

BioMedical Admissions Test

Introductory Test

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|------------------|--|-------------------|
| SECTION 1 | Aptitude and Skills | 20 minutes |
| SECTION 2 | Scientific Knