



**Cambridge Assessment
Admissions Testing**

BioMedical Admissions Test

Section 1

November 2020

Explained Answers

- 1 You can only take the practical driving test after passing the theory test. You have failed the theory test, so you cannot take your practical test.

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

- A You need to have lived in the UK for 5 years to become a citizen. You have lived in the UK for 5 years, so you will not be refused citizenship.
- B People who are good at mathematics are likely to be good at music. You are good at mathematics, so you should learn to play a musical instrument.
- C Pacifists refuse to fight in wars or join armies. You refuse to fight in wars or join an army, so you are a pacifist.
- D To enter China you need a visa. You don't have a visa, so you cannot enter China.
- E Smoking is bad for your health and can cause heart and lung problems. You smoke, so you will have heart and lung problems.

The first sentence of the argument states that a condition (having passed the theory test) is necessary for something else to happen (taking the practical driving test). The second sentence of the argument then gives the fact that the condition has not been met to support the conclusion that 'you cannot take your practical test'.

Option **D** has the same structure: a condition (having a visa) is necessary for something (entering China). You don't meet the condition, so you cannot enter China.

Option **A** starts with a similar structure: a condition (having lived in the UK for 5 years) is necessary for something (becoming a UK citizen). However, the second sentence is drawing a conclusion from the fact that the condition has been met, rather than from the fact that the condition has not been met.

Option **B** does not contain a condition which is necessary for something else (there is a condition under which something becomes more likely instead). The reasoning then draws a conclusion from the condition being met, rather than not met.

Option **C** gives refusing to fight or join armies as a necessary condition for being a pacifist. The conclusion is then drawn based on the fact that this condition is met, rather than from the fact that the condition has not been met.

Option **E** does not contain a condition which is necessary for something else (there is a condition under which something becomes more likely instead). The reasoning then draws a conclusion from the condition being met, rather than not met.

- 2 We have just installed a new boiler in our house. It has cost £4700 to install, but it will last for 9 years before it needs replacing. Nevertheless, the supplier assures us that it will cut our heating costs by 30%. This is good news as we currently pay, on average, £500 every quarter year. The supplier insists that it will pay for itself (i.e. save enough money to cover the cost of the purchase, before it needs replacing).

How long will the boiler take to pay for itself?

- A 31 quarters
- B 32 quarters
- C 33 quarters
- D 34 quarters
- E 36 quarters

The saving will be 30% of £500 every quarter year, which is £150.

$31 \times £150 = £4650$ and $32 \times £150 = £4800$, so the boiler will have paid for itself after 32 quarters, which is option **B**.

- 3 Analysis from the Office for National Statistics tells us that income is far less significant for life satisfaction than things like marital status, having children and a job. Far from being unencumbered, young, free and single, it is in fact the binding of ourselves to others through covenants, contracts and caring responsibilities that provides us with an empowered sense of self. This is hardly surprising. Indeed perhaps the best evidence of the importance of community to our lives is to be found in how our lives are summarised on our gravestones: 'Mother of four' or '60 years married' say our tombstones, rarely 'property tycoon' or 'owner of Mazda MX-5 generation four'.

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

- A The reason why people get married and have children is to have an empowered sense of self.
- B The only way to achieve life satisfaction is to bind oneself to others.
- C Most people believe that income is what determines happiness.
- D The inscriptions on gravestones reflect what people think is most important in their lives.
- E The Office for National Statistics is typically considered to be a reliable source of information.

The argument concludes that it is hardly surprising that the analysis from the Office for National Statistics shows income is far less significant for life happiness than things like marital status, having children and a job. The argument suggests that the best evidence for this is to be found in the way that our lives are summarised on our gravestones. For this evidence to support the conclusion, it must be the case that the inscription on a gravestone is an accurate reflection of the things that that person felt to be important and not simply the convention for what should be written there. Option **D**, therefore, needs to be assumed.

Option **A** does not need to be assumed as it is the fact that people get an empowered sense of self from *sustaining* long-lasting relationships that leads to the conclusion that these relationships are more significant than income, and so the reason why people *initially* choose to get married and have children does not affect the validity of the reasoning.

Option **B** does not need to be assumed as the reasoning only requires that these activities help people to achieve life satisfaction. The reasoning is still valid even if there are other ways to achieve life satisfaction.

Option **C** makes explicit the idea that happiness is achieved by income, which the passage sets out to discredit. But even if it were true that most people believe this, the conclusion of the passage is still validly drawn from the reasons given.

Option **E** does not need to be assumed as the argument provides reasoning to support the outcome of the analysis, rather than relying on the authority of the Office for National Statistics.

- 4 Everyone with a good idea wants it to have impact, but why do some social innovations go global whilst others remain small-scale? Whether their idea is a pioneering schooling model or a new form of volunteering, social innovators must become campaigners and embrace change in order to have widespread influence. Innovators who can campaign for an idea create demand amongst those who might benefit from it or help support it. Being willing to experiment with an idea is also critical. Experimentation pinpoints adaptations needed for an innovation to spread beyond specific sets of circumstances. Likewise, innovators must be ready to let their ideas grow beyond their own organisational boundaries. Most social innovations spread through copying rather than through building the social equivalent of big corporations.

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

- A The majority of social innovations spread through copying.
- B Everyone with a good idea for a social innovation wants it to have impact.
- C Some ideas related to social innovation are suited only to specific circumstances.
- D To have widespread influence, social innovators must become campaigners and embrace change.
- E The most important question for social innovators concerns why some ideas spread around the world while others remain small-scale.

The passage begins with some context about social innovation, then states the conclusion, followed by the reasoning. The conclusion is option **D**: 'To have widespread influence, social innovators must become campaigners and embrace change.'

The first reason to support this is that 'innovators who can *campaign* for an idea create demand amongst those who might benefit from it or help support it.'

The second and third reasons lead towards the '*embrace change*' idea in the conclusion.

The second reason given is that willingness to experiment with an idea is (also) critical, which is supported by the reasoning that 'experimentation pinpoints adaptations needed for an innovation to spread beyond specific sets of circumstances.'

The third reason given is that 'innovators must be ready to let their ideas grow beyond their own organisational boundaries', which is supported by the reasoning that 'most social innovations spread through copying rather than through building the social equivalent of big corporations.'

Option **A** is the statement in the last sentence of the argument, which is supporting the idea that 'innovators must be ready to let their ideas grow beyond their own organisational boundaries' (which is then one of the reasons that supports the conclusion).

Option **B** is part of the statement that is used to introduce the argument, but it does not play a part in the reasoning.

Option **C** is based on the statement that 'experimentation pinpoints adaptations needed for an innovation to spread beyond specific sets of circumstances', which suggest that some ideas are suited only to particular circumstances. This is part of the second reason rather than the conclusion.

Option **E** rephrases the question that is asked at the start of the passage, but the conclusion of the argument is about what helps an idea to spread, rather than a decision relating to the importance of this question.

- 5 Many people knowingly buy fake brands because they are substantially cheaper than the genuine article would be. They may try to justify their behaviour, on the grounds that the manufacturers and retail outlets are already rich enough from ripping off the public with their exorbitant prices and paying rock-bottom wages to their employees. As true as these claims may be, it doesn't excuse the shopper for encouraging piracy.

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

- A There is no justification for hotels charging inflated prices when demand for rooms is high.
- B Jorge was wrong to spread lies about his ex-girlfriend even though she had cheated on him.
- C Shops should not set high prices on articles just so that they can reduce them in the sales.
- D No one should ever post a message on social media that they would not want posted about themselves.
- E Footballers are entitled to criticise a referee for a bad decision only if it has advantaged the other side.

The principle used in the passage is that it is not acceptable to do something that is wrong (buy fake brands) with the justification that the victims of that behaviour (the manufacturers and retail outlets) also do things that are wrong (rip off the public with exorbitant prices and pay rock-bottom wages to their employees).

Option **B** applies the same principle: it was not acceptable for Jorge to do something that is wrong (spread lies) on the grounds that the victim (his ex-girlfriend) had also done something that is wrong (cheated on him).

Option **A** does not apply the principle as the demand for rooms being high is not a result of the customers doing anything wrong.

Option **C** does not apply the principle which involves one 'wrong' behaviour being justified by another 'wrong'. In this instance, the behaviour of the shops in raising/cutting prices is looked at in isolation.

Option **D** does not apply the principle as the comparison here is with the effect that the action would have on the person rather than considering whether the victim had done anything wrong.

Option **E** does not apply the principle as it is giving an example of someone citing lack of fairness in a decision rather than justifying one bad action of their own by another's bad action.

- 6 In a café, *Delicious Tropical* drink is one-half orange juice and one-half strawberry juice. *Vibrant Sunset* drink is two-thirds orange juice and one-third apple juice. Stacey makes a mixture called *Tasty Delight* which is one-quarter *Delicious Tropical* and three-quarters *Vibrant Sunset*.

What is the proportion of orange juice in *Tasty Delight*?

- A $\frac{1}{8}$
- B $\frac{1}{4}$
- C $\frac{3}{8}$
- D $\frac{1}{2}$
- E $\frac{5}{8}$

The one-quarter of the *Tasty Delight* that is *Delicious Tropical* contains equal amounts of orange juice and strawberry juice, so one-eighth (one-half of one-quarter) of the final drink will be orange juice from the *Delicious Tropical*.

The three-quarters of the *Tasty Delight* that is *Vibrant Sunset* contains twice as much orange juice as apple juice, so one-half (two-thirds of three-quarters) of the final drink will be orange juice from the *Vibrant Sunset*.

Therefore, five-eighths of the final drink will be orange juice, which is option **E**.

7 The prices for customised birthday cards are shown in the tables below.

<i>size</i>	<i>standard image</i>	<i>customer's image *</i>
small	\$3	\$4
medium	\$4	\$5
large	\$6	\$8

<i>additional charges</i>	
personalised greeting	\$2 per card
postage charges (for each group of up to 10 cards)	\$1

* Image must be uploaded by the customer.

James wishes to buy 8 small cards and 20 medium cards. He has decided to use one of the standard images on the small cards, but has his own image that he will upload to go on the medium cards. He will have personalised greetings on 5 of the cards.

How much will James have to pay (including the postage) for his cards?

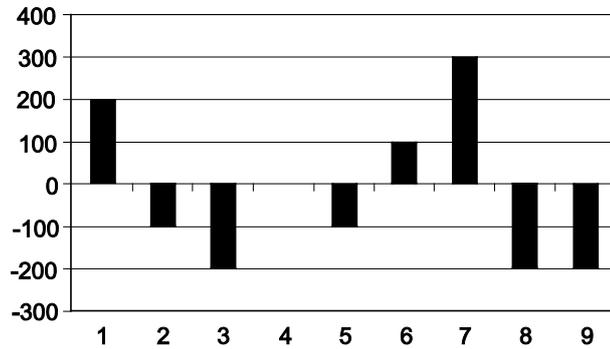
- A \$117
- B \$127
- C \$137
- D \$147
- E \$157

From the left-hand table, we can see that a small card with a standard image costs \$3 and a medium card with the customer's image costs \$5. Therefore, the total cost of the cards will be $8 \times \$3 + 20 \times \$5 = \$124$.

From the right-hand table, we can work out that James will also have to pay \$10 for the personalised greetings on 5 of the cards and \$3 for the postage of 3 groups of cards.

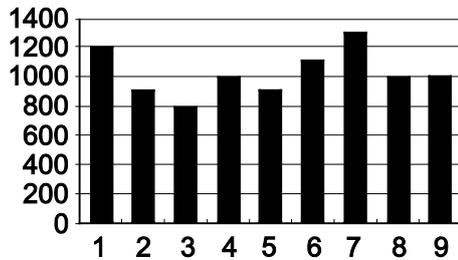
The total price will therefore be \$137, which is option **C**.

- 8 The following graph shows the changes in Ali's bank balance each month over a period of 9 months. The change in balance in a given month is the difference between the balance at the end of the month and the balance at the end of the previous month.

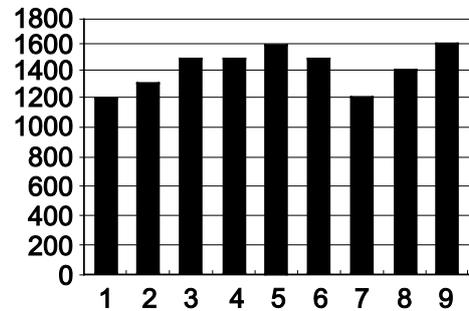


Which one of the following graphs could show the actual amount in his bank balance at the end of each month?

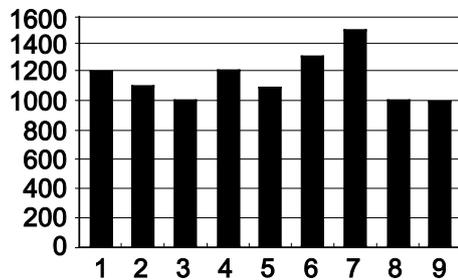
A



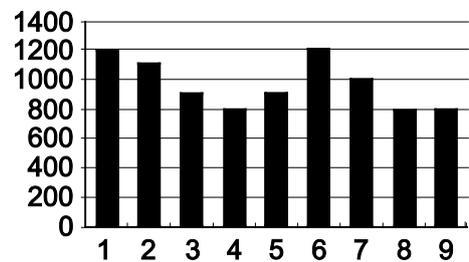
B



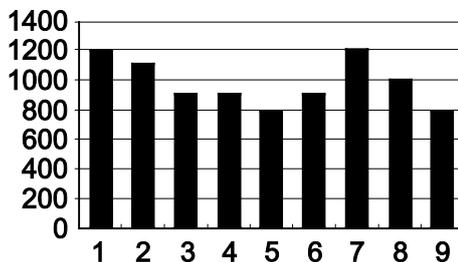
C



D



E



The first bar in the graph provided is not useful as it shows that the first bar in the graph of actual bank balances should be 200 units higher than the bar for the end of month 0 would have been if it were included.

The second bar in the graph should be lower than the first bar to represent a reduction of 100 units in the bank balance from the end of month 1 to the end of month 2. The third bar should be lower than the second bar and the drop should be twice as much to represent a reduction of 200 units. The fourth bar in the graph should be the same height as the third bar, as there is no change in the bank balance that month, and so on. The only option that correctly shows these features is option **E**.

- 9 A high unemployment level is an indicator of a weak economy. Unemployment levels in Malaysia are low, so the economy must be strong.

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

- A A tanned skin shows that you have been out in the sun. You have a pale skin, so you have not been sunbathing.
- B It takes hours of work to keep your garden tidy. Your garden is tidy, so you must have spent a long time working in it.
- C More crowded roads lead to more traffic accidents. There has been an increase in traffic accidents, therefore the roads must be more crowded.
- D Drinking strong coffee raises the heart rate. You do not have a raised heart rate, therefore you have not been drinking strong coffee.
- E Only violins made in 18th century Cremona produce a very good sound. That violin makes a very good sound, so it must be Cremonese.

