in expenditure on some public services should be welcomed if the result is more money for schools and hospitals.

D Research into drugs that maximise the profits of the big pharmaceutical companies is desirable if the result is that more lives are saved.

E Longer prison sentences should be imposed on the criminal minority for the benefits of the large majority of citizens who are law-abiding.

The argument defends developers who profit from the Energy Star label awarded to products that reduce greenhouse gas emissions. Although green campaigners may complain developers are motivated by profit, the argument draws on the principle that the outcome of a project determines its value. Since the outcome of the Energy Star label is more energy-efficient buildings, the argument concludes it is good.

Option **D** illustrates the same principle: if the outcome of research into new medicines saves lives, then it is a good thing even if it happens to increase the profits of big pharmaceutical companies.

Option **A** stipulates a condition for organisations claiming to be good employers: they must prioritise fair pay and good conditions for their employees. It does not deal with the issue of profits/outcomes as the argument in the passage does.

Option **B** illustrates an opposing principle that bases the value of an organisation's work on their intention to put the good of others first.

Option **C** recommends redistributing public money to increase funding for schools and hospitals but without any reference to consequences.

Option **E** implies a causal relation between the length of sentences for criminals and the good of law-abiding citizens but does not refer to outcomes.

29 The 'ticking time bomb' scenario demonstrates that it is possible for torture to be morally permissible. In the scenario, a person with knowledge of an imminent terrorist attack that will kill many people is in the hands of the authorities, and will disclose the information needed to prevent the attack only if she is tortured. The consequences of not torturing her – many people dying – are far worse that the consequences of torturing her – one person being tortured – so in this situation torture would be morally permissible.

Which one of the following is an underlying assumption of the above argument?

A If an action is morally permissible in one situation, it is morally permissible in other situations too.

B Dying is worse than torture.

C The moral status of an action is determined by its consequences.

D Ordinarily, torture would be morally wrong.

E If an action is morally permissible, then it ought to be carried out.

The argument poses a moral dilemma: is it morally permissible to torture someone in an effort to prevent an attack on many people? Since the consequences of an attack are worse (many people dying) than the consequences of torturing an individual, the author of the argument draws the conclusion that torturing a suspect is morally permissible.

However, this conclusion can only be legitimately drawn if the author assumes that the morality of an action is solely determined by its consequences, which is stated in option **C**.

Option **A** is not assumed because the argument does not incorporate a generalisation from one to many cases.

The argument does not have to assume option **B**. Even if torture and death were equally bad, the fact that the attack will cause many deaths would ground the claim that, with respect to consequences, the attack is worse than torturing the individual suspect.

Option **D** is not an underlying assumption of the argument because the moral permissibility of torturing the suspect depends on the consequences in the specified circumstances and not on the morality of torture in most cases.

The argument does not have to assume option **E** because the conclusion of the argument is that torture would be morally permissible, not that it is obligatory.

30 Joyce has decided to volunteer to work in the local High Street Charity Shop.
She has agreed to be in the shop for 4 hours on a Saturday.

To get from her home to the High Street, Joyce will have to travel by bus. Her walk from home to the bus stop is no more than 5 minutes, and the bus journey each way takes between 20 and 30 minutes depending on traffic.

Buses from Joyce's home leave for the High Street at 30 minute intervals, on the hour and on the half hour. Return buses for Joyce leave the High Street at 30 minute intervals, at 15 minutes past the hour and 15 minutes to the hour.

The walk to and from the bus stops to the Charity Shop is no more than 5 minutes.

Joyce wants to catch the 13:45 bus home after working in the shop.

What is the latest time that she should leave home for work?

    A   08:25

    B   08:30

    C   08:55

    D   09:00

    E   09:25

Joyce must leave the shop by 13:40 to make sure she is at the bus stop in time for the 13:45 bus.

She must therefore start work at the shop no later than 09:40, so the latest bus she can take is the 09:00 bus. This allows for the 5-minute walk and up to 30 minutes for the bus journey.

Her walk of up to 5 minutes from home to the bus stop means that she should not leave home later than 08:55. The correct answer is option **C**.

31 The prices for tickets to a concert are set based on the day of the performance and the number of tickets that have been sold so far. The table below shows the ticket prices. There are 1000 tickets on sale for each performance.

Day	First 200 tickets	Next 300 tickets	Next 500 tickets
Monday–Thursday	$15	$20	$25
Friday	$20	$25	$30
Saturday	$20	$30	$35
Sunday	$25	$35	$45

I need to buy 10 tickets for Saturday's performance. I will buy all of them in one purchase this afternoon.

Which of the following is **not** a price that I might have to pay for the tickets?

A $250

B $275

C $300

D $325

E $350

Focus on the row of prices for Saturday and ignore the other rows.

