BioMedical Admissions Test   **4500/11**

Thursday 2 November 2017   **1 hour**

SECTION 1   **Aptitude and 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 may not finish the paper.** There are no penalties for incorrect responses, only points for correct answers, so you should attempt all 35 questions. All questions are worth one mark.

Answer on the sheet provided. All 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 paper consists of 28 printed pages and 8 blank pages.

PV4

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1 Hugh painted a room 60% pink and 40% orange.

Before he began he had three full 1.5 litre pots of paint: one red, one yellow and one white. He mixed equal amounts of red and yellow to create the orange paint and he mixed red and white in the ratio 1 : 3 to create the pink paint.

He made exactly the amounts of orange paint and pink paint that he needed. After doing so, he had 900 ml of the yellow paint left.

How much of the red paint did Hugh have left?

A 150 ml

B 300 ml

C 450 ml

D 500 ml

E 700 ml

F 1050 ml

G 1350 ml

2 There were 61 million prescriptions for antidepressant drugs in the UK in 2015. This was double the number of prescriptions in 2005. In 2014, there were 1.1 million mental health disability claimants. This was double the number in 1995.

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

A While antidepressant drugs can help combat mental illness in the short term, data suggests that in the long term their use leads to worse outcomes for patients.

B Doctors are being increasingly encouraged to prescribe drug treatment for people suffering from depression regardless of how effective a treatment it is.

C Antidepressant drugs are clearly not an effective solution in the long term treatment of mental illness.

D Figures for drug prescriptions and disability claimants provide no evidence that antidepressant drugs are improving the long term mental health of people in the UK.

3 Mr and Mrs Joelson and their twin sons intend to move house. They have a budget of $900 000.

Ideally, they would like a house with at least four bedrooms, a double garage and a medium or large size garden. They would also like to be no more than 2 km from the nearest grocery store and within 6 km of sports facilities. They realise that their wish list may not be met in full, so they decide that they will be happy with a house, within budget, that satisfies at least four of their five wishes. If more than one house satisfies at least four of their wishes, then they will choose the one for which dividing the cost of the house by the number of bedrooms gives the lowest price.

The Joelson family have found five houses which satisfy at least some of their wishes.

house	number of bedrooms	garage	garden	distance to grocery store	distance to sports facilities	cost
Acorns	5	double	large	2.0 km	8 km	$825 000
Bellavista	3	single	medium	2.5 km	4 km	$810 000
Chestnuts	6	double	large	3.0 km	3 km	$930 000
Dayview	4	double	medium	1.0 km	7 km	$640 000
Everglade	4	none	small	1.5 km	5 km	$860 000

Which house should the Joelson family buy?

A Acorns

B Bellavista

C Chestnuts

D Dayview

E Everglade

4   Nuclear power is often suggested as a 'cleaner' or 'greener' alternative to power production using fossil fuels such as coal and oil. Nuclear power may be less air-polluting than fossil fuels, but it still poses an unacceptable risk to the environment and to humanity. The expansion of all nuclear power production should therefore be stopped and existing plants shut down. Despite what the nuclear industry tells us, building enough nuclear power stations to make a meaningful reduction in greenhouse gas emissions would create tens of thousands of tons of lethal, high-level radioactive waste. Instead, we need an energy system that can fight climate change, based on a mix of renewable energy sources (such as wind, solar and tidal) and energy efficiency. Nuclear power already delivers less energy globally than renewable energy.

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

   A   There are established procedures for managing and safely storing nuclear waste, funded by electricity users.

   B   The share of global energy delivered by nuclear power will continue to decrease in the coming years.

   C   Wind power typically costs much more than nuclear power and cannot provide power on demand.

   D   Currently, nuclear energy saves the emission of 2.5 billion tonnes of CO_2 relative to coal.

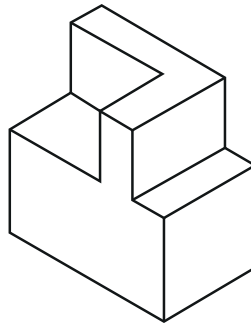**5**   A piece of a puzzle is shown below.
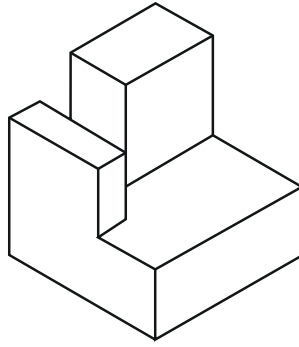
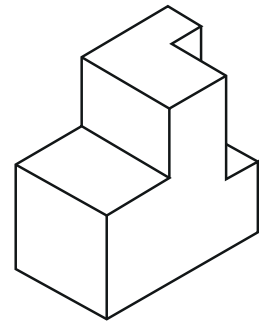Which one of the following blocks could fit onto this piece to make a solid cube?
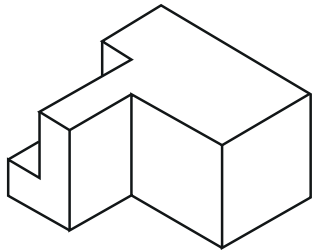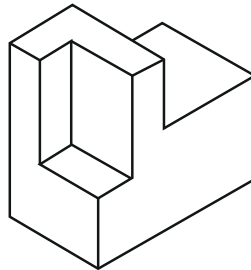
A
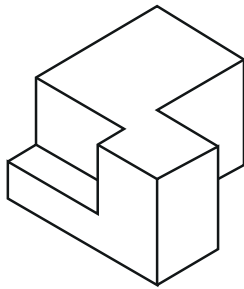
B

