BioMedical Admissions Test   4500/11

2022   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 20 printed pages and 4 blank pages.

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1 For centuries the Netherlands has battled with the dangers of water as most of the country lies below sea level. In 1953, nearly two thousand people were killed by flooding, a disaster on such a scale that it changed everything. Since then Dutch governments have consistently made flood prevention infrastructure a spending priority. There is a conviction that this is so important that it overrides political differences. While other countries may be good at rescuing stranded people by helicopter, or sending in armed forces to clear flood wreckage, the Dutch approach is always prevention. Now that so many huge coastal cities are threatened, the world needs to learn lessons from this small country. Since 1953, not one person in the Netherlands has died as a direct result of flooding.

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

A   For centuries the Netherlands has battled with the dangers of water.

B   The importance of flood prevention in the Netherlands has overridden political differences.

C   Governments of the Netherlands have focussed their efforts on prevention.

D   Prevention of flooding is always better than dealing with the consequences.

E   The world needs to learn lessons from the Netherlands.

2 Sarah drives to work each morning. On the way she passes through a busy junction with a set of traffic lights. One morning she stops behind a line of traffic just as the lights go red. She can see 14 cars between her and the red light. The red (stop) light will remain on for 42 seconds. The green (go) light will come on for just 10 seconds, and this will be enough time for 7 cars to get through the junction before the red light comes on again and the line of cars is brought to a stop.

How long will Sarah have to wait until she can go through the junction?

A   52 seconds

B   1 minute 34 seconds

C   1 minute 44 seconds

D   2 minutes 26 seconds

E   2 minutes 36 seconds

3 Yana only works in the restaurant in the evening if Saffiya is ill. Saffiya is not ill today, so Yana will not be working in the restaurant this evening.

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

A Zak only works hard when his exams are less than a month away. As the exams are due to be held in two weeks' time, Zak will be studying hard every day.

B Zara only stays at the Imperial when the Regency is closed. She is not staying at the Imperial now, so the Regency must be open.

C Maya will only take a flight if her mother can go with her. Maya's mother is fit to travel, so Maya will fly.

D Birds that migrate south in the winter return only when the weather in the north is warmer. This winter has been very mild so the birds will return sooner.

E James will not be travelling to England this year. He only travels to England when he has a wedding to attend and none of his friends are getting married this year.

4 Government legislation has proved very effective in reducing emissions from car exhausts. But exhausts are not the only source of air pollution linked to traffic. A recent study showed that particles from brakes, tyres and road surfaces actually made up about two thirds of all dangerous particulate matter from road transport. It is now time to legislate to impose lower speed limits in areas where there are high volumes of traffic.

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

A Lower speed limits will lead to a reduction in car exhaust emissions.

B There are no other sources of air pollution besides those caused by traffic.

C Air pollution is only a problem in areas where there is a high volume of traffic.

D If legislation has been effective elsewhere then it is likely to be effective in this case.

E Pollution from brakes, tyres and road surfaces is reduced when lower speed limits are imposed.

5 In many places, it is becoming increasingly popular to keep a hive of honey bees at home. This growth in hobby beekeeping is due in large part to public awareness of the environmental threats facing honey bees. The equally serious threats facing other species of bees and other insect pollinators are less widely appreciated. These species of wild pollinators are in decline due largely to the loss of flowering plants caused by urbanisation and intensive farming practices. When people introduce honey bees into their home gardens, they risk further impacting local wild pollinators by introducing additional competition for food sources. Moreover, honey bees are given an unfair advantage as beekeepers tend to supplement their food over winter when there are no flowers to provide nectar.

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

A Public information campaigns tend to focus more on the threats facing honey bees than on those facing wild pollinators.

B The hobby of keeping honey bees at home is not always ecologically beneficial.

C Only people with some expertise related to bees and other insects should be allowed to keep honey bee hives at home.

D Increasing the number of honey bee hives in people's home gardens is not likely to help reduce the threats faced by the honey bee.

E The flowers people plant in their gardens at home have little to no effect on the wellbeing of local populations of pollinating insects.