The first sentence of the argument states that a particular measure (high unemployment) indicates something (a weak economy). The second sentence then applies flawed reasoning by using the opposite of the stated measure (low unemployment) to support a conclusion (that the economy is strong).

Option **A** has the same structure: a measure (having a tanned skin) indicates something (that you have been out in the sun). The opposite of the measure (pale skin) is used to support the conclusion (you have not been sunbathing).

Option **B** states that one thing (hours of work) is a necessary condition for another (a tidy garden). This could be taken to say that a tidy garden indicates that hours of work have been spent on it, but to parallel the reasoning of the initial argument, the conclusion would have to be based on the garden being untidy.

Option **C** states that one thing (more crowded roads) is the cause of another (more traffic accidents). This, therefore, does not parallel the first part of the initial argument.

Option **D** states that one thing (drinking strong coffee) causes another (having a raised heart rate). This, therefore, does not parallel the first part of the initial argument.

Option **E** states that one thing (being made in 18th-century Cremona) is a necessary condition for another (making a good sound). This could be taken to say that the fact that a violin makes a good sound indicates that it was made in 18th-century Cremona, but to parallel the reasoning in the initial argument, the conclusion would have to be based on a violin not making a good sound.

- 10** Indian mongooses were introduced to Japan's Amami island in 1979 to control the rat and pit viper populations. They also preyed on the tip-nosed frog, dramatically reducing their numbers. Once the mongooses were removed, the population of the frogs rebounded. A recent project found that, when approached by researchers, frogs in areas where the impact of the mongooses had been greatest would hop away faster than those in less affected areas. Since almost all of the mongooses were removed from the island five years ago, it is unlikely that the frogs observed have ever seen one, and so this cannot have been learned from contact with mongooses. The greater wariness in the frogs must have been caused by a genetic change.

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

- A** It draws a conclusion about frogs based on information about just one area.
- B** It assumes that the reduction in numbers of frogs was solely caused by the mongooses.
- C** It ignores the possibility that the frogs' behaviour was learned in some other way.
- D** It fails to explain the mechanism by which the genetic change would have happened.
- E** It assumes that the removal of the mongooses was intended to protect wildlife on the island.

The conclusion of the argument is that the greater wariness observed in the frogs must have been caused by a genetic change. The reason provided to support this conclusion is that mongooses were removed from the island five years ago and so it is unlikely that the frogs now alive have ever seen one. Since the reasoning only demonstrates that the greater wariness cannot have been caused through learning by contact, the flaw in the reasoning is that the argument ignores the possibility that the frogs may have learned the behaviour in some other way, as expressed in option **C**, rather than the only possible explanation being genetic change, as the conclusion assumes.

Option **A** is not a flaw in the argument as the conclusion is about the frogs in this area, rather than frogs in general.

Option **B** is not a flaw in the argument as any other reasons for the reduction in numbers of frogs would not change the reasoning relating to whether or not the frogs had recently encountered mongooses.

Option **D** is not a flaw in the argument as the conclusion is based on the determination that all other possibilities have been eliminated.

Option **E** is not a flaw as the argument is based on consideration of the amount of interaction between the frogs and mongooses. The reason why the mongooses were originally removed is irrelevant to this argument.

- 11 The arrival of the digital age and the communication platforms and software advances underpinning it are significant for a much older pursuit: the study of human behaviour. Revolutionary 'big data' now exists in the form of the internet traffic created by users of various websites and social networking services and applications. The nature of the information shared by internet users tends to differ depending on the type of site or platform concerned. Messages and other content posted on Facebook, and other social media linked to people's 'real' identities, tend to be edited somewhat to present a more attractive or successful image. People's Google searches, and usage of other sites where their 'real' identities can remain more concealed, reveal more accurate information about their lives.

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

- A Traditional in-person data collection methods are no longer all that important to research into human behaviour.
- B Content on Facebook may be useful for researchers interested in knowing how people wish to be perceived by others.
- C Advances in computer software mean that today's social science researchers may require less expertise with respect to analysing data.
- D No similarity exists between most individuals' Facebook content and what they post on sites where they can remain hidden.
- E Data in the form of Google search topics lacks value for research purposes if the individuals behind the searches remain hidden.

The passage gives the following reasoning:

- The nature of the information shared by internet users tends to differ depending on the type of site or platform concerned.
- Messages and other content posted on Facebook, and other social media linked to people's 'real' identities, tend to be edited somewhat to present a more attractive or successful image.

From this it can be concluded that researchers interested in knowing about how people wish their lives to be perceived by others may find content on Facebook useful, which is option **B**.

Option **A** cannot be drawn as a conclusion as the passage does not give any reasons to believe that existing methods of data collection are no longer important – it merely discusses some issues relating to a potential new source.

Option **C** cannot be drawn as a conclusion as the software advances described in the passage are related to the way in which the communication platforms operate and so there is no reason to think that this might result in the analysis of the data requiring less expertise.

Option **D** cannot be drawn as a conclusion as there is nothing in the passage to suggest that there is no similarity and so this conclusion is too strong to be supported by the passage.

Option **E** cannot be drawn as a conclusion as the passage discusses the degree to which the identities of the users can be established, but there may be other things for which there is a research interest where the identities of the users is not relevant.

- 12 Meg is making costumes for the 30 members of the Rainbow Dancers, for their annual show. The costumes can be made in a variety of colour combinations, as shown in the following table. The table also shows the number of dancers who will have each variety of costume.

<i>costume colour</i>	<i>number of dancers</i>
100% red	4
100% blue	4
100% yellow	3
100% green	3
50% red, 50% blue	2
50% blue, 50% yellow	2
50% green, 25% red, 25% blue	2
60% red, 20% yellow, 20% blue	10

Each costume can be made from exactly 2 m of material. The material comes in 30 m rolls and Meg buys one roll in each of red, yellow, green and blue.

How much blue material will be left over?

- A 12.5 m
- B 13.0 m
- C 17.0 m
- D 18.0 m
- E 21.5 m

The blue material will be needed for the following costumes:

4 completely blue costumes:	$4 \times 1 \times 2 \text{ m} = 8 \text{ m}$
4 that are 50% blue:	$4 \times 0.5 \times 2 \text{ m} = 4 \text{ m}$
2 that are 25% blue:	$2 \times 0.25 \times 2 \text{ m} = 1 \text{ m}$
10 that are 20% blue:	$10 \times 0.2 \times 2 \text{ m} = 4 \text{ m}$

A total of 17 m of blue material is required, so there will be 13 m left, which is option **B**.

13 Tom is organising a 7-night tour holiday for his parents and himself.

The table below shows details of the five tour companies that Tom is considering.

<i>company</i>	<i>day tours</i>	<i>cost per person</i>	<i>single supplement per person per night</i>	<i>escorted travel</i>	<i>flights</i>
Alltravel	inclusive	€1100	€40	fully escorted	1 change
Beyond	inclusive	€1200	€10	fully escorted	direct
Cosmic	inclusive	€1150	€30	fully escorted	direct
Discreet	inclusive	€1100	€40	fully escorted	direct
Ecotravel	inclusive	€1000	€30	partly escorted	direct

Tom has a maximum budget of €3600. All three travellers will qualify for the quoted cost per person, but Tom will also have to pay the additional single supplement.

They will need direct flights. They will want fully escorted travel and inclusive day tours.

Which company should Tom choose for the holiday?

- A Alltravel
- B Beyond
- C Cosmic
- D Discreet
- E Ecotravel

Alltravel can be ignored as the flights are not direct.

Ecotravel can be ignored as the travel is not fully escorted.

The costs for the other companies are:

Beyond: $3 \times \text{€}1200 + 7 \times \text{€}10 = \text{€}3670$

Cosmic: $3 \times \text{€}1150 + 7 \times \text{€}30 = \text{€}3660$

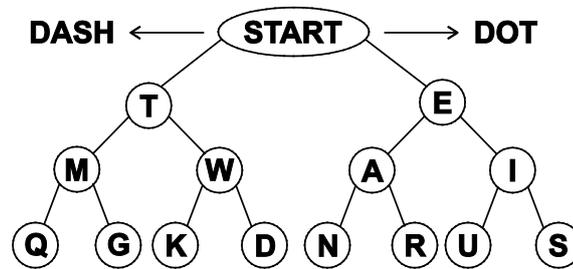
Discreet: $3 \times \text{€}1100 + 7 \times \text{€}40 = \text{€}3580$

Tom should therefore choose Discreet, which is option **D**.

- 14 An early form of electronic communication is Morse code, which is used with a series of dots and dashes to send a message. The code is shown below, with dots and dashes indicating each letter of the alphabet.

A	• —	N	— •
B	— • • •	O	— — —
C	— • — •	P	• — — •
D	— • •	Q	— — • —
E	•	R	• — •
F	• • — •	S	• • •
G	— — • •	T	—
H	• • • •	U	• • —
I	• •	V	• • • —
J	• — — —	W	• — —
K	— • • —	X	— • • —
L	• — • •	Y	— • — —
M	— —	Z	— — • •

To make it easier to learn Morse code a different display was configured and part of this display is shown below. Beginning from the START point, the letter 'A' would be determined by one right move which is a DOT, and one left move, which is a DASH. So A is a DOT DASH.



Some of the circles in the display above have been labelled with the wrong letter.

How many circles have been incorrectly labelled?

- A 1
- B 2
- C 3
- D 4
- E 5

All of the circles in the display need to be checked. The incorrect ones are:

Q: The display shows Q as dash, dash, dash.

The table shows that Q is dash, dash, dot, dash.

W: The display shows W as dash, dot.

The table shows that W is dot, dash, dash.

N: The display shows N as dot, dash, dash.

The table shows that N is dash, dot.

The correct answer is, therefore, that 3 are incorrectly labelled, which is option **C**.

- 15** People who give money to charity tend to choose the large, well-known ones, but there are many reasons why that is a mistake. Small charities are usually the vision of one dedicated individual and have a specific focus. Because administrative costs are low, nearly all of the money donated is used for the object of the charity. But that all changes when charities become big. In order to become a household name, these charities spend a lot of money on advertising and employing fundraisers. Furthermore, to attract talented senior staff, the largest charities offer salaries which are intended to compete with profit-making companies.

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

- A** People who give to charity want as much of their donation as possible to go directly to the object of the charity.
- B** It is inevitable that charities which begin on a small scale grow bigger.
- C** Spending on fundraising is a waste of charities' money.
- D** Paid fundraisers raise far more money for the charities that employ them than the cost of their salaries.
- E** Talented senior executives do not deserve the high salaries they are paid.

The conclusion of the argument given in the passage is that it is a mistake to choose the large, well-known charities when giving money. The reasons for this are:

- Small charities tend to have a specific focus and nearly all of the money donated is used for the object of the charity because the administrative costs are low.
- Larger charities spend a lot of money on advertising and employing fundraisers.
- Larger charities offer salaries that are intended to compete with profit-making companies so that they can attract talented senior staff.

Since all of the reasoning focuses on the way in which the money donated is spent, the conclusion depends on the assumption that people who give to charity want as much of their donation as possible to go to the specific object of the charity, which is option **A**.

Option **B** does not need to be assumed: the argument presents reasoning about what happens as charities become bigger, but that reasoning is valid whether this happens to all charities or not.

Option **C** does not need to be assumed as the reasoning in the argument is that a higher proportion of your donation will go to the cause of the charity if you choose a smaller charity. This reasoning is not affected by whether or not the other uses for the money are deemed to be a waste.

Option **D** does not need to be assumed as the argument is not drawing conclusions about whether these activities are sensible ones for the charity to undertake, only that they are using a proportion of the money that is donated to the charity.

Option **E** does not need to be assumed as the argument is not drawing a conclusion about whether or not the money that the charity spends on other costs is justified.

- 16** Newspapers and magazines preach endlessly about a need for everyone else to take urgent action on climate, whilst simultaneously promoting, and profiting from, flying. Travel promotion takes up vast space in the media, whilst the income from flight advertising pays a significant portion of many journalists' salaries. Journalists thus enjoy personal gain from the promotion of a fossil fuel-dependent industry, which also widely influences the holiday decisions of the general public. Not only does this practice reek of hypocrisy, but it also undermines the effort to reduce global warming to internationally agreed levels. Each plane passenger is likely to generate the equivalent of an entire household's annual carbon footprint every time they fly, according to figures released by campaign group Flight Free.

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

- A** It is not always possible to tell the difference between articles and advertisements when they are side-by-side in a magazine or newspaper.
- B** Few members of the public are aware of the disproportionate effect of air travel on an individual's carbon footprint.
- C** Newspaper and magazine articles urging climate action have more influence on public attitudes than the advertising that appears alongside them.
- D** The travel industry is a huge contributor to the economy and a massive provider of employment.
- E** Commercial television channels advertise holidays and air travel even more aggressively than print media.

The conclusion of the argument is that the practice of newspapers and magazines promoting and profiting from flying while preaching about the need for everyone to take urgent action on climate undermines the effort to reduce global warming.

The argument describes the ways in which the advertising influences the public, but acknowledges that the content of the newspapers and magazines does urge readers to take action. If it is the case that the articles have a greater effect than the advertising, then the argument is weakened, so option **C** is correct.

Option **A** does not weaken the argument as the reasoning is based on the fact that both the articles and advertisements can be found in the newspapers. The reasoning does not require that the reader is able to differentiate between the two.

Option **B** does not weaken the argument but strengthens it. If few members of the public are aware of the disproportionate effect of air travel, it suggests that factual articles published are having less impact on the public than is needed for them to change their behaviour and reduce air travel, and advertising can have greater impact.

Option **D** does not weaken the argument as the argument is focused on the newspapers and magazines. Whether or not there are benefits that come from the existence of the travel industry does not therefore affect the reasoning.

Option **E** does not weaken the argument as the same reasoning could be applied to the commercial television channels to conclude that the same issues exist there. The fact that the newspapers and magazines are not the worst case would not weaken the reasoning that there is a problem.

- 17 Recent research suggests that antiretroviral drugs designed to prevent HIV-positive individuals developing AIDS also have an effect on multiple sclerosis (MS). A study of 21 000 HIV-positive individuals treated at English hospitals between 1999 and 2011 found that they were 62% less likely to develop MS compared to non-HIV-positive individuals. One explanation for this could be that HIV infection actually combats the onset of MS in some way. However, some theories on the development of MS suggest that it has its origins in a viral infection.

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

- A Antiretroviral drugs may prevent the onset of multiple sclerosis.
- B Antiretroviral drugs are given to all HIV-positive patients.
- C Antiretroviral drugs may be a treatment for multiple sclerosis.
- D Antiretroviral drugs may eliminate a range of viral infections.
- E Antiretroviral drugs should not be given to those at risk of developing multiple sclerosis.