C

D

E

6   Researchers have found that middle-aged men with bigger waist measurements have an increased risk of developing prostate cancer. They found that, for every extra ten centimetres a man had on his waist, his risk of developing the most aggressive form of prostate cancer was raised by 13 per cent. Early results suggest the increased risk is linked with the disruption to testosterone and other hormones that occurs with weight gain. This shows that middle-aged men can prevent the development of prostate cancer by eating a healthy diet and taking regular exercise.

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

A   It ignores the fact that weight gain is a factor in other forms of cancer.

B   It assumes that major changes to diet and exercise are achievable by all men.

C   It assumes that losing weight is sufficient to avoid developing prostate cancer.

D   It fails to note the role of hormone disruption in other forms of cancer.

7 The chart below shows the results of a survey of the favourite sport of each child in a school.
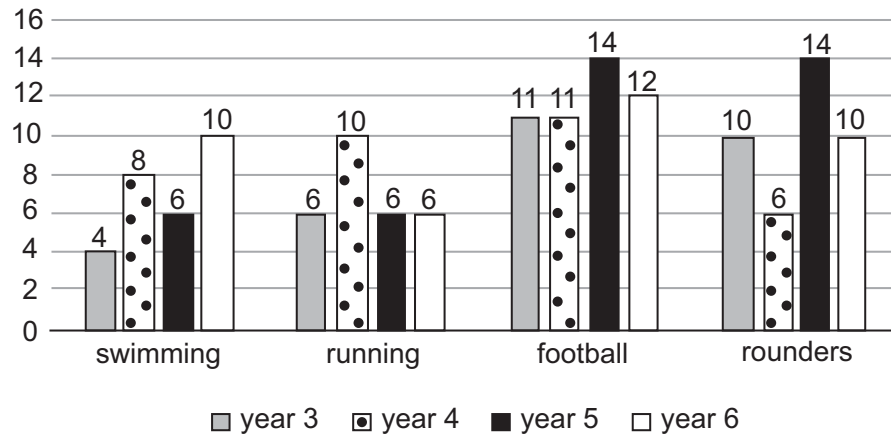
An equal number of girls and boys took part in the survey.

No girls chose swimming and no boys chose rounders.

Equal numbers of girls and boys chose running.

How many girls chose football?

A 5

B 18

C 20

D 24

E 30

F 31

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Questions **8–11** refer to the following information.

The following set of data is from a nine-year study of reoffending and reconviction rates in the UK. The study followed a cohort of 42,721 offenders who were released from prison in 2000 or given a non-custodial sentence in 2000.

Reconviction rates, frequency rates, and severity rates for different follow-up periods

Follow-up period	Reconviction rate[1]	Reconviction frequency rate[2]	Rate of severe reconvictions[3]
3 month	19.9%	50.3	0.2
6 month	30.8%	98.9	0.4
9 month	37.9%	142.6	0.6
1 year	43.0%	185.1	0.8
2 year	55.2%	347.5	1.6
3 year	61.9%	498.5	2.5
4 year	65.8%	632.9	3.1
5 year	68.4%	741.7	3.8
6 year	70.4%	833.9	4.4
7 year	71.8%	912.3	5.0
8 year	73.0%	986.4	5.5
9 year	74.0%	1,057.5	6.0

[1] Reconviction rate: the proportion of offenders who were reconvicted for one offence or more during the follow-up period

[2] Reconviction frequency rate: the number of offences per 100 offenders in the cohort resulting in a reconviction

[3] Rate of severe reconvictions: the number of severe offences (e.g. violence or armed robbery) per 100 offenders

All figures are cumulative and relate only to offences that resulted in a conviction. No adjustment was made for factors that might account for a decline in the rate of reconvictions over time.