10 tickets @ $30 would cost $300 and 10 tickets @ $35 would cost $350, so options **C** and **E** can be eliminated.

Consider the possibility that some of the tickets could be the last of the first 200 tickets and some of the next 300 tickets or the last of the next 300 tickets and the rest of the next 500 tickets.

(5 × $20) + (5 × $30) = $250, which eliminates option **A**.
(5 × $30) + (5 × $35) = $325, which eliminates option **D**.

$275 = (5 × $20) + (5 × $35), which is not possible in one purchase because it is a combination of the first 200 tickets and the last 500 tickets. The correct answer is option **B**.

32 Bert has agreed to make 14 decorations for his daughter's birthday. Each decoration will require two gold ribbons, one 12 cm long and the other 7 cm long.

The table shows the lengths and prices of available gold ribbon.

gold ribbon price list	
gold ribbon length	price
30 cm	£4.00
50 cm	£5.00
60 cm	£6.00

The ribbon can be easily cut to size for the decorations, but short pieces of ribbon cannot be joined to make longer lengths.

What is the least amount that Bert will need to spend on gold ribbon for the 14 decorations?

A £26.00

B £27.00

C £28.00

D £29.00

E £30.00

There are various ways that this problem may be approached. The following is one of them.

The greatest total length that can be bought for £26 is (4 × 50) + 60 = 260 cm. The total length needed is 19 × 14 = 266 cm, so **A** can be discounted.

The greatest total length that can be bought for £27 is (3 × 50) + (2 × 60) = 270 cm.

      14 lengths of 7 cm can be produced from 2 of the lengths of 50 cm,
      4 lengths of 12 cm can be produced from the other length of 50 cm,
      the other 10 lengths of 12 cm can be produced from the 2 lengths of 60 cm.

The correct answer is option **B**.

33 The last century has seen amazing advances in medical research and practice. By preventing millions of premature deaths and reducing pain and incapacity, they have transformed life all over the world. But it is now time to call a halt. Further progress in surgery or medicine will be too expensive for any but a very few excessively rich people to be able to benefit from it. Trying to meet the medical needs of a whole population will therefore bankrupt any country which is foolish enough to attempt it. Extending the slow decline towards the grave does more harm than good, because no one looks forward to a life of increasing dependence and deteriorating mental capacity.

Which of the following best expresses the main conclusion of the above argument?

A Medical progress has achieved great benefits in every part of the world.

B Work on developing new medical and surgical treatments should now cease.

C Any new medicines and new surgical procedures which are developed will cost too much.

D No country can now afford to give total medical care to all its people.

E The prolongation of old age is not a benefit.

The conclusion of the argument is that there should not be any further research into medicine and surgical treatments.

The reasoning that supports this conclusion is:

1 Medical research has reduced pain and premature deaths.
2 Further progress would be too expensive for all but the richest in society.
3 Trying to meet the medical needs of everyone would bankrupt a country.
4 No one looks forward to a protracted decline in later life.

Option **B** is a statement of the main conclusion.

Option **A** is a statement of reason 1.
Option **C** is a statement of reason 2.
Option **D** is a statement of reason 3.
Option **E** is a statement of reason 4.

34 Campaigners have long been calling for a change in the law to force social media companies to take racist, sexist, terrorist, or obscene material posted on their platforms more seriously. They want the government to bind Facebook, Google, etc. to the same strict rules that apply to newspapers and magazines. But that would be wrong. The proprietors of newspapers and magazines are classified as 'publishers', and all publishers are responsible for the content that is printed or displayed on their pages, whoever has contributed it. But the operators of social media platforms are not publishers in the proper sense of the word, and therefore they are not accountable for what individuals post on their platforms.

Which one of the following best expresses the flaw in the above argument?

A The fact that social media operators are not classified as publishers does not mean they cannot have some of the same responsibilities.

B The fact that the government wants to bind the media giants to strict rules is not a reason to conclude that they will be successful.

C The fact that communication platforms have not been subject to the same standards as publishers in the past does not mean that they will continue to be so in the future.

D The fact that newspaper and magazine proprietors are classified as publishers does not make it right to hold them responsible for what their contributors write.

E The fact that Facebook and Google do not take their responsibility seriously does not necessarily apply to all social media providers.

The main conclusion of the argument is that it would be wrong to apply the same rules to social media platforms that are applied to magazine and newspaper publishers. The basis for this conclusion is that owners of newspapers and magazines are classified as publishers who are responsible for what they print. But since social media companies are not classified as publishers, they are not accountable for what people post on their site.

But just because publishers have a set of responsibilities, it does not follow that only publishers have such responsibilities. Option **A** expresses this erroneous step in the argument.

Option **B** misses the point of the argument, which is about whether social media companies are responsible for their content and not about whether they can be successfully held to account.

Option **C** does not identify a flaw because the argument does not involve an inference from how things have been to how they will be in the future.