The passage states that some theories on the development of multiple sclerosis suggest that it has its origins in a viral infection. If this is correct, then this could explain the evidence from the study where individuals treated with antiretroviral drugs to hinder the development of AIDS were significantly less likely to develop MS. This would allow the conclusion to be drawn that antiretroviral drugs may prevent the onset of multiple sclerosis, which is option **A**.

Option **B** cannot be drawn as a conclusion as the passage only states that the drugs were designed to prevent HIV-positive individuals from developing AIDS. This does not mean that all HIV-positive patients are given such drugs.

Option **C** cannot be drawn as a conclusion as the passage only describes evidence about preventing the onset of the condition rather than treating it.

Option **D** cannot be drawn as a conclusion as the passage only provides evidence relating to MS and only suggests that a link may exist between MS and viral infections.

Option **E** cannot be drawn as a conclusion as, while the passage does provide some reasoning to suggest that the reduction in development of MS may not be related to the use of these drugs, there is no reasoning presented to suggest that the drugs should not be given.

- 18 A banana costs 20p, a nectarine 30p and a mango 45p. I spend exactly £1.50 on some or all of these fruits.

Which one of the following statements is incorrect?

- A I cannot buy all three types of fruit.
- B I could buy more than 3 bananas.
- C I cannot buy more than 2 mangoes.
- D I cannot buy fewer than 5 items.
- E The maximum number of items that I could buy is 7.

One possible way to spend exactly £1.50 is to buy 2 mangoes and 2 nectarines, which is only 4 items, so option **D** is incorrect.

All of the other statements can be confirmed to be correct:

- If I buy some mangoes, then I must buy 2 (because they are 45p each, and my full spend ends in a 0), so the remaining 60p would have to be spent on either 3 bananas or 2 nectarines. It is therefore not possible to buy all three types of fruit (option **A**).
- It would be possible to buy 6 bananas and 1 nectarine, so I could buy more than 3 bananas (option **B**).
- The number of mangoes bought must be a multiple of 2, and 4 mangoes cost £1.80, which is more than £1.50, so I cannot buy more than 2 mangoes (option **C**).
- The cheapest item costs 20p, so if I buy more than 7 items, then the cost would have to be more than £1.50 (option **E**).

- 19 James needs to buy some new batteries and has compiled the table below showing the prices of the different packs available.

battery type	pack size			
	1	2	4	8
AA	–	\$3.00	\$5.50	\$9.00
AAA	–	\$3.50	\$6.50	\$10.50
C	\$2.50	\$4.50	\$8.00	–
D	\$3.50	\$5.50	\$8.50	–

James needs six AAA batteries and three D batteries.

What is the least amount that James could pay to get the batteries that he needs?

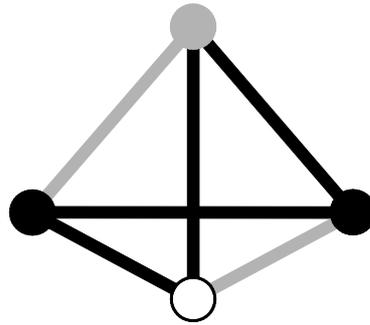
- A \$17.00
- B \$17.50
- C \$18.00
- D \$18.50
- E \$19.00

The least that James could pay for 6 AAA batteries is \$10.00 (a pack of 4 and a pack of 2).

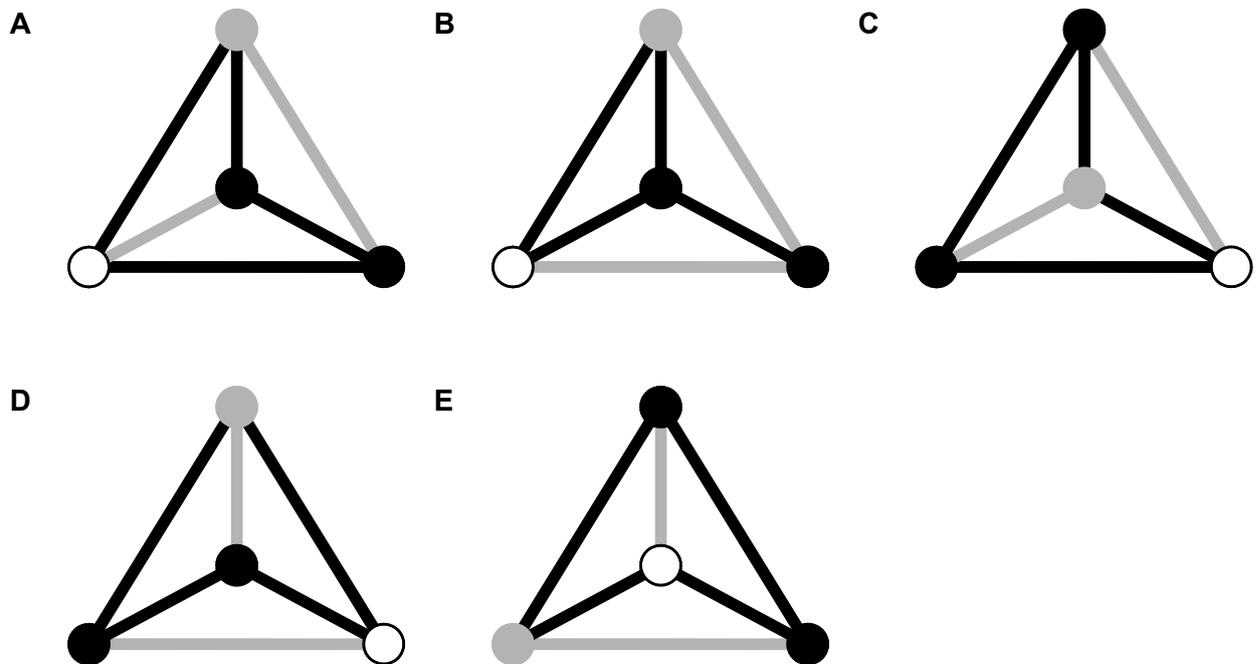
The least that James could pay for 3 D batteries is \$8.50 (a pack of 4, with 1 additional battery).

The least amount that James could pay is therefore \$18.50, which is option **D**.

- 20 The following structure is a triangular-based pyramid made from black and grey rods and white, grey and black spheres connecting the rods together. The black and grey rods are all the same length.



If this structure is rolled like a dice and lands on the surface of a table, which one of the following options is **not** a possible view of the structure as viewed from above?



The picture of the structure has two grey rods: one of the grey rods connects the grey sphere to a black sphere and the other grey rod connects the white sphere to a different black sphere. This can be seen in all of the options apart from option **B** where the two grey rods are connected to the same black sphere.

- 21** Positive discrimination, known as affirmative action in the US, is the process of increasing the number of employees from under-represented groups in workplaces from which they have been excluded, by preferentially selecting recruits from those categories. Although many countries, including the US, allow the practice of positive discrimination, it remains illegal in the UK under the Equality Act 2010, and so it should. Positive discrimination serves not only to lessen the sense of achievement for those who belong to the relevant minority, but also to foster resentment amongst those who do not. Qualifications alone should decide employment decisions. After all, a person's qualifications are the best reflection of their true ability.

Which one of the following is the best expression of the main conclusion of the above argument?

- A** Positive discrimination devalues achievement and fosters resentment.
- B** UK law prohibits positive discrimination.
- C** Qualifications represent a candidate's true ability.
- D** Positive discrimination ought to remain illegal in the UK.
- E** Employment decisions should be based on nothing other than a candidate's qualifications.