Additional data was collected on offenders who had served custodial sentences and who were released from prison in 2000. Offenders who received longer sentences (four years and over) formed 2.3 per cent of the cohort. Offenders who received shorter sentences (less than twelve months) formed 24.2 per cent of the cohort, but committed 39 per cent of all offences that led to a conviction in the first year of the follow-up.

8   According to the data in the table, what was the average number of reconvictions per re-offender by the end of the nine year follow-up period?

A   7.8

B   10.6

C   14.3

D   40.4

9   Which of the following statements is supported by the table and accompanying information?

    1   Over 77 per cent of all offenders who were reconvicted within the two year follow-up period were actually reconvicted in the first year.

    2   Of all offences resulting in a reconviction in the nine year follow-up period, at least one third occurred in years 2 and 3.

    3   In the first year of the follow-up period there were at least 77,000 reconvictions.

A   1 only

B   2 only

C   3 only

D   1 and 2 only

E   1 and 3 only

F   2 and 3 only

G   1, 2 and 3

10 In the first year of the follow-up period, approximately how many offences leading to a reconviction were committed by prisoners who had served sentences less than 12 months?

A 7,400

B 19,000

C 31,000

D 180,000

11 Which of the following factors might feasibly account for a decline in the year-on-year rate of reconvictions as indicated by the study?

1 substantial numbers of re-offenders being sent to prison

2 normal mortality rate over a decade

3 a deterrent effect created by harsher sentencing

A 1 only

B 2 only

C 3 only

D 1 and 2 only

E 1 and 3 only

F 2 and 3 only

G 1, 2 and 3

12 The theatre show called *Gracie's World* needs 8 characters to be performed. Gracie, Sarah and Rose are characters who must be played by female performers and Teddy, Graham and Carl must be played by male performers. There are two guards in the show who can be played by either a male or female performer. Each performer can play more than one character but each character can only be played by one performer. The performer who plays the role of Gracie cannot play any other characters. The table below shows the characters involved in each scene:

scene	characters
1	Teddy, Graham, Guard 1 and Guard 2
2	Teddy, Sarah, Carl and Guard 2
3	Teddy, Gracie and Rose
4	Teddy, Rose and Carl
5	Gracie and Graham
6	Teddy and Sarah
7	Teddy, Gracie, Rose and Graham
8	Rose and Carl
9	Gracie, Carl and Guard 1
10	Teddy, Rose and Sarah
11	Teddy and Sarah
12	Teddy, Rose and Gracie
13	Carl and Gracie

In this year's production, the performer who plays Rose also plays Guard 1.

Which of the following pairs of characters could be played by the same person in this year's production?

A Gracie and Sarah

B Teddy and Guard 1

C Sarah and Guard 1

D Graham and Carl

E Sarah and Graham

F Rose and Guard 2

13 In the history of the Earth there have been three extinctions of marine animals, which as yet we cannot explain. Earlier this year, researchers discovered that periods when the oceans had high levels of trace elements, such as zinc, copper, manganese and selenium, seemed to overlap with periods when most groups of living animals first appeared. These minerals are called essential trace elements because without them we die. Now new research has shown that drops in selenium levels in the oceans correlate well with each of the extinction events at the end of the Ordovician, Devonian and Triassic periods. Thus the level of selenium in the oceans ...

Which one of the following most logically completes the last sentence in the above passage?

A … must be the explanation as to why marine animal life developed on Earth.

B … could be a contributory factor in the three incidences of extinction of marine animals.

C … is more crucial than the other trace elements to the survival of marine animal species.

D … must have caused the extinctions of marine animals at the end of the Ordovician, Devonian and Triassic periods.

14 There are three political parties in Xanthia: the Citron Party, the Jonquil Party and the Saffron Party. Before last month's General Election the Jonquils held 126 of the 240 seats in the Xanthian Parliament, the Citrons held 80 and the Saffrons held 34.

In last month's General Election:

- the Citrons gained 47 seats from the Jonquils and 10 seats from the Saffrons;
- the Jonquils gained 11 seats from the Citrons and 15 seats from the Saffrons;
- the Saffrons gained 18 seats from the Citrons and 33 seats from the Jonquils.