6 Julia has a job interview next week. To get there she will walk to the train station, take a train to Newtown and then get a taxi to her destination. Trains leave the station every half hour, starting at 07:00 and take 60 minutes to reach Newtown. It will take Julia 15 minutes to walk from her home to the train station. The taxi journey will take 20 minutes.

Julia needs to arrive at the train station 10 minutes early in order to buy a ticket. She will allow 15 minutes to walk from the platform at Newtown to the taxi rank.

The interview starts at 10:00.

What is the latest time that Julia can leave home to go to the interview if she is to arrive on time?

A 07:35

B 07:45

C 07:55

D 08:05

E 08:15

7   A café owner allows customers to create smoothies, by mixing various combinations of the three flavours: raspberry, blueberry and mango. The most popular smoothies consist of the following combinations:

| smoothie name	raspberry (%)	blueberry (%)	mango (%)
Mango Madness	35	35	30
Blueberry Twirl	10	70	20
Dawn Pink	60	25	15
Spring Garden	30	30	40
Sunset Red	70	15	15

A customer mixes 100 ml of 'Sunset Red' with 300 ml of 'Blueberry Twirl'.

What percentage of raspberry juice does the customer's smoothie contain?

A   10%

B   25%

C   40%

D   70%

E   80%

8 I play a game by rolling two dice. Both of my dice are quite old, and some of the dots have rubbed off. But when they were new, they were both conventional six-sided dice i.e. opposite faces add up to 7.

The result of my roll is as follows:
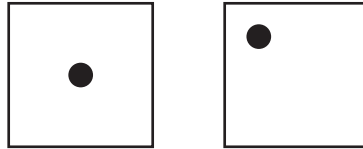
I work out my score by **multiplying** the values of the two faces showing, as represented by the numbers of dots that were showing on those faces when the dice were new.

Which of the following could **not** be my score?

A   8

B   9

C   10

D   12

E   20

9 These days, it is hard to escape the message that getting enough sleep is critical for the maintenance of mental and physical health. Too much of a good thing can be bad, however. When one examines the medical histories of people with chronic health conditions, a striking trend emerges. Those patients who sleep the most over a period of several weeks are also the most likely to die during that time. This finding holds true even when comparing patients in different age groups and with different diagnoses. Clearly, people – especially those in poor health – should be more aware of the real dangers of getting too much sleep.

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

A   It treats adequate sleep as the only thing needed to keep someone alive.

B   It assumes that just because we all need adequate sleep, every person needs to sleep for the same number of hours.

C   It assumes that just because people have a chronic health condition, they are more likely to die than people without a health condition.

D   It ignores the fact that people's sleep patterns vary over their lifetime.

E   It assumes that just because patients die following periods of more sleep, their deaths are caused by that amount of sleep.

10 Of all the changes shaping healthcare, the public information revolution is perhaps the most promising. The rise of the internet means that never before has so much health information been available to so many people. Social attitudes have changed so that more people are taking greater responsibility for their health instead of just relying on doctors to fix their problems. And experts are implementing findings from behavioural science research to craft effective messages about how to avoid 'lifestyle illnesses' (such as type 2 diabetes) through diet, exercise, and other practices. Simply put, given all the publicly available health information, people with access to that information no longer have any excuses for not preventing their own health problems, at least as far as 'lifestyle illnesses' are concerned.

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

A Doctors warn that online information is not a substitute for receiving medical care.

B Some people still do not have any access to the internet.

C There are financial and other obstacles that prevent many people from staying healthy.

D It is more difficult to design effective public health messages about genetic illnesses than about 'lifestyle illnesses'.

E Doctors are taking an increasingly active role in directing patients to the most reliable sources of health information online.

11 Despite a decades-old law requiring equal pay for equal work, pay discrimination against women remains widespread in the UK. The disparity is especially pronounced at senior levels, where male executives in sectors from business to academia to the media often earn significantly more than their female colleagues working in comparable roles. To finally put a stop to the unfair pay practices, greater transparency and accountability are needed. The job description and salary level of every executive or equivalent senior employee must be released as public information. After all, each of us plays a part in determining what kind of world we live in, and we should not fear sharing personal data when it is for the benefit of a fairer society.

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

A Everyone in good health should be willing to become a potential stem cell donor by signing up to a blood stem cell donor list.