Option **D** does not identify a flaw and merely questions the legitimacy of holding newspaper owners responsible for what they print.

Option **E** does not identify a flaw because the campaign is based on offensive material having been published at all, which does not involve a generalisation from particular cases to widespread occurrence.

35 There are countless ways to get rich in this world. Those who do not achieve wealth either do not find it important or simply have bad luck. Jane is poor but she has always valued material goods, so she must have been unlucky in her life.

Which one of the following most closely parallels the reasoning used in the above argument?

A Anyone can become prosperous by working hard. Tom is not wealthy so he must not have been working hard.

B There are numerous ways to become famous. Among others, one can learn to play a musical instrument very well, study to become a world-class scientist or just upload a funny video of oneself to the internet. Mike is not famous because he has not done any of these.

C To make a cake sweet, one can use either sugar or honey. This cake is not sweet because it was made with neither sugar nor honey.

D Two paths lead to the lake: one through the forest and another over the mountain. You must have arrived at the lake by the forest route because you were not on the mountain path.

E It takes a lot of luck to win the lottery. I have never won the lottery, so I must not have been lucky so far.

The passage and option **D** both share the same underlying structure: If P, then Q or R; P is true and Q is not true; therefore R must be true.

In the passage: P = 'x is poor', Q = 'x does not value material goods' and R = 'x has been unlucky in life'.
In option **D**: P = 'arrive at the lake', Q = 'take the path through the forest' and R = 'take the path over the mountain'.

Option **A** has the underlying structure: If P then Q; Q is not true; therefore P is not true.
P = 'work hard' and Q = 'be wealthy'.

Option **B** has the underlying structure: If P or Q or R, then S; P and Q and R are not true; therefore S is not true.
P = 'learn a musical instrument', Q = 'become a world-class scientist', R = 'upload funny videos' and S = 'be famous'.

Option **C** has the underlying structure: If P, then Q or R; neither Q nor R is true; therefore P is not true.
P = 'the cake is sweet', Q = 'the cake is made with sugar' and R = 'the cake is made with honey'.

Option **E** has the underlying structure: P is necessary for Q; Q is not true; therefore P is not true.
P = 'have luck' and Q = 'win the lottery'.

10.5 metres
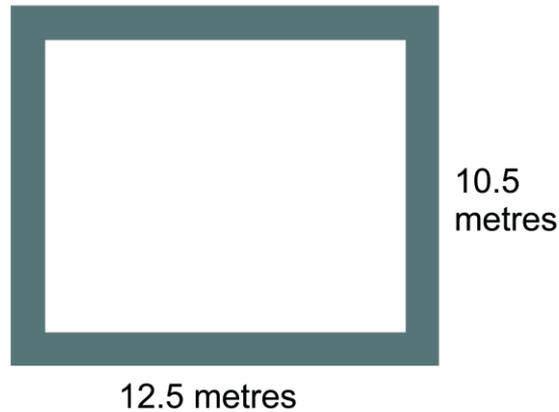
12.5 metres

The whole of my garden is a patio, which is 12.5 by 10.5 metres. I intend to resurface my patio. I would like my patio to include a 25 cm border of bricks and the remainder of the patio inside the border to be covered with paving slabs.

The bricks I will use for the border are 25 cm x 25 cm and the paving slabs I will use for the remainder are 30 cm x 20 cm.

What is the total number of bricks and paving slabs that I will need for my patio?

A   2000

B   2180

C   2184

D   2268

E   2272

The border of the patio is the width of one brick. 4 bricks create a length of 1 m, but 4 × the perimeter of 46 m includes the four corners twice each, so the number of bricks needed is 180.

Inside the border, the surface to be covered is 12 m × 10 m, which means that there will be 50 rows (10 m ÷ 20 cm) of 40 paving slabs (12 m ÷ 30 cm), a total of 2000. The correct answer is option **B**.

37 The table below shows the popularity of different breakfasts served in a hotel from 2006 to 2012.

breakfasts	2006	2007	2008	2009	2010	2011	2012
bacon, egg, sausage and fried bread	70%	60%	50%	40%	30%	20%	10%
porridge, toast and marmalade	5%	10%	15%	20%	25%	30%	35%
toast and jam	5%	5%	5%	5%	5%	5%	5%
boiled egg and toast	10%	10%	15%	15%	15%	15%	15%
fresh fruit and cereals	10%	15%	15%	20%	25%	30%	35%

From the figures in the table, which one of the following statements is **not** true?

A Breakfasts of toast and jam have never been more popular than in 2006.

B The popularity of breakfasts that include porridge overtook the popularity of breakfasts that include eggs in 2012.

C The popularity of breakfasts that include porridge or cereals has gone up 10 percentage points, year on year, for the last four years shown in the table.