Which one of the following pie charts, suitably labelled, shows the current state of the parties in the Xanthian Parliament?
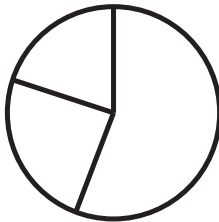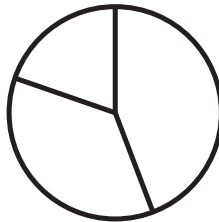
A   **B**   **C**

D   **E**

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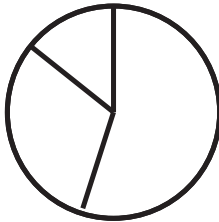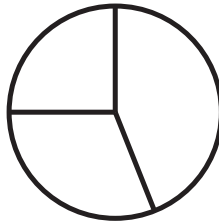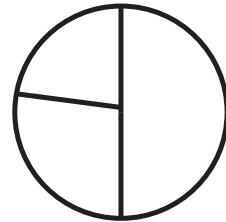
15 How did Earth get its water? It seems it had it all along. There are two possible sources for our water: either bombardment by meteorites soon after Earth's formation, or it was present in the dust from which our planet formed. So a team from the University of Glasgow looked at the ratio of heavy hydrogen – an isotope known as deuterium – and normal hydrogen in water trapped for 4.5 billion years in volcanic rock. They found little sign of deuterium, which rules out meteorites since they have much more of this isotope. Instead the water must have originated in the dust cloud from which the solar system, including Earth, condensed.

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

A Soil is either acidic or alkaline, but there are camellias growing here, which cannot tolerate alkalinity, so this soil must be acidic.

B Were the dinosaurs warm-blooded or cold-blooded? Obviously they were cold-blooded since they were reptiles and all reptiles are cold-blooded.

C A planet that is neither too hot nor too cold to support life is known as a 'Goldilocks planet'. Since many of these exist in the universe, there must be life on some of them.

D There are two possible ways to get to the airport, bus or taxi. A taxi will get you there faster, but since the bus is cheaper, most people travel by bus instead.

16 I have two credit cards, each of which has a four-digit PIN. Together the two PINs consist of eight different non-zero digits, whilst the four digits of each of them individually add up to 19.

Which non-zero digit does neither of the two PINs contain?

A 1

B 3

C 5

D 7

E 9

17   We often hear about childhood stars having breakdowns in later life. Celebrity gossip magazines regularly feature stories revelling in the decline of a once innocent and adored child actor into a troubled twenty-something going through painful relationship break-ups and battles with drug addictions. Their fate is inevitable given the moral bankruptcy of show business: the industry is steeped in sex, alcohol and drugs. Parents choosing to expose their children to these evils at such a vulnerable age must take the blame for their struggles with them in later life. Given the lasting damage, I would argue that it is actually child abuse to place a minor into such an environment. As part of our policy of child protection, it should be illegal to let your child work in show business.

Which of the following expresses a flaw in the above argument?

    1   Break-ups and mental breakdowns do not occur only to childhood stars; they can happen to anyone.

    2   Being adored as a child is not an adequate explanation for addictions or broken relationships in later life.

A   1 only

B   2 only

C   both 1 and 2

D   neither 1 nor 2

18 I need to do some baking for my son's birthday party. I am going to bake a chocolate cake and some chocolate biscuits, and then after that I would like to make some pancakes.

The ingredients required for each of these are as follows:

8 pancakes	1 chocolate cake	60 chocolate biscuits
100 g flour	225 g flour	400 g flour
2 eggs	330 g sugar	100 g cocoa powder
200 ml milk	85 g cocoa powder	200 g sugar
50 g butter	2 eggs	400 g butter
20 g sugar	250 ml milk	
1 lemon	150 g butter	

In my kitchen I have the following provisions available:

500 g tin of cocoa powder
12 eggs
600 g bag of sugar
5 lemons
2.5 litre carton of milk
600 g of butter
1 kg bag of flour

After baking the cake and making 60 chocolate biscuits, how many pancakes can I make with what I have left?

A   0

B   8

C   16

D   24

E   32

F   40

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Questions **19–22** refer to the following information.

A fifth of genomics papers between 2005 and 2015 contained errors in spreadsheets

A recent study in the journal *Genome Biology* looked at papers published in 18 genomics journals between 2005 and 2015, and found spreadsheet-related errors in 20% of articles that provided supplementary data alongside their text. Although the quality of the papers was not necessarily affected, such errors can create complications for other scientists trying to replicate or build on previous work. The charts and the table below summarise the findings.

% of papers with spreadsheet errors, 2005–2015

Supplementary files with gene name errors
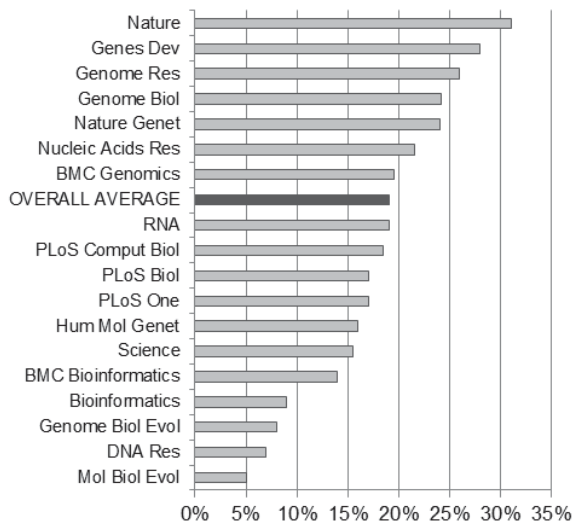
Number of papers affected per journal, 2005–2015

