

## **BioMedical Admissions Test**

4500/11

November 2020 60 minutes

SECTION 1 Thinking Skills

## **INSTRUCTIONS TO CANDIDATES**

Please read this page carefully, but do not open the question paper until you are told that you may do so.

This paper is Section 1 of 3. Your supervisor will collect this question paper and answer sheet before giving out Section 2.

A separate answer sheet is provided for this section. Please check you have one. You also require a soft pencil and an eraser.

Please complete the answer sheet with your:

- BMAT candidate number
- Centre number
- Date of birth
- Name

Speed as well as accuracy is important in this section. *Work quickly, or you might not finish the paper.* There are no penalties for incorrect responses, only marks for correct answers, so you should attempt all 32 questions. Each question is worth one mark.

Answer on the sheet provided. Questions ask you to show your choice between options by shading one circle. If you make a mistake, erase thoroughly and try again.

You **must** complete the answer sheet within the time limit.

You can use the question paper for rough working or notes, but **no extra paper** is allowed.

Calculators are NOT permitted.

Please wait to be told you may begin before turning this page.

This question paper consists of 22 printed pages and 2 blank pages.

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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?

- 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.
- В 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.
- 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.
- Smoking is bad for your health and can cause heart and lung problems. You smoke, so you will have heart and lung problems.
- 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?

- Α 31 quarters
- В 32 quarters
- C 33 quarters
- D 34 quarters
- Ε 36 quarters

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.
- 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.

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?

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

- Α 8
- В 4
- C 3
- D  $\overline{2}$
- <u>5</u> 8 Е

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

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

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

<sup>\*</sup> Image must be uploaded by the customer.

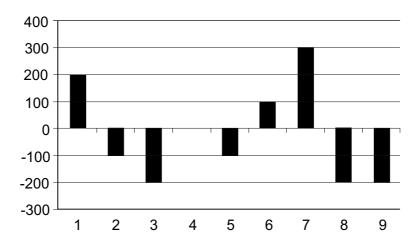
James wishes to buy 8 small cards and 20 medium cards. He has decided to use one of the standard images on the small cards, but has his own image that he will upload to go on the medium cards. He will have personalised greetings on 5 of the cards.

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

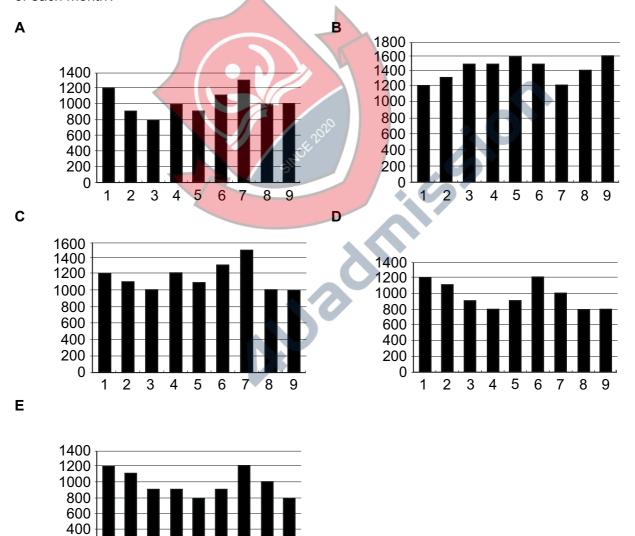
- **A** \$117
- **B** \$127
- **C** \$137
- **D** \$147
- **E** \$157



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?



200 1 2 3 4 5 6 7 8

**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 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.
- 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 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.
- 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.

costume colour	number of dancers
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?

Α	1	2.5	ī m

**B** 13.0 m

**C** 17.0 m

**D** 18.0 m

**E** 21.5 m

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.

company	day tours	cost per person	single supplement per person per night	escorted travel	flights
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

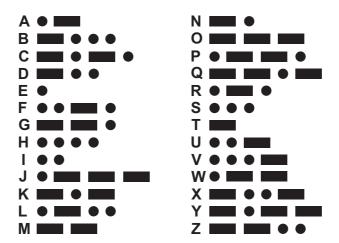
Tom has a maximum budget of €3600. All three travellers will qualify for the quoted cost per person, but Tom will also have to pay the additional single supplement.