B All elected government officials should agree to be interviewed by journalists.

C Those who can afford a subscription to an online streaming service should share their login details with those who can't.

D All individuals should allow their DNA to be kept in a police database in order to facilitate criminal investigations.

E Lawyers should encourage their clients to cooperate with the police rather than exercise their legal right to remain silent.

12 In preparation for a shopping trip with her mother, Maisy is counting the coins from her money box.

She sorts the coins into piles of £1 coins, 50p coins, 10p coins, 5p coins and 2p coins. She has two or more coins in each of the five piles, and finds that the total value of all of these coins is £5.75.

What is the lowest possible total number of coins in the five piles?

A 14

B 18

C 19

D 21

E 24

13 The table shows the prices of different packs of toy animals.

number of animals in pack	price for 1 pack	price for 3 packs
1	£1	–
3	£2	£5
6	£3	£8

Alice wants to buy some toy animals for her zoo.

What is the greatest number of animals that Alice can buy for £15?

A 25

B 27

C 30

D 31

E 33

14 The charts below show the number of customers served at a till in each hour while a store was open yesterday and the average amount spent by each of those customers during that hour.

customers served at till   average amount spent per customer
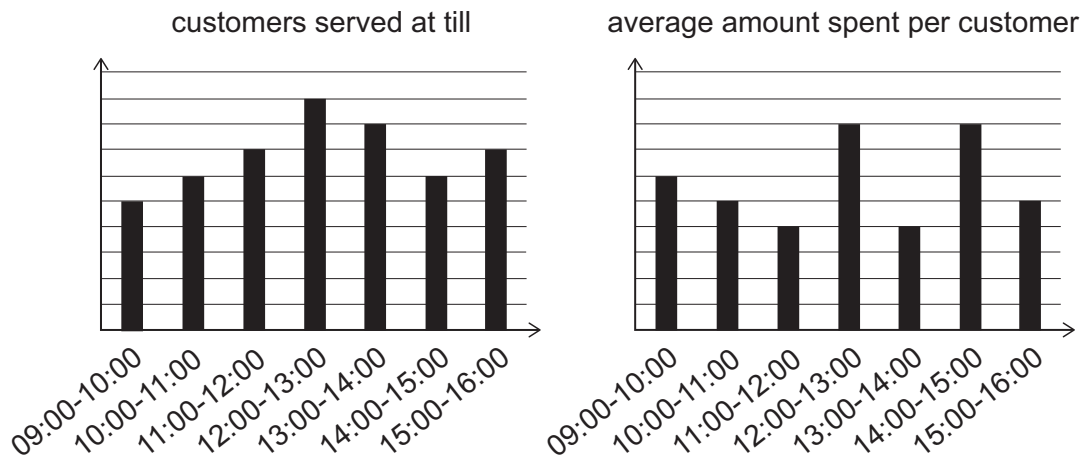
In which hour of the day was the **least** money taken in the store?

A   09:00-10:00

B   10:00-11:00

C   11:00-12:00

D   13:00-14:00

E   15:00-16:00

15 The field of 'brain training' – and the excitement surrounding it – is growing rapidly. There is much promise in the idea that training people via memory games and similar exercises can improve overall cognitive function. But this promise has yet to be truly substantiated by research conducted so far. The most convincing studies have shown training gains when it comes to very specific sorts of tasks, but it is unclear whether such improvements will carry over into real-world tasks outside of the lab. Investigations into the effects of 'brain training' also suffer from weaknesses common in other kinds of research. The studies claiming to show the greatest effects tend to test smaller numbers of participants without a control group that could guard against the placebo effect.

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

A There is a rapid growth both in the field of 'brain training' and in the interest that it attracts.

B Research thus far has failed to convincingly validate the promise of 'brain training'.

C It is unclear if lab-based cognitive gains from 'brain training' translate into improvements in real-world tasks.

D The weaknesses of investigations into the effects of 'brain training' are common to many other kinds of research.

E The 'brain training' studies claiming to show the biggest improvements use smaller numbers of participants.