| Journal title	No. of papers affected
PLoS One	170
BMC Genomics	158
Genome Res	68
Nucleic Acids Res	67
Genome Biol	63
Genes Dev	55
Hum Mol Genet	27
Nature	23
BMC Bioinformatics	21
RNA	15
Nature Genet	9
Bioinformatics	6
PLoS Comput Biol	6
PLoS Biol	5
Mol Biol Evol	4
Science	3
Genome Biol Evol	2
DNA Res	2
Total	704
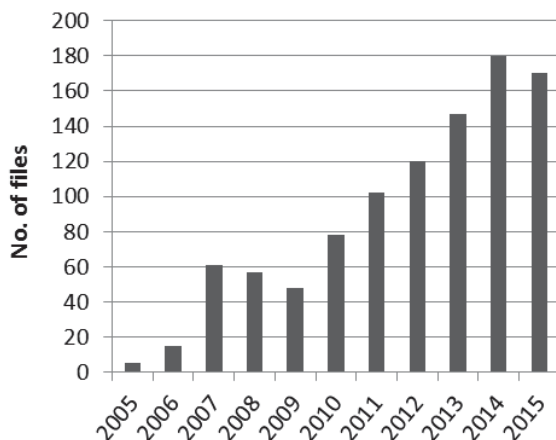
The syntax of genomics makes it particularly difficult for off-the-shelf software to digest. For example, spreadsheets often mistake gene symbols for dates. The authors found that Microsoft Excel would often interpret 'SEPT2', which corresponds to the gene Septin 2, as 'September 2nd'. Such hiccups can be quickly resolved, but they are easy to overlook.

The paper's most worrying finding is that mistakes seem to be proliferating. The authors found that the number of genomics papers packaged with error-ridden spreadsheets increased by 20% a year over the period, far above the 10% annual growth rate in the number of genomics papers published. If we extrapolate current trends indefinitely into the future, soon every spreadsheet attached to a genetics paper will have an error.

19 Which one of the following, if true, weakens the support that the data gives to the claim made in the headline?

    A   Scientific fields other than genomics do not have a similarly high prevalence of error-ridden spreadsheets.

    B   The study counted empty cells (which indicate that data is unavailable and are perfectly normal) as spreadsheet errors.

    C   The findings of the majority of papers observed in this study have been successfully replicated.

    D   New versions of Microsoft Excel allow the user to turn off the automatic conversion of entries like 'SEPT2' to dates.

20 Which of the following is supported by the information given?

    1   In 2015, at least half of the journals observed published a paper whose supplementary files contained spreadsheet errors.

    2   In 2011, the number of files with gene name errors was more than twice as high as in 2009.

    3   During the observed period, *Nature* published twice as many papers with spreadsheet errors as *BMC Bioinformatics*.

    A   1 only

    B   2 only

    C   3 only

    D   1 and 2 only

    E   1 and 3 only

    F   2 and 3 only

    G   1, 2 and 3

21 Consider the journals in which the proportion of papers affected was higher than the average.

What percentage of the total number of affected papers were published in these journals?

    A   40%

    B   43%

    C   52%

    D   63%

    E   66%

22 Suppose that 80% of all genomics papers published in 2015 were affected. Using the growth rates expressed in the last paragraph to make predictions about the future, what is the first year in which every genomics paper would be affected?

   A 2016

   B 2017

   C 2018
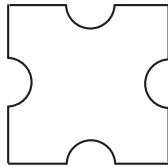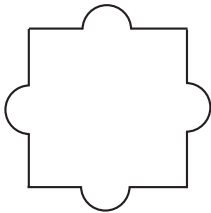
   D 2019