D In every year between 2006 and 2012, the popularity of breakfasts that include fresh fruit was the same as the popularity of breakfasts that include marmalade.

E The popularity of breakfasts that include toast has increased year on year.

Each of the statements can be analysed as follows:

Option **A**: Toast and jam have remained the same throughout, so it is true that they have never been more popular than in 2006.

Option **B**: The total of the two categories that include eggs fell from 35% in 2011 to 25% in 2012, while breakfasts that include porridge rose from 30% to 35%, so this statement is true.

Option **C**: The totals for breakfasts that include porridge or cereals from 2008 to 2012 are 30%, 40%, 50%, 60% and 70%, so this statement is true.

Option **D**: This statement is *not* true for the years 2006 and 2007. The totals including fresh fruit and marmalade were only the same as each other from 2008 to 2012.

Option **E**: The totals for the three categories that include toast from 2006 to 2012 are 20%, 25%, 35%, 40%, 45%, 50% and 55%, so this statement is true.

The correct answer is option **D**.

38   At a smoothie factory, a tropical smoothie mixture contains banana, orange and apple in the proportions shown in the pie chart below.
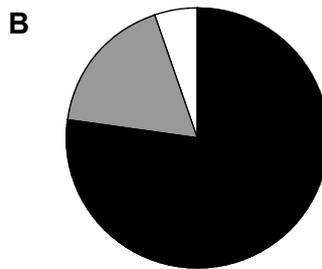

■ banana
▨ orange
☐ apple
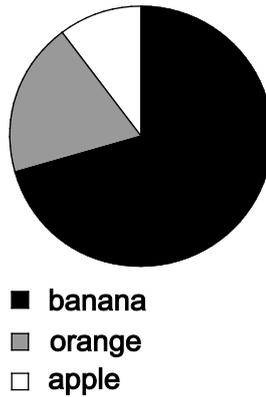
The chief taster requested a new recipe, in which every litre contained 10% more banana than was present in the original mixture, and 10% less orange than was present in the original mixture. This change also affected the proportion of apple in the mixture.
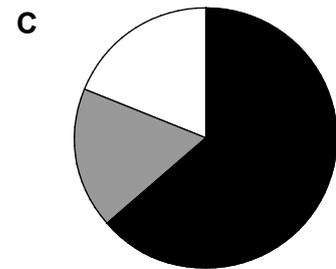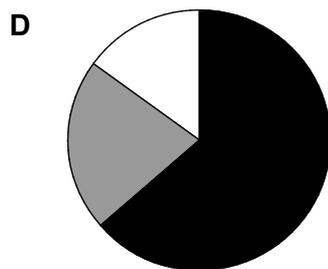
Which one of the following graphs shows the content of the new smoothie mixture?
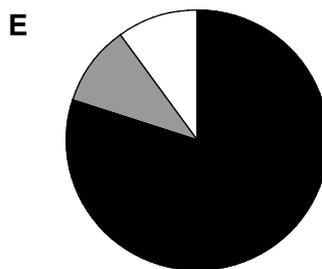
A
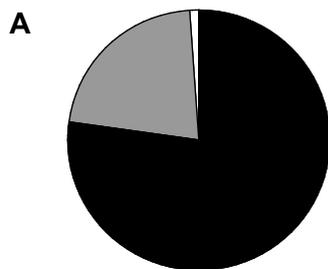
■ banana
▨ orange
☐ apple

B

■ banana
▨ orange
☐ apple

C

■ banana
▨ orange
☐ apple

D

■ banana
▨ orange
☐ apple

E

■ banana
▨ orange
☐ apple

If you consider the first pie chart to represent, for instance, 100 ml of mixture, then you should estimate the amounts of the three fruits to be approximately 70 ml banana, 20 ml orange and 10 ml apple.

An increase of 10% in the banana content and a decrease of 10% in the orange content would result in approximately 77 ml banana, 18 ml orange and therefore 5 ml apple in 100 ml of the new recipe. The correct answer is option **B**.

39 If the captain of a national team commits any kind of crime, he or she is likely to be dropped, heavily fined by the sport's governing body, or barred from future competition. This is on top of any punishment handed down by the courts. Senior politicians, doctors, judges or head teachers who offend also find themselves barred from their professions, with little or no chance of regaining their hard-earned status after serving their sentence. There is nothing unjust in this, although it is effectively a double punishment for a single offence. Privileged people must understand that with rewards come responsibilities, including the responsibility to behave in a more exemplary way than those in ordinary walks of life.

Which one of the following illustrates the principle underlying the above argument?

A A crime is a crime whoever commits it, and no exceptions should be made for highly placed people.

B A police chief who accepts a bribe deserves more blame than the criminal who offers the bribe.

C Leading sports personalities should understand that they are role models for young people.

D It is wrong to use the law to make an example of some people but not others.

E People on low incomes who commit offences should have reduced sentences.

The argument concludes that when the captain of a national team commits a crime, it is right that they are dropped from the team and face any penalties determined by the courts. This is based on the principle that senior and privileged positions in society carry additional responsibilities, including having to behave in a more morally exemplary fashion.

Option **B** illustrates this principle: since the police chief occupies a senior and privileged position, they are more blameworthy accepting a bribe than is the criminal who offers it in the first place.

Option **A** illustrates a different principle that effectively states 'no one is above the law'.

Option **C** illustrates an alternative principle: people should take the responsibilities associated with their position seriously.

Option **D** illustrates an opposing principle: penalties for wrongdoing should be the same whoever carries it out.

Option **E** recommends that custodial sentences should be more lenient for people on low incomes. But holding people in senior positions to a higher moral standard does not entail lowering the standard for people from deprived backgrounds.

40 What is there in the universe that we know, or have good reason to believe, to possess consciousness? Humans, and perhaps certain other animals. What do they all have in common? They are living beings, made of flesh and blood. As far as we know, nothing else in the universe contains any consciousness at all. For all the mystery of consciousness, of exactly what it is, and of how and why it arises, there is one thing that is certain: it is a biological phenomenon. Any fears surrounding the possibility of so-called 'artificial intelligence' are therefore misplaced. If machines are not biological organisms, then they cannot have a mind. Do not expect man-made machines to be conscious – now or ever!

Which one of the following best expresses the flaw in the above argument?

- **A** It assumes that just because the only things we know to possess consciousness are biological organisms, they are the only things that could do.
- **B** It draws a general conclusion about the properties of all naturally existing objects on the basis of merely a finite selection.
- **C** It takes for granted that we understand exactly what it means to be conscious, when this is a vague and undefined term.
- **D** It fails to consider the phenomenal speed with which new developments in technology are actually occurring.
- **E** It ignores the possibility that some plants might possess a basic form of consciousness of their own.

The conclusion of the argument is that fears around the emergence of machine intelligence are misplaced because the only things known to be conscious are biological organisms. Since machines are not biological organisms, there's no possibility of them being conscious.

But the argument makes an illegitimate move from the claim that 'only biological organisms are known to be conscious' to the stronger claim that 'only biological organisms can be conscious'. Option **A** identifies this erroneous step in the reasoning.

Option **B** does not state the flaw; the claim that only biological organisms are conscious is not generalised from a limited set of particular examples.

Option **C** does not state the flaw; the argument does not demand that we know exactly what consciousness amounts to, only that we are confident about attributing it exclusively to biological organisms.

Option **D** does not state the flaw; since the possibility of machine consciousness is ruled out by definition, the pace of technological development is not relevant.

Option **E** does not state the flaw; the possibility of vegetative consciousness is consistent with the claim that only biological organisms can be conscious.

41 Some readers think there is nothing to learn from historical fiction. Yet the historian and the writer of historical fiction can work in a way that is complementary. Historical novels can thus enrich our understanding of the past. History is a record of the past that is full of gaps. We mostly don't know what was said or how people behaved when there was no one around to record what was going on. The historian's trade is never simply about stockpiling facts. The novelist's trade is never just about making things up. Those undocumented areas of history often force us to contemplate the most private, human moments, away from the public stage, and the blank spaces they leave are irresistible to a novelist.

Which one of the following best expresses the main conclusion of the above argument?

A Most areas of history were never documented.

B We can never know exactly what happened in the past.

C Historical novels can add to our understanding of the past.

D Not everyone thinks we can learn something from historical fiction.

E The work of the historical novelist is not just about making things up.

The main conclusion of the argument is that historical novels can enrich our understanding of the past.

This is drawn from the following reasons:

1 History is full of gaps.
2 We mostly don't know what was said or how people behaved.
3 The historian's trade is never simply stockpiling facts.
4 The novelist's trade is never just about making things up.
5 The undocumented areas of history force us to contemplate private, human moments.
6 Novelists explore and reflect on these private, human moments.

Option **C** expresses the main conclusion.

Option **A** expresses reason 1.
Option **B** expresses reason 2.
Option **D** expresses the contextualising sentence at the start of the passage.
Option **E** expresses reason 4.

42   On sports day at Thiska Academy points are awarded in each event as follows:

winner	12 points
2nd place	8 points
3rd place	5 points
4th place	3 points
5th place	1 point

Each student may enter no more than three events.

What is the smallest points total that it is **not** possible for an individual student to score?

A   22

B   26

C   30

D   33

E   37

There are no options less than 22, so you can be sure that all totals up to 21 are possible.