16 Everyone knows that the UK National Health Service (NHS) is severely overstretched. The problem is made worse by inappropriate use of Accident and Emergency (A&E) departments. Data from a new study shows young adults are bypassing their family doctor and heading straight to busy A&E departments, not because their problem is an emergency, but because they can't get family doctor appointments at suitable times. A stark generational divide in the way people use the NHS is highlighted. People aged 18 to 34 are more than twice as likely to attend A&E departments as those aged 55 and over – and they are far less likely than older people to be able to see a family doctor when it is convenient for them.

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

A Fewer people aged 55 visit A&E departments than people aged 18 to 34 years.

B Expectations of what the NHS can provide are now unrealistically high.

C Extending the opening hours of family doctors would help to relieve the pressure on A&E departments.

D A&E departments should refuse to see patients whose problem is not urgent.

E Young people are expecting to be able to see a doctor exactly when it suits them.

17 The UK Meteorological Office is set to spend £1.2 billion on a world-leading supercomputer to improve their weather predictions. The installation will need a massive supply of electricity, so a European country with low-cost geothermal or hydropower sources of energy may be chosen as its location. The project will be particularly beneficial to the agencies that work to protect us from flooding. We know that extreme weather events can be sudden, making them difficult to respond to in an appropriate and timely way. Accurate, localised forecasts can ensure that response resources are directed appropriately and sufficiently. Given the rate at which global warming is accelerating, the benefits of this supercomputer will soon exceed the staggering start-up costs.

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

A The UK currently lags behind other countries in the accuracy of its weather predictions.

B Geothermal or hydropower sources of energy are not available in the UK.

C Flooding is the major climate-change challenge facing the UK.

D The UK currently has the financial capacity to afford the supercomputer.

E Extreme weather events are more likely as the Earth's temperature increases.

18 A concert venue holds 14 000 people. There are three types of ticket: standing, seated, and VIP. 60% are standing tickets, 30% are seated tickets, and the remainder are VIP tickets. The charges are normally £20 for standing tickets, £30 for seated tickets and £50 for VIP tickets. At present, the seated area is unavailable due to refurbishment and for tonight's concert, to compensate for the disruption, the tickets will be £15 for standing tickets and £40 for VIP tickets.

All of the available tickets for tonight have been sold. What is the total income for tonight?

A £182 000

B £238 000

C £308 000

D £350 000

E £364 000

19 There were 60 episodes of my favourite TV show. After it finished, 20 DVDs were released, each containing 3 episodes. DVD 1 contained episodes 1, 2 and 3, DVD 2 contained episodes 4, 5 and 6, etc.

I bought all 20 DVDs, but I have since lost DVDs 7, 16 and 19.

The collection has recently been reissued, this time as 12 DVDs, with DVD 1 containing episodes 1, 2, 3, 4 and 5, DVD 2 containing episodes 6, 7, 8, 9 and 10, etc.

I am keen to make sure that I have all the missing episodes, but I don't want to buy more of the new DVDs than necessary.

How many of the new DVDs will I buy?

A 2

B 3

C 4

D 5

E 6

20   The numbers of sales made by each of the employees of a company for Monday, Tuesday and Wednesday are shown in the bar chart below.

sales per day

■ Monday   ☐ Tuesday   ▨ Wednesday
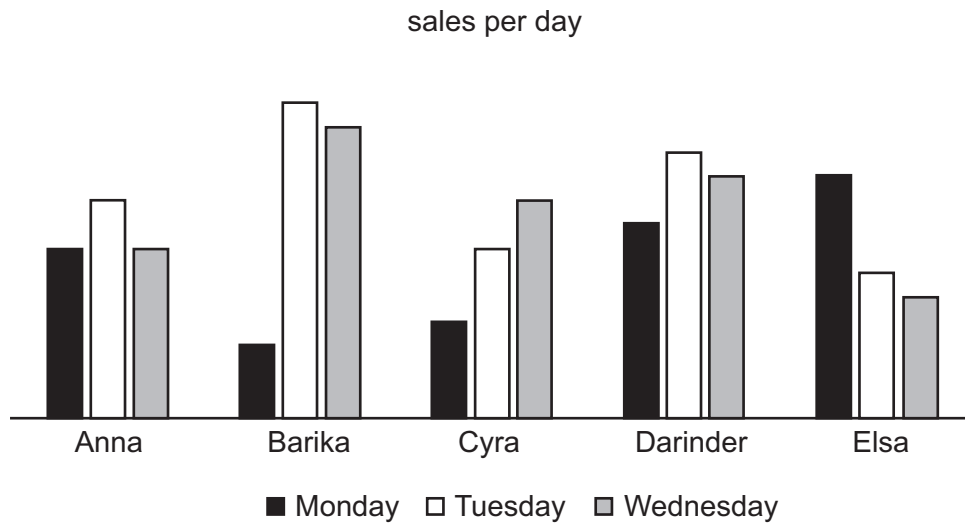
At the end of each day the employees are ranked in order of the number of sales made that day.