   E 2020

23   The following diagram shows how the pieces fit together in a child's 15-piece jigsaw puzzle:
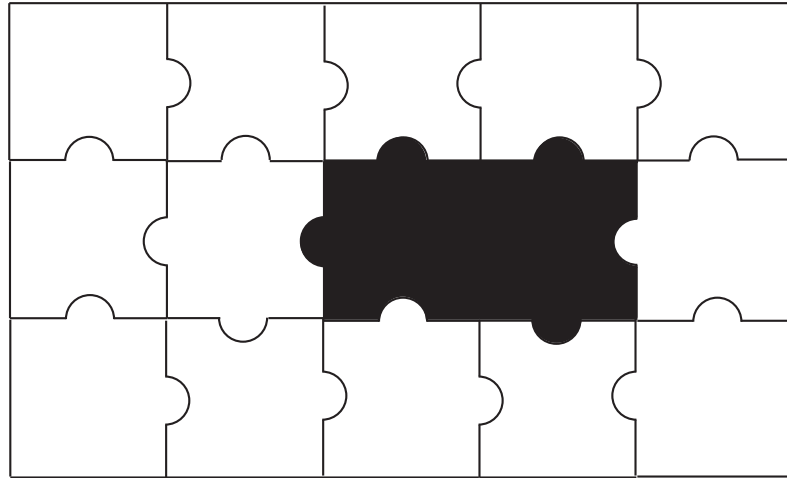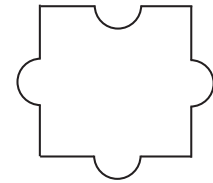
The area shaded in black indicates where two pieces are missing.

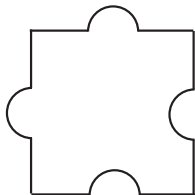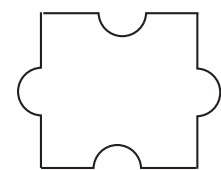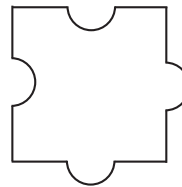Which one of the following pairs could be the missing pieces?
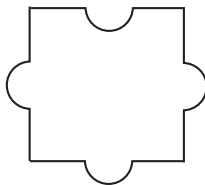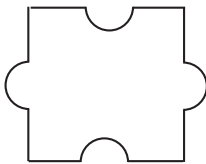
A

B

C

D

E

[Turn over
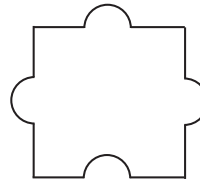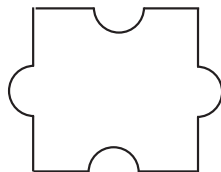
24 Two hundred years ago the average woman in a rich nation could expect to give birth to 8.5 children and to die around her fifty-fifth birthday. By 1920 the birth rate had halved to 4.2 children and women's life expectancy had risen to almost seventy years. We can conclude, therefore, that the heavy biological toll of childbirth on women means that the more times they give birth, the faster they age and the more likely they are to die early.

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

A It assumes that, historically, women were ignorant of the toll childbirth takes.

B It draws conclusions which relate only to women in rich nations.

C It fails to note falling infant mortality rates in the given time period.

D It implies that all women who have multiple pregnancies will die early.

E It fails to consider other factors that might have improved women's life expectancy.

25 A bus service runs between the towns of Restler and Soper. The average speed for one journey, including stops, is 30 kilometres per hour. Residents are beginning to move into a new housing development and the Restler–Soper bus service will be re-routed with extra stops. The buses will travel 4 kilometres further per journey than at present. The average speed, including stops, will be reduced by 3 kilometres per hour. The journey time will increase by 25%.

How far will the bus travel on its new route from Restler to Soper?

A 20 kilometres

B 22 kilometres

C 28 kilometres

D 32 kilometres

E 36 kilometres

26 Research about a 'health check' programme operated by the National Health Service (NHS) is receiving a lot of attention amongst UK health policymakers. The study found that the 'health checks', dedicated screening appointments offered to everyone in middle age, have uncovered thousands of cases of high blood pressure and other serious health risk factors not previously diagnosed in the people attending the appointments. Government officials have been especially keen to highlight the fact that this level of detection of such risk factors could equate to the prevention of over 2,000 heart attacks and strokes. The researchers did not, however, continue to monitor the health of the individuals identified to have the risk factors or track whether they went on to take the prescribed medications or make the other lifestyle changes recommended to them as a result of their 'health checks'.

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

A The cited research can be used to justify fully the resources spent on the 'health checks'.

B Screening programmes alone cannot influence people's health-related behaviours.

C The cited study does not prove conclusively that the 'health checks' have prevented over 2,000 heart attacks and strokes.

D More NHS resources should be used to monitor the long-term health outcomes of individuals.

E The 'health checks' would be even more effective if they were offered to people in other age groups.

27 Charlie is preparing plates of seafood salad for the lunchtime menu. She will put 50 grams of each of prawns, cockles, whelks, squid, and smoked salmon on each plate.

The prawns are available in 400 gram packs, the cockles, the whelks and the smoked salmon are available in 200 gram packs, and the squid is available in 300 gram packs.

All packs of each seafood item cost €4.08, but the wholesaler offers a deal of 'buy any two packs of one item and get another pack of the same item free'.