A strategy here could be to systematically consider which totals greater than 21 are possible:

> 12 + 12 + 12 = 36
> 12 + 12 + 8 = 32
> 12 + 12 + 5 = 29
> 12 + 12 + 3 = 27
> 12 + 12 + 1 = 25
> 12 + 12 (+ 0) = 24
> 12 + 8 + 8 = 28
> 12 + 8 + 5 = 25
> 12 + 8 + 3 = 23
> 12 + 5 + 5 = 22
> 8 + 8 + 8 = 24

The smallest total that is not possible is therefore 26. The correct answer is option **B**.

43 Every Christmas the most popular children's toys become scarce. Many people turn to online auction sites to buy them instead. The table below shows the recommended retail price and the price that the listed toys have sold for online.

children's toy	recommended retail price ($)	online auction site ($)
Moshling Tree House	18.99	198.98
LeapPad Explorer	79.99	225.00
Doggie Doo	24.99	50.00
Fireman Sam Pontypandy Rescue set	29.99	59.99
Fijit Friends	54.99	99.95
Monster High Lagoona's Station	29.99	59.98
Nerf Vortex Nitron Blaster	44.99	59.99
Kidizoom Twist	49.99	65.95
Milky the Bunny	59.99	74.99
Star Wars Ultimate Force Lightsaber	39.99	49.95
Lets Rock Elmo	69.99	84.99
Ninjago Fire Temple	91.99	96.99
Sylvanian Families	79.95	192.29
Vtech Innotab	79.99	150.99
Lego Star Wars Millennium Falcon	132.99	265.98

How many of the toys above have increased in price by more than 100%?

A 3

B 4

C 5

D 6

E 7

Although there is a lot of information here, you are looking to identify the toys that have more than doubled in price. These are:

Moshling Tree House, which has clearly increased by far more than 100%
LeapPad Explorer, which has increased by 100% + $65.02
Doggie Doo, which has increased by 100% + 2¢
Fireman Sam Pontypandy Rescue set, which has increased by 100% + 1¢
Sylvanian Families, which has increased by 100% + $32.39

Note that Monster High Lagoona's Station and Lego Star Wars Millenium Falcon have both increased by exactly 100%, not more than 100%.

The correct answer is option **C**.

44 A store sells a particular type of television. The graphs below show the number of these televisions sold per month and the total income from their sales per month, over a six-month period.

number sold

total monthly income
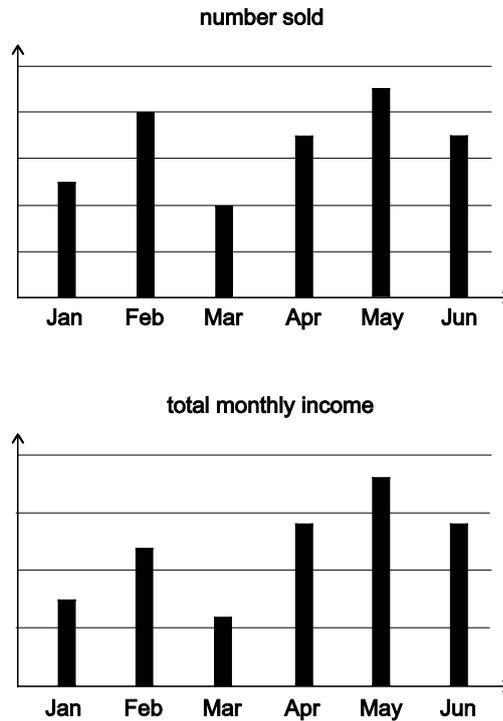
The price at which these televisions were sold was increased at the beginning of one of the six months.

At the beginning of which month was the price increased?

A February

B March

C April

D May

E June

For successive months where the price does not change, the ratio of the heights of the two corresponding bars will be the same. Taking each division in both charts to be one unit, the ratios of the upper bar to the lower bar for each month are roughly:

Jan   2.5 : 1.5 = 5 : 3
Feb   4 : 2.4 = 5 : 3
Mar   2 : 1.2 = 5 : 3
Apr   3.6 : 2.8 = 9 : 7
May   4.5 : 3.5 = 9 : 7
Jun   exactly the same bars as Apr

Although some of these require estimations of bar heights, it should be clear that the price change must have been at the beginning of April. The correct answer is option **C**.

45   The UK is the most researched nation on Earth. Some £60 per head is spent each year on surveys, polls, consumer panels and questionnaires, more per capita than any other country, according to the Market Research Society. No wonder many Brits are suffering from survey fatigue and refuse to fill out questionnaires. This reluctance to participate is very likely to have contributed to incorrect polling predictions in several elections.

Which one of the following can be drawn as a conclusion from the above passage?

A   Opinion polls in the UK are less accurate than in other countries.

B   It is impossible to predict accurately how people will vote in a given election.

C   Survey fatigue is the main reason why polling can give inaccurate predictions.

D   More polling does not necessarily give a more accurate picture of popular opinion.