Which employee was ranked in the same position on all three of the days?

A   Anna

B   Barika

C   Cyra

D   Darinder

E   Elsa

21 The case for veganism as a solution to the world's environmental concerns is problematic. The synergy between livestock and crop production farming fosters biologically rich, fertile soils through grazing and application of farmyard manure, and reduces the need for agrichemicals to be used on croplands. Globally, soils have been depleted of organic matter, biological life and carbon stores by intensive agrichemical-dependent agriculture. Much plant-based food is produced this way. Additionally, in 'Veganuary' last year – an annual worldwide challenge in which meat-eaters try a vegan diet for a month – imports of many of the key vegan sources of protein, fats and oils increased, adding to environmentally damaging emissions.

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

A The key vegan sources of protein, fats and oils can only be grown in large quantities in a few countries.

B Nutrients found in red meats are vital for children's development.

C New methods are being developed to allow the production of plant-based foods which do not deplete soils in the ways described.

D Livestock farming will become more environmentally damaging per unit of food produced if overall demand diminishes.

E It would take many years to reverse the depletion of the soils that has already taken place.

22 Social scientists are interested in the factors that influence human behaviour. As such, they look at things like criminal or violent or antisocial actions and try to explain what the factors were that led the person to behave that way. Such analysis is invariably enlightening. Yet a danger soon arises, in that the action being investigated can begin to look as though it was entirely explicable, and a clear scientific explanation can be given for something that is essentially inexcusable. It is important to remember that just because an action can be explained or understood, it does not mean it is therefore justified. Simply establishing the causes involved does not exonerate the individual from the act they committed.

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

A Being able to explain some of the causes of global warming does not necessarily mean you think everything should be done to halt it.

B You cannot use a person's sense of what is morally right or wrong when trying to explain their behaviour.

C The fact that one party in a dispute had a strong sense of grievance does not necessarily mean they were the innocent party.

D A lawyer should not agree to defend someone they believe to be guilty of a crime even if they are able to explain clearly why the person committed it.

E The Police Commissioner should not excuse his officers for ignoring petty crime because of their excessive workload.

23 The benefits that they bring in reducing emissions have made them symbols of environmental friendliness, but electric cars are making environments increasingly unfriendly to pedestrians. The fact that they make considerably less noise increases the chance that pedestrians will step out into the road in front of them. Additionally, the new charging points that we are increasingly seeing on pavements are an obstacle to pedestrians. We should suspend the production of electric cars until these issues have been resolved.

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

A Walking is more environmentally friendly than using any type of car.

B The noise generated by cars currently using the roads is not a significant concern.

C A solution to the problems that electric cars cause for pedestrians will be found in the near future.

D It will not be possible to develop electric cars that charge through the use of solar panels.

E The dangers to pedestrians are more significant than the environmental benefits brought by electric cars.

24 Exactly 27 identical little cubes can be put together to make one larger solid cube with a volume of 216 cubic centimetres.

What is the tallest tower that can be made with one third of the little cubes?

A 9 cm

B 12 cm

C 18 cm

D 24 cm

E 54 cm

25 A village hall runs a small lending library which opens only on Saturdays. There are 80 members, each of whom may borrow up to four books at a time, which they may keep for three weeks. Members never overrun the three week time limit. After the annual stock-take, for which all books were returned, the library has 2000 books. On the next three Saturdays 120, 80, and 60 books are borrowed respectively.

What is the smallest number of books that could be left in the library after the fourth Saturday?