If Charlie orders the smallest number of packs to prepare whole plates of seafood salad and not have any of the seafood left over, what will be the unit cost per plate of seafood salad?

A €2.83

B €2.89

C €3.06

D €4.25

E €4.42

28 Police departments across the world should require the use of body-worn video cameras for their officers. Research has shown that filming police−public interactions can lower levels of violence within these encounters because the known presence of the camera encourages police officers to better regulate their own behaviour. While it is now common for bystanders to capture footage of police−public encounters on their camera phones or similar devices, police implementation of body-worn video cameras is preferable for a number of reasons. Chief amongst these reasons is the fact that police procedures for body-worn cameras require that an officer issue a clear warning from the start that everyone in an interaction is being filmed.

Which of the following are underlying assumptions of the above argument?

1 The level of force used by police in some interactions with the public exceeds that which is required by the situation.

2 It is now possible for police departments in different countries to agree on what levels of force are appropriate within police−public interactions.

3 In cases where police−public interactions have been filmed by bystanders, the individuals involved may not have been aware of the filming.

A 1 only

B 2 only

C 3 only

D 1 and 2 only

E 1 and 3 only

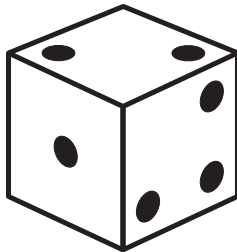**F** 2 and 3 only

G 1, 2, and 3

29 The total number of spots on any two opposite faces of conventional dice should always be seven.

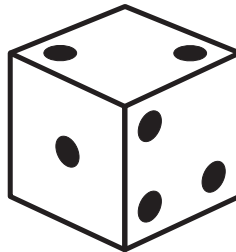Below are two views of a dice that has lost one spot from each of three of its faces.
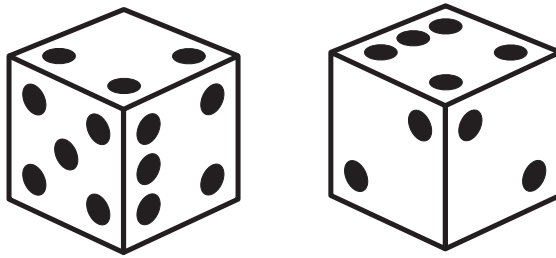
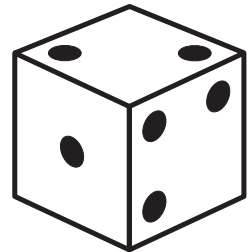Which one of the following is another view of the same dice?
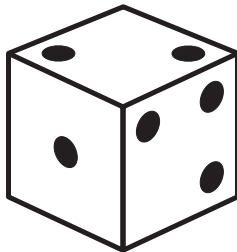
A

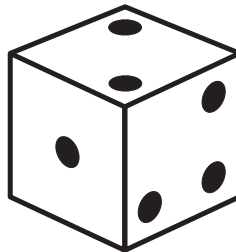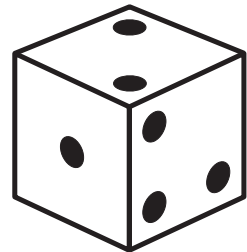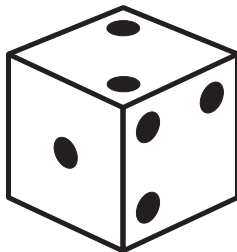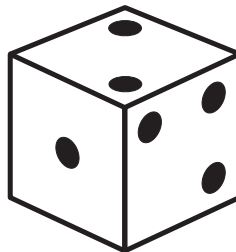**B**

C

D

E

F

G

H

[Turn over

30 Functional magnetic resonance imaging (fMRI) is a neuroimaging procedure that maps brain activity by detecting blood flow changes. One recent finding of fMRI research relates to variation amongst individuals with respect to patterns of connectivity across regions of the brain. People with strong brain region connectivity were found more likely to exhibit various 'positive' lifestyle traits, including high educational attainment and high levels of life satisfaction. People with weaker connectivity were more likely to exhibit 'negative' qualities, including higher levels of mental illness and substance abuse issues. A beneficial use of fMRI technology would be to conduct 'brain training' for those with weaker connectivity. If exercises were developed to help people learn to regulate their brain activity so that their brain connectivity was improved, they too could benefit from more 'positive' lifestyle attributes.

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

A It assumes that everyone considers high educational attainment levels to constitute a 'positive' lifestyle trait.

B It ignores the more critical health care needs that could be addressed through the use of fMRI technology.

C It assumes that just because 'positive' traits are associated with strong brain connectivity these traits are caused by the strong connectivity.

D It ignores the fact that some people whose brain connectivity has been damaged through injury are still able to lead productive lives.