The conclusion of the argument is that positive discrimination ought to remain illegal in the UK, which is option **D** and is expressed by the words 'and so it should' in the second sentence.

The reasoning presented is that:

- Positive discrimination serves to lessen the sense of achievement for those who belong to the relevant minority.
- Positive discrimination serves to foster resentment amongst those who do not belong to the relevant minority.
- Qualifications are the best reflection of a person's true ability, so they alone should decide employment decisions.

Option **A** is one of the reasons given in support of the conclusion.

Option **B** is a statement of the position in the UK, which the argument is supporting, but it is the support for prohibiting positive discrimination that is the conclusion, not the fact that it is the case in the UK.

Option **C** is part of the reasoning that positive discrimination is unfair.

Option **E** is a restatement of the reason given in the penultimate sentence.

22 A belief is a thought about how things are – about what really is or is not the case. For instance, someone who believes in God believes that a being such as God actually exists. Assuming that people would prefer to have true beliefs rather than false ones, then they need to find a way to determine which is which. Unfortunately, people have a tendency to want to ‘protect’ their existing beliefs by only seeking evidence that supports them and being blind to contrary evidence. This makes for a very poor test of whether a given belief is indeed true. Actively seeking the evidence that goes against your own beliefs allows you to make a proper assessment, and consequently a far more reliable judgment.

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

- A** If people want to know if their beliefs are true, they should think about why they might be false.
- B** People who believe in God are in greater danger than atheists of becoming blind to evidence that goes against their beliefs.
- C** People typically want to have true beliefs rather than false ones.
- D** People who feel certain about their beliefs are more likely to have false ones.
- E** Once you accept a belief as probably true, you cannot then change your mind about it.

The passage provides the following reasoning:

- People have a tendency to want to ‘protect’ their existing beliefs by only seeking evidence that supports them.
- This makes for a very poor test of whether a given belief is indeed true.
- Actively seeking the evidence that goes against your own beliefs allows you to make a proper assessment.

It can therefore be concluded that, if people want to know if their beliefs are true, they should think about why they might be false, which is option **A**.

Option **B** cannot be drawn as a conclusion as it tries to draw a comparison between the group with the belief identified in the passage with a group that have a different belief. Nothing in the passage suggests that the problems identified are more significant for those who believe in God compared to those who are atheists.

Option **C** is stated as an assumption in the third sentence of the passage. If it is assumed, it cannot be drawn as the conclusion.

Option **D** cannot be drawn as a conclusion as the passage only provides evidence that people will seek evidence that supports their beliefs. There is no information about whether it is easier to find evidence supporting true beliefs or false ones, so there is no way to conclude whether people who feel certain about their beliefs are more likely to have false ones.

Option **E** cannot be drawn as a conclusion as the passage only provides reasoning to support the idea that people are not likely to change their beliefs. No evidence is provided to support the conclusion that it is impossible to change your mind.

- 23** If we want to reduce our carbon footprint by travelling by train instead of air, we must be prepared for journeys taking longer and being more expensive. I would be willing to pay a higher cost but cannot make my trips to Europe by train as I do not have time available, so I have to make the journeys by plane. It won't be possible for me to reduce my carbon footprint.

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

- A** To make bread successfully, Jason needs some fresh yeast and a warm kitchen for his bread dough to rise. The yeast he is using is out of date and his kitchen is cold, so Jason's bread will not turn out well.
- B** Kristina will not be able to go to her first choice of university. To achieve that she needed top grades in all her examinations and to do well at interview. She failed to get the best grade in one of her subjects although she performed well in the interview.
- C** It is rarely possible to see the Northern Lights from anywhere except the upper northern hemisphere, and in the winter. Maria lives in the upper northern hemisphere but sometimes travels to Australia in the winter, so she will never see the lights.
- D** To reduce food waste everyone should plan meals and eat food left over from a meal on the following day. Greta plans her meals carefully so that she cooks only the exact amount she will eat. So Greta is helping to reduce food waste even if she does not eat leftovers.
- E** If Mahmood wants to work in London he has to either live in London or commute for 3 hours each day. Mahmood cannot afford to buy a house in London, nor can he commute for 3 hours each day. So Mahmood cannot work in London.

The first sentence of the argument states that, if we want one thing (to reduce our carbon footprint), then we have to do certain other things (have journeys that take longer and are more expensive). The second sentence explains that I can do one of these (pay a higher cost), but cannot do the other (have journeys that take longer). The conclusion is then drawn that it will not be possible for me to reduce my carbon footprint.

Option **B** has the same structure (although the statements have been reordered): if Kristina wants one thing (to go to her first choice of university), then she has to do certain other things (get top grades in all her examinations and do well at interview). She did one of these (performed well at interview), but did not do the other (get top grades in all her examinations). The conclusion is then drawn that she will not get into the university that she wants.

Option **A** states that, to do one thing (make bread successfully) we have to have two requirements (fresh yeast and a warm kitchen). The second sentence explains that neither of these requirements is met, so the bread will not be made successfully. So in this case, neither requirement is met, whereas in the passage and option **B**, one requirement is met but not the other.

Option **C** contains more elements of uncertainty about the different components: it states that one thing (seeing the Northern Lights) is normally only possible except in certain circumstances (being in the upper northern hemisphere and it being winter). Maria is not always in the northern hemisphere in the winter, so it is (wrongly) concluded that she will never see the Northern Lights.

Option **D** states that, to do one thing (reduce food waste) we have two requirements (plan meals and eat food left over from a meal on the next day). Greta meets one of these requirements and avoids the other, so it is concluded that she is achieving a reduction in food waste. In other words, she is achieving the desired end (reduce food waste) despite not fulfilling the two named conditions.

Option **E** states that, to do one thing (work in London) Mahmood has a choice of two things (live in London or commute for 3 hours each day). Mahmood cannot do either, so it is concluded that he cannot work in London. In other words, neither condition is met for the desired outcome.

- 24 A small factory produces four types of cycle: bicycles (two-wheeled), tricycles (three-wheeled), tandems (two-wheeled for two riders) and unicycles (one-wheeled without handlebars). The number of essential components required for each product is shown in the table below.

<i>product</i>	<i>saddles</i>	<i>wheels</i>	<i>handlebars</i>
bicycle	1	2	1
tricycle	1	3	1
unicycle	1	1	0
tandem	2	2	2

We know that yesterday 10 saddles, 14 wheels and 9 handlebars were used, and 7 cycles were built in total.

How many tricycles were built?

- A 0
- B 1
- C 2
- D 3
- E 4

Since all of the products have 1 saddle apart from the tandem, the fact that 10 saddles were used for 7 cycles shows that 3 tandems were built. Removing the saddles, wheels and handlebars for 3 tandems from the totals shows that 4 saddles, 8 wheels and 3 handlebars were used to make the remaining 4 cycles.

Since the unicycle does not have a handlebar, but the other two products have one, it must be the case that 1 unicycle was built.

The remaining three cycles needed 7 wheels. If they had all been bicycles, then only 6 wheels would have been needed, so 1 tricycle must have been built, which is option **B**.