E   To get an accurate picture of people's voting intentions, we should not rely on use of a questionnaire.

The passage asserts that the UK is the most researched country in the world and notes that many Britons suffer 'survey fatigue'. It goes on to suggest that this fatigue may explain the inaccuracy of polling done ahead of recent elections.

If these statements are true, then it follows that carrying out a lot of polls doesn't mean you will get a more accurate picture of popular opinion. The UK conducts more polls than any other country and yet failed to forecast the actual results in elections. This conclusion is expressed in option **D**.

Option **A** does not follow because the passage only states that other countries conduct fewer polls than the UK and doesn't suggest they are more accurate.

Option **B** cannot be drawn as a conclusion; although some polling is inaccurate, it doesn't follow that accurate polling is impossible.

Option **C** does not follow because although the passage asserts that survey fatigue is a likely cause of inaccurate polling, it doesn't follow it is the main reason.

Option **E** cannot be drawn as a conclusion; the passage is about the volume of polling as opposed to the intrinsic accuracy or inaccuracy of any given format. The passage is consistent with the possibility that questionnaires used appropriately could accurately represent people's opinions.

46 My dog's coat had been looking dull, so I bought some conditioning tablets. The pet shop stocks these in boxes of 300 tablets, and for a dog the size of mine the recommendation (which I have followed) is 6 tablets per day.

Now, several months later, his coat is much shinier. Opening a new box of tablets today, I have decided to reduce his dosage. I shall just give him 6 tablets per day, twice a week, and on the remaining days each week he can have 4 tablets each day.

What is the maximum number of extra days that this box of conditioning tablets will now last?

A 10 days

B 15 days

C 16 days

D 24 days

E 25 days

Previously, a box of tablets lasted for 300 ÷ 6 = 50 days.

Now, the dog has (5 × 4) + (2 × 6) = 32 tablets per week. In 9 weeks, which is 63 days, he has 9 × 32 = 288 tablets. Depending on which days he receives 4 tablets rather than 6, the remaining 12 tablets will last a maximum of 3 further days. This means that a box could now last up to 66 days, 16 days longer than before. The correct answer is option **C**.

47 The UK private security industry employs half a million people in a range of roles, including supervising public events, guarding cash in transport, and assisting police in surveillance work. Some government officials are pushing for the legal regulation of such work to be moved out of government agency control and placed in the hands of the private security companies themselves. According to these officials, self-regulation is justified on economic grounds and because of the sector's 'willingness to … be more accountable for its own actions'. The foolishness of this argument is breathtaking. The power entrusted to these workers over valuable property – not to mention the safety of people – means that there's a fundamental need for monitoring and oversight of standards of conduct by an impartial, trustworthy source.

Which one of the following is an underlying assumption of the above argument?

A The UK private security industry is likely to continue to grow rapidly in the near future.

B Self-regulation of an industry is an unwise approach regardless of the sector concerned.

C By government standards, the current regulatory system for the UK private security sector is economically efficient.

D Many companies in the UK private security industry have a poor record when it comes to issues of professional misconduct or corruption.

E The government agency staff are less susceptible to corrupt or unfair practices when regulating the workers than are those at the private security companies.

The main conclusion of the argument is that it would be wrong to move from government regulation of private security firms to self-regulation. The basis for this conclusion is that the responsibility of, and the power granted to, security firms is so great that an impartial and trustworthy source must oversee them.

But the reason only supports the conclusion if we further assume that the government agency currently regulating security firms is impartial and trustworthy. This assumption is expressed in option **E**.

The argument does not assume option **A** because although the increasing size of the security industry may strengthen the claim for appropriate oversight, the regulation of security companies is urged because of their importance and not because of their size or number.

The argument does not assume self-regulation is never appropriate (option **B**), only that it isn't in certain circumstances.

Option **C** conflicts with the suggestion in the passage that government regulation is economically inefficient and is, in any case, independent of trustworthiness, which is the point at issue.

Although the truth of option **D** would count as a reason to prohibit self-regulation, we do not need to assume many companies have a poor record to justify having appropriate oversight. Given how important proper security is, even occasional failures would be significant.

48 Trains run regularly between Ayton and Exbay, stopping at Beetown, Chalton and Deeford, according to the following timetable.

Departures			
Ayton	7:10	and every 40 minutes until	21:10
Beetown	7:25		21:25
Chalton	7:30		21:30
Deeford	7:44		21:44
Exbay	8:02		22:02

George lives a 14-minute walk away from Beetown station. He is going to the cinema in Exbay to watch a film that starts at 19:20. It will take him five minutes to walk from the station at Exbay to the cinema. George wants to make sure that he will miss no more than the first five minutes of the film.

What is the latest time George should leave home?

A 17:36

B 17:51

C 18:05

D 18:19

E 18:31

George needs to arrive at Exbay station no later than 19:20.