A 1420

B 1540

C 1680

D 1740

E 1800

26 A cube with painted triangles on some of the corners of its faces is shown below in two different positions.
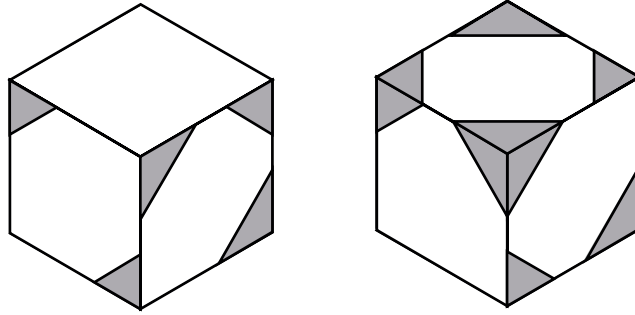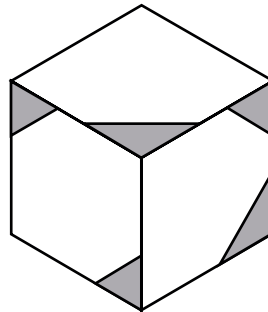

No two faces on the cube are painted in exactly the same way.

Which one of the following could **not** be a different view of the same cube?
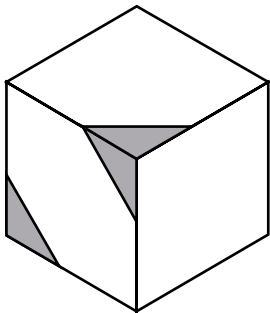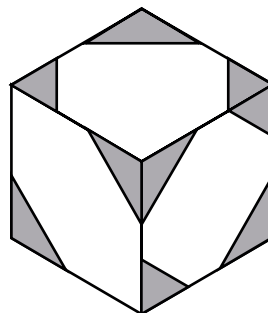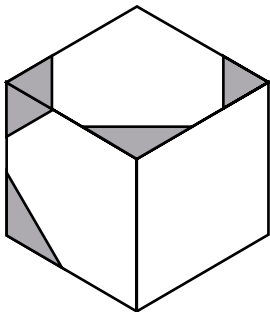
A
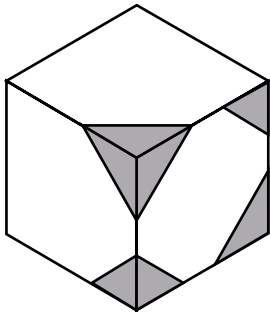
B

C

D

E

27 Are you a young person thinking of starting your own business, inspired by stories of youthful yet highly successful entrepreneurs? If so, you might want to consider waiting until you are older. A recent study found the mean age of the entrepreneurs behind the 1000 fastest growing new ventures to be 45 years. This is actually not surprising, when you think about it. People tend to accumulate resources, skills and experience with age, all of which boost their chances of entrepreneurial success. Although conventional thinking tends to paint the young generation as uniquely creative innovators, and insists that in order to be a successful entrepreneur you have to start young, it would seem that older generations are in fact more likely to possess the actual traits required to be a successful entrepreneur.

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

A Not all skills acquired over the course of one's life stay relevant as working environments change.

B The average age at which the successful entrepreneurs started their first business was 25.

C People's cognitive skills sometimes begin to decline when they reach their forties.

D More than half of the ventures that failed last year had been launched by people over 40.

E According to many business analysts, luck frequently plays a major role in determining whether or not a given business takes off.

28 Karl is racing against Frank. The race is run over a distance of 800 m.

In the first race, Karl allows Frank to start 5 seconds before him, but still completes the race 3 seconds before Frank.

In the second race, they start to run at the same time, but Karl allows Frank to start 100 m ahead of him on the track, so Frank only has to run 700 m. Frank completes this race 4.5 seconds before Karl.

In the third race, they again start to run at the same time and Karl allows Frank to start 40 m ahead on the track.

Karl runs each race at the same constant speed. Frank runs slower but at the same constant speed for each race.

What is the outcome of the third race?

A Karl finishes the race 3 seconds before Frank.

B Karl finishes the race 0.5 seconds before Frank.