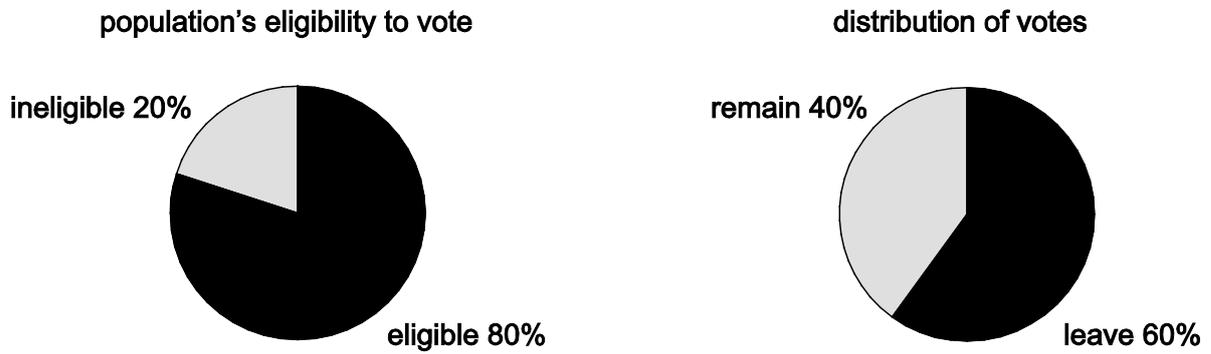
- 25** I want to buy a brochure which costs 49p. I have a pocket full of small change and so want to use as many coins as possible. I have 8 x 1p coins, 5 x 2p coins, 5 x 5p coins, 3 x 10p coins and 1 x 50p coin.

What is the largest number of coins I can use and pay the exact price?

- A** 10
- B** 15
- C** 16
- D** 17
- E** 21

It is clear that the 50p coin cannot be used. The total value of the remaining 21 coins is 73p, so the coins that I don't use will have a value of 24p. The most efficient way to make 24p will use 4 coins (two 10p coins and two 2p coins), so 17 is the maximum number of coins that can be used to pay the exact price, which is option **D**.

- 26 The diagrams below relate to a recent referendum in Bolandia about whether the country should remain a member of, or leave, the Continental Union.



Two-thirds of those eligible to vote did so.

What proportion of the total population voted for leaving the Continental Union?

- A 32%
- B 37%
- C 40%
- D 48%
- E 53%

The first pie chart shows that 80% of the population were eligible to vote, so two-thirds of 80% of the population voted. The second pie chart shows that 60% of the votes were for 'leave'.

The proportion of the total population who voted for leaving was therefore 60% of two-thirds of 80%. 60% of two-thirds of 80% is 32%, which is option **A**.

- 27** US health authorities have linked at least 18 deaths and more than 1000 cases of a mysterious lung illness with vaping (an alternative to smoking in which users inhale an aerosol, or vapour). The symptoms include chest pain, fatigue and shortness of breath, and while doctors have not been able to establish what is causing the illness (and it has not been linked to any particular product), vaping oils containing THC appear to pose a greater risk. However, if the level of risk is not well understood by doctors, people should – for the moment – still have the right to make their own choice. The government should not impose a ban on vaping until more research has been completed.

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

- A** More needs to be done to prosecute those who create scam emails as they always result in significant damage to those who respond.
- B** Planned passenger trips into space should not be cancelled on safety grounds, as we have not yet fully investigated the dangers involved.
- C** We should not impose limits on gambling even though people who gamble more than a certain amount every month are almost certain to find themselves in financial difficulty in the future.
- D** It is right that speed limits are in place as they help to prevent accidents, which have a higher chance of causing serious injury when at greater speeds.
- E** The rules preventing publication of incorrect information in the media are justified as such information causes considerable damage to the people reported on.

The principle used in the argument is that the right to choose (vaping) should take priority when the level of risk is not well understood (it has not been possible to establish the causes of the mysterious lung illness).

Option **B** applies the same principle: the right to choose (taking a passenger trip into space) should take priority as the level of risk is not well understood (we have not fully investigated the dangers involved).

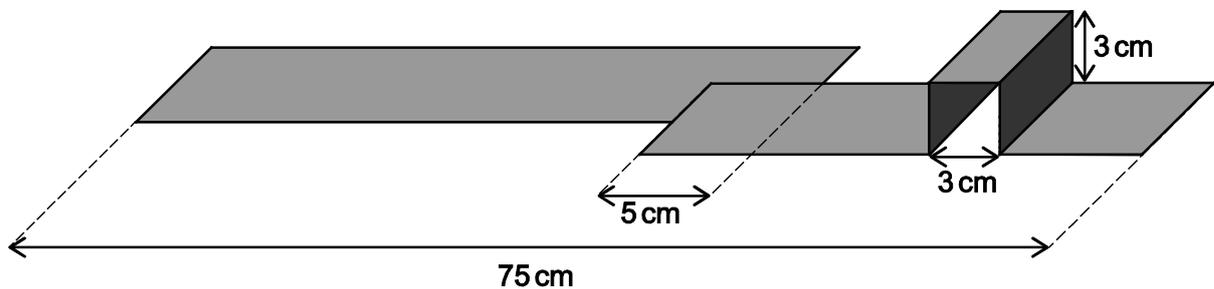
Option **A** does not apply the principle as it deals with a case in which the level of risk is understood (proposing that the activity should not be allowed).

Option **C** does not apply the principle as it deals with a case in which the level of risk is well understood (proposing that the activity should be allowed).

Option **D** does not apply the principle as it offers support for restricting an activity in which the level of risk is well understood.

Option **E** does not apply the principle as it offers support for preventing activities in which the level of risk is well understood.

- 28 Two identical rectangular pieces of paper are arranged to overlap each other by 5 cm. One of the rectangles has been folded to make the structure below (not to scale). The length of the whole arrangement is 75 cm.



What is the length of one of the pieces of paper?

- A 40.0 cm
- B 41.5 cm
- C 43.0 cm
- D 44.5 cm
- E 45.5 cm

If the two pieces of paper had been arranged end-to-end, then the total length would be increased by 5 cm (because there would no longer be an overlap) and a further two sets of 3 cm (because the two vertical sections of the second piece of paper would now be added to the length). The total length would therefore be $75 + 5 + 2 \times 3 = 86$ cm, meaning that one sheet of paper is 43.0 cm long, which is option **C**.

29 Silk gets stronger when supercooled whilst other materials get weak and brittle. The discovery was made by a group of scientists shooting bullets at various supercooled items and filming them shatter. When they tried it on a spider web it didn't work: the web just caught the bullet. At the time it was just an interesting curiosity, but plainly it has enormous practical significance. By studying how the spider makes its silk we can learn how to make polymers (plastics) that don't get brittle in the deep freezer, or in outer space, or in the Arctic. Moreover, natural silk can itself be used to manufacture objects for use in extreme conditions. The half-million tonnes already produced annually is almost certain to increase dramatically.

Which of the following is the best expression of the main conclusion of the above argument?

- A** Silk increases in strength when it is supercooled.
- B** The effect of extreme cold on a spider web was not at first taken seriously.
- C** The discovery that silk does not get brittle when supercooled is highly significant.
- D** We can learn how to make polymers that withstand cold from the way in which spiders make their silk.
- E** There is almost certain to be a large increase in silk production.

The discovery that silk does not get brittle when supercooled is explained in the first three sentences. The conclusion is then that this is a highly significant discovery, which is stated in the fourth sentence and is option **C**.

The reasoning to support this conclusion is then provided in the remainder of the passage:

- By studying how the spider makes its silk we can learn how to make polymers (plastics) that don't get brittle in the deep freezer, or in outer space, or in the Arctic.
- Natural silk can itself be used to manufacture objects for use in extreme conditions.
- The half-million tonnes (of natural silk) already produced annually is almost certain to increase dramatically.

Option **A** is a statement of one of the properties of silk and is not supported by any reasoning. The argument is about the significance of the discovery, so the nature of the discovery cannot be the main conclusion.