Trains arrive at Exbay at 2 minutes past and 42 minutes past each even hour and 22 minutes past each odd hour. The train that arrives at 19:22 is too late, which means that the latest train he can take from Beetown departs at 18:05, which is 37 minutes before its 18:42 arrival at Exbay.

He takes 14 minutes to walk to Beetown station, so he must not leave home later than 17:51. The correct answer is option **B**.

49   One often hears that this or that action is justified or unjustified morally on the grounds that it is 'natural' or 'unnatural'. To say that something is 'natural' is really just to say that this is how things happen to be. Yet just because something happens to be the case, it doesn't mean that it ought to be the case. After all, there are plenty of things in life that are natural – for instance illness and disease, droughts and earthquakes; even emotions such as aggression, jealousy, anger and a desire for revenge. This does not mean that they are to be encouraged or welcomed. To say of something that it is natural, or unnatural, is not to provide anything by way of moral justification.

Which one of the following illustrates the principle used in the above argument?

A   The fact that human beings have a tendency to be competitive does not mean that this should be encouraged in schools.

B   The fact that someone believes that human beings ought always to behave ethically does not mean that they actually will.

C   The fact that some countries have laws protecting freedom of speech does not mean that all countries should.

D   The fact that some things in life are clearly unpleasant does not mean that life itself is not worth living.

E   The fact that someone thinks a particular person is not to be trusted does not mean that the person in question is indeed untrustworthy.

The argument opposes the idea we can justify certain behaviours on the ground that they are natural. The final sentence of the passage expresses the principle that just because something is natural doesn't make it right.

The principle is illustrated in option **A**, which states that although competitiveness may be a natural, and not a learned, characteristic, it does not mean schools should encourage it.

Option **B** does not illustrate the principle but merely points out that thinking something ought to be the case does not mean it will be the case.

Option **C** does not illustrate the principle, but questions whether enshrining moral precepts in law in one country creates an obligation for other countries to do the same.

Option **D** does not illustrate the principle; it challenges the idea that life is only worth living if people never experience anything unpleasant.

Option **E** does not illustrate the principle. It makes the claim that our judgements about people are not always accurate.

50   The table below shows the medal count by the top five teams in a recent Mini Olympics.

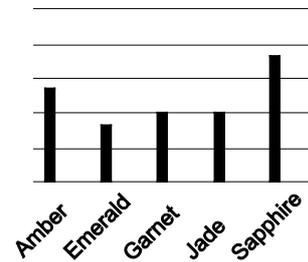| teams	gold medals	silver medals	bronze medals
Amber	8	7	6
Emerald	5	10	6
Garnet	6	6	10
Jade	6	5	5
Sapphire	11	8	9

Each team calculated the proportion of their medals that were gold.

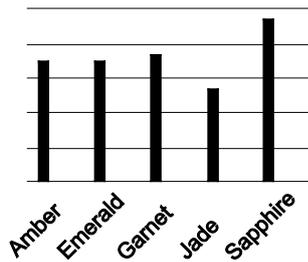Which one of the following charts, with appropriate labelling, shows this proportion for each of the five teams?
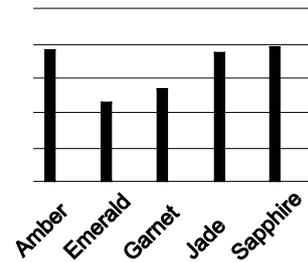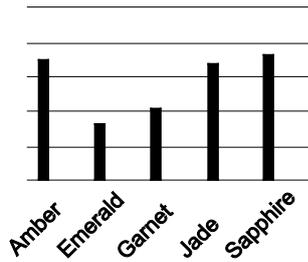
A
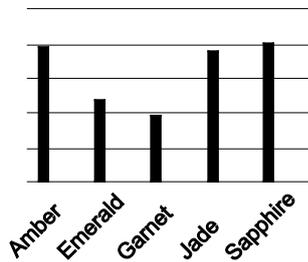
B

C

D

E

The best approach is to work out the approximate percentage of each team's medals that were gold:

8 of Amber's 21 medals were gold, which is just under 40% (40% of 21 = 8.4).
5 of Emerald's 21 medals were gold, which is just under 25% (25% of 21 = 5.25).
6 of Garnet's 22 medals were gold, which is just over 25% (25% of 22 = 5.5).
6 of Jade's 16 medals were gold, which is 37.5% (37.5% of 16 = 6).
11 of Sapphire's 28 medals were gold, which is just under 40% (40% of 28 = 11.2).

It seems logical to presume that each division on each of the charts represents 10%, in which case you are looking to identify the chart that has the heights of Amber, Jade and Sapphire just below 4 divisions, with Emerald a little lower than 2.5 divisions and Garnet a little higher than 2.5 divisions. The correct answer is option **D**.

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