31 Six friends are sitting around in a circle discussing which two sports each of them most likes to play.

The table gives the preferences of the friends sitting either side of, and opposite to, each member of the group:

name	favourite sports		
	friend sitting on left	friend sitting on right	friend sitting opposite
Amir	cricket and hockey	golf and rugby	hockey and snooker
David	football and snooker	cricket and rugby	football and golf
Eli	football and golf	football and snooker	cricket and rugby
George	hockey and snooker	cricket and hockey	golf and rugby
Jess	cricket and rugby	football and golf	football and snooker
Peter	golf and rugby	hockey and snooker	cricket and hockey

Jess discovers that each of the friends sitting either side of her shares one common interest with her.

Who is sitting opposite Jess?

A Amir

B David

C Eli

D George

E Peter

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Questions **32–35** refer to the following information.

The London Assembly is investigating how to prevent clogged roads from suffocating the capital

As the London Assembly transport committee investigates what the mayor and Transport for London (the local government body responsible for the transport system in Greater London) can do to reduce rising levels of road traffic congestion in London, bear in mind that the price of gridlock is not only paid in frustration and pollution. A Transport for London (TfL) analysis of vehicle delays on Greater London's roads during 2015 estimated the cost of congestion to London's GVA (Gross Value Added, the increase in the value of the economy due to the production of goods and services) to have been an astonishing £5.5 billion a year.

London's GVA for 2015 was £364 billion. The Centre for Economics and Business Research think tank put the cost to London's GVA of the six Underground strikes in 2015 at £10 million each. This was the most conservative calculation – others think it's higher – but even the Federation of Small Businesses estimate of £300 million is dwarfed by the cost of congestion.

In other words, congestion is doing major damage to the city's economy. And the frustration and pollution are adding to that cost because they make London less agreeable to function in. Speaking to the transport committee last week, Grant Davis, chairman of the London Cab Drivers' Club, spoke of more and more of his customers getting out of his taxi before reaching their destinations because his cab was stuck in traffic. Demand for the bus service has started to decline after years of increase because of slower speeds and worse reliability.

Construction works, the proliferation of private hire vehicles and delivery vans, the halving of the congestion charge zone and a long-term loss of road space to bus lanes have all contributed to the growth of the problem over the past two years. This follows a long period of general stability during which London has seen a big shift away from all forms of private transport, principally cars, towards public transport.

TfL's most recent annual Travel in London statistics show that 34 per cent of 'journey stages' in 2000 – the components of an excursion from one place to another – were undertaken on public transport compared with 43 per cent by private vehicles. By 2014, the public transport figure had risen to 45 per cent and the private transport figure had fallen to 32 per cent.

The pattern for 'trips' – entire excursions within London – has followed a similar trend. Just 28 per cent were taken by public transport (including taxis) in 2000 and 47 per cent by private vehicle. But by 2014 both measures were running at 37 per cent. All other journey stages and trips were done by bicycle (accounting for 1 per cent in 2000 and 2 per cent in 2014) or on foot.

Car ownership too has been falling, in marked contrast with the rest of England and Wales. So too has the volume of motor vehicle traffic in London as a whole according to both Department for Transport estimates of distances travelled in them and TfL's own traffic flow data. And yet, for all this progress, the plague of road congestion is now getting worse. The committee's investigation continues.

32 Which of the following could account for the increase in the problem of London's road congestion?

> **1** interventions to prioritise public transport
>
> **2** an increase in road works by utility companies

A 1 only

B 2 only

C both 1 and 2

D neither 1 nor 2

33 Using the most conservative estimate how many times greater than the cost of tube strikes was the cost of congestion to London's GVA in 2015?

A 3

B 11

C 18

D 55

E 92

34 Which of the following can be inferred from the information given?

> **1** The decline of car ownership in London has not reduced the capital's road congestion problem.
>
> **2** Converting traffic lanes into cycle tracks would make London's congestion problem better.
>
> **3** The problem of congestion in London is deterring people from using certain methods of public transport.

A 1 only

B 2 only

C 3 only

D 1 and 2 only

E 1 and 3 only

F 2 and 3 only

G 1, 2 and 3

35 In an attempt to reduce the loss from London's GVA, a proposal has been made to restore the original wider boundaries of the congestion charge zone. Which one of the following would explain why this proposal might not have the desired effect?

A Three hundred extra buses a day were run in the original wider congestion charge zone.

B The original wider congestion charge zone encompassed some of London's profitable retail areas.

C Some owners of luxury cars register their vehicles as mini-cabs to qualify for exemption from the congestion charge.

D The average length of traffic delay in the last year of the original wider congestion charge zone was the same as it had been before the charge's introduction.

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