Option **B** is the statement that precedes the expression of the conclusion in the argument. It is a statement of something that happened, but there is no reasoning to support it, so it cannot be a conclusion.

Option **D** is one of the applications of the discovery and so it is a reason that supports the main conclusion.

Option **E** is a statement of the intermediate conclusion that silk production will increase and this then supports the main conclusion that the discovery is highly significant.

- 30** A paint company uses two different coding systems to define the colours used in its paints. One code is the 'YMC' code, in which numbers between 0 and 63 are used to represent the proportions of yellow, magenta and cyan in the colour. The other is the 'OCT' code, which contains 6 numerical digits.

The table shows the YMC configurations and the OCT code for a number of the paints in its range:

<i>colour</i>	<i>Y</i>	<i>M</i>	<i>C</i>	<i>OCT</i>
Blood Red	63	63	0	007777
Green Grass	63	0	63	770077
Sky Blue	0	63	63	777700
Luscious Pink	34	50	34	396139
Orange Squeeze	63	41	0	005077
Regal Purple	0	63	41	507700
Jet Black	63	63	63	777777
Dazzling White	0	0	0	000000
Grizzly Grey	34	34	34	393939

A customer wants a gold-coloured paint mixing, which he knows to have a YMC configuration of 50 yellow, 41 cyan and 34 magenta.

What is the OCT code of this gold colour?

- A** 397761
- B** 395077
- C** 503961
- D** 615039
- E** 776139

The relationship between the amounts of yellow, magenta and cyan in the paint with the OCT code needs to be determined. From the first three rows of the table, it can be seen that the OCT code includes numbers to represent each of the colours in the order C, M, Y, with 63 being converted to 77 and 0 being converted to 00.

The code for Luscious Pink shows that a value of 34 for one of the colours is represented by 39 in the OCT code and a value of 50 for one of the colours is represented by 61 in the OCT code.

The code for Orange Squeeze shows that a value of 41 for one of the colours is represented by 50 in the OCT code.

The gold-coloured paint has 41 cyan, 34 magenta and 50 yellow, so should have an OCT code of 503961, which is option **C**.

31 Obesity has increased greatly in recent years in the UK. Some commentators have attributed this to people becoming greedier in a consumer society; however, obese people should not be blamed for their condition when it is the food environment in Europe that has changed. Obesity results from a combination of genetic factors and a fast-food culture that provides an easy supply of cheap, sugary and processed snacks and meals that are high in calories. This is compounded by the shift to more sedentary lifestyles both at work and in leisure time, which has led to a lack of exercise.

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

- A** Many people are unaware of the dangers of unhealthy eating.
- B** There are some foods available today that are not high in calories.
- C** Levels of obesity are higher in the UK than in most other European countries.
- D** Food retailers are largely responsible for the growing obesity problem.
- E** The government has not taken adequate steps to regulate the types of food available.

The passage gives three key pieces of information:

- Obesity levels in the UK have increased greatly.
- Obesity is caused by a combination of genetic factors and consumption of high-calorie foods.
- The food environment in Europe today is dominated by high-calorie foods.

The conclusion is that obese people should not be blamed for their condition.

The conclusion is weakened by the evidence in option **C** that levels of obesity are higher in the UK than in other European countries. If European countries all share the same high-calorie food environment (the third key piece of information given), but the UK's rates of obesity are higher, there must be some explanation for the difference in obesity rates other than the food environment. This suggests that individual choice and lifestyle may be responsible – which contradicts the conclusion.

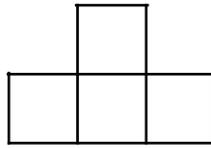
Option **A**, if anything, slightly *strengthens* the conclusion that individuals should not be blamed for their own obesity. It offers a possible explanation for unhealthy eating, implying a lack of public education.

Option **B** states that the food environment includes some healthy options (which would provide choice and therefore individual responsibility for the choice), but the passage states that the food environment is dominated by 'cheap, sugary and processed snacks and meals that are high in calories'. If the healthier options are more expensive, then people on lower incomes may not be able to make a healthy choice and cannot therefore be held responsible.

Option **D** adds strength to the argument, as food retailers are a key part of the 'food environment in Europe'.

Option **E** is a further conclusion which could be drawn from the passage. If the food environment is a primary cause of obesity, then we might conclude that the government has allowed food producers and retailers too much licence. It does not weaken the argument.

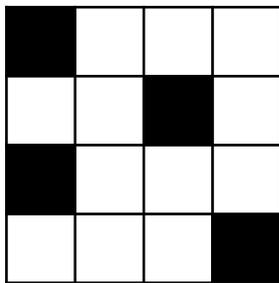
32 A puzzle consists of 4 tiles, all of which have the shape shown below.



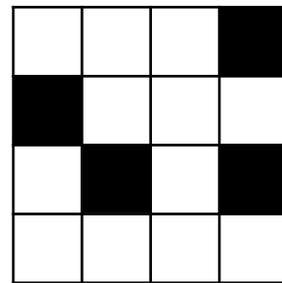
On each tile one of the squares is coloured black and the other three are coloured white. No two tiles look the same. The back of each tile is grey.

Which one of the following patterns can be made by placing the four tiles together?

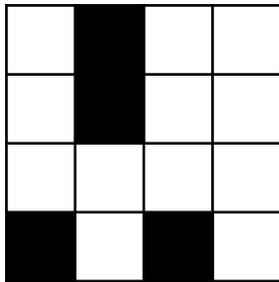
A



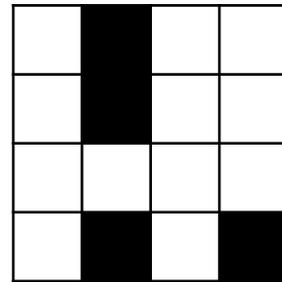
B



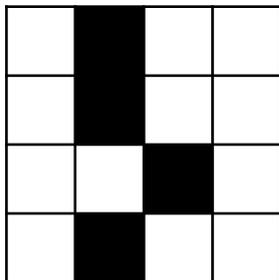
C



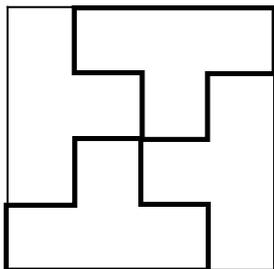
D



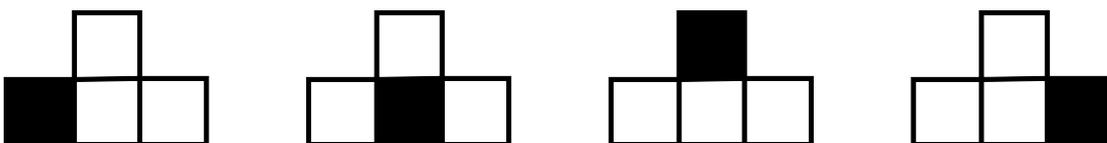
E



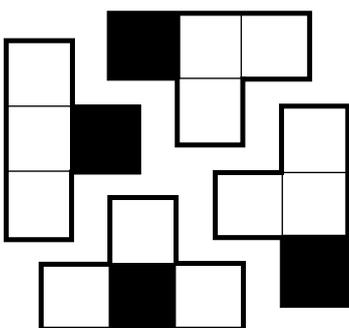
The only way in which the four tiles can be put together to make a square is as follows.



The question states that no two tiles look the same so that leaves four options for how these tiles can look.



The only pattern that meets this requirement is option **D**.



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