C They finish the race at the same time.

D Frank finishes the race 0.5 seconds before Karl.

E Frank finishes the race 3 seconds before Karl.

29 It's often said you shouldn't treat people simply as statistics, but instead as individuals, each with their own complex feelings and concerns. But perhaps treating people purely statistically is – on a large scale – the most moral way to treat them. In treating people as statistics, you automatically give everyone's life an equal value. If we start thinking about who these people are, and what their interests or desires are, then we are liable to start making distinctions between them, seeing some as 'better' than others, or more deserving in some way. But as soon as we start making such distinctions, we are departing from the most important moral principle: that each human life should be granted equal consideration. Such a departure would itself be immoral.

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

A You shouldn't treat people simply as statistics, but instead as actual people with feelings and concerns.

B Treating people purely as statistics is – on a large scale – the most moral way to treat them.

C By treating people as statistics you automatically give everyone's life an equal value.

D The most important moral principle is that each human life should be granted equal consideration.

E We start to act immorally ourselves if we depart from the principle of equal consideration.

30 Rainbows School has 18 classrooms. Each room will be painted in one of the seven colours of the rainbow. For each of the seven colours, there will be at least two rooms painted in that colour. Painting each room will require 1 tin of paint.

The cost of a tin of paint varies according to the colour, as shown in the table.

colour	cost per tin	special offers
red, blue or yellow	£20	2 tins of the same colour for £36
orange, green or indigo	£22	buy 3 tins of the same colour and get a 4th tin of the same colour for £2
violet	£24	buy 2 tins and get a 3rd violet tin free

What is the least possible cost of the 18 tins of paint needed to paint all the classrooms?

A £332

B £334

C £336

D £340

E £344

31 The vehicle must pass all of the tests in order to receive its annual safety certificate. There is one test left and all of the tests so far have been passed, so if the final test is passed then a safety certificate will be issued.

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

A You can only start the game if you have 20 players. Since only 19 are here at the moment, you need another person to arrive in order to start.

B Any team that wins 10 matches of the 12 that they play in total will win a prize. You have won 9 of your 11 matches so far, so if you win the final match you will get a prize.

C You cannot claim your free book unless you collect all of the tokens from the newspaper this week. You have all the tokens so far, so if you collect the token from tomorrow's paper you will be able to claim your book.

D If you get 10 penalty points on your driving licence then you have to pay a fine. You currently have 9 points, so the next time you get a penalty point you will be fined.

E Your father told you that he needed all of the items on the list in order to make the cake. You have everything except the eggs. If you don't buy the eggs then you won't be able to have the cake.

32 The drawing below shows five blocks. Some of the blocks can be fitted together.
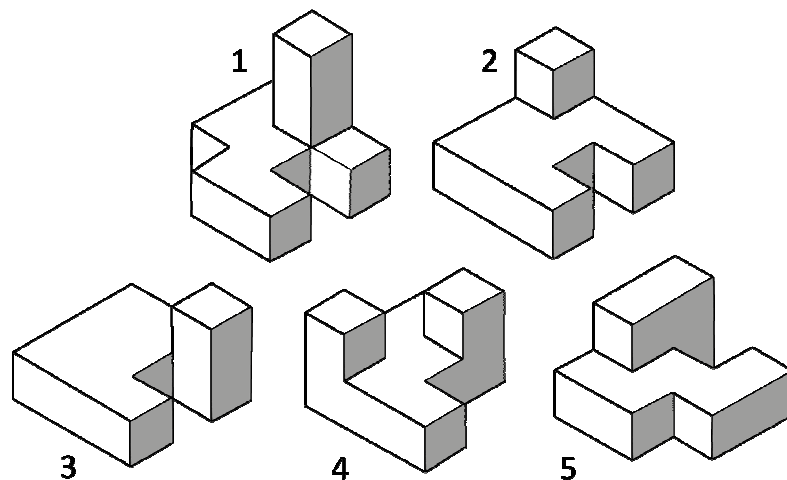
Which two shapes, together with shape 1, will fit together to make a perfect cube?

A blocks 2 and 3

B blocks 2 and 5

C blocks 3 and 4

D blocks 3 and 5

E blocks 4 and 5

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