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

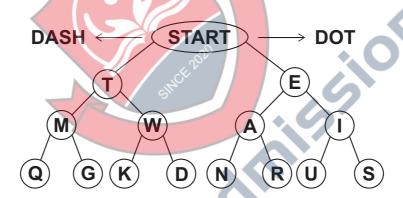
Which company should Tom choose for the holiday?

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

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.



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

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.
- 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.

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.
- 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.

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

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

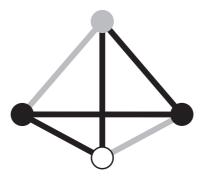
James needs six AAA batteries and three D batteries.

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

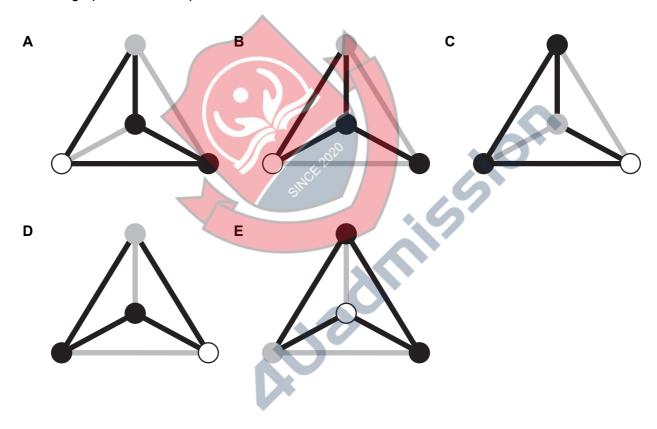
- **A** \$17.00
- **B** \$17.50
- **C** \$18.00
- **D** \$18.50
- **E** \$19.00



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?



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.
- 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.

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.
- A small factory produces four types of cycle: bicycles (two-wheeled), tricycles (three-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.

product	saddles	wheels	handlebars
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.

**B** 1

**C** 2

**D** 3

**E** 4

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
- 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.

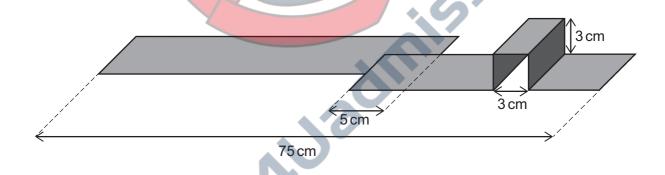
What proportion of the total population voted for leaving the Continental Union?

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

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.
- 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

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.



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:

colour	Υ	М	С	OCT
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

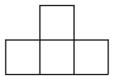
Obesity has increased greatly in recent years in the UK. Some commentators have attributed this to people becoming greedier in a consumer society; however, obese people should not be blamed for their condition when it is the food environment in Europe that has changed. Obesity results from a combination 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.

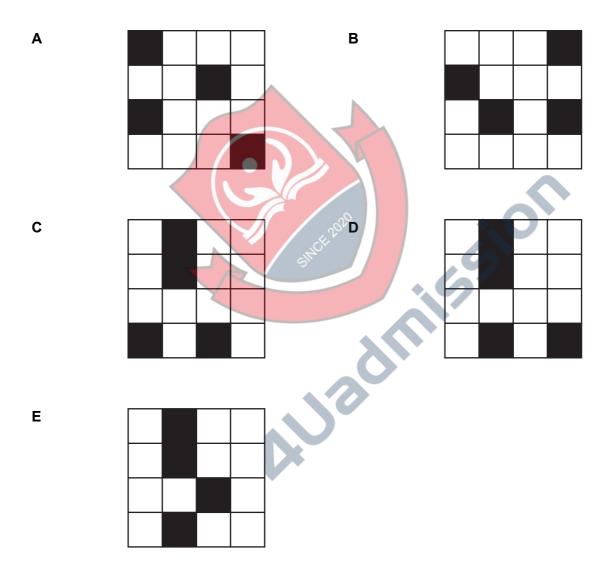


**32** A puzzle consists of 4 tiles, all of which have the shape shown below.



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?



**END OF TEST** 

## **BLANK PAGE**



NOTE: Question 30 has been amended to remove a minor typographical error present in the original test.

This document was initially designed for print and as such does not reach accessibility standard WCAG 2.1 in a number of ways including missing text alternatives and missing document structure.

If you need this document in a different format please email <a href="mailto:admissionstesting@cambridgeassessment.org.uk">admissionstesting@cambridgeassessment.org.uk</a> telling us your name, email address and requirements and we will respond within 15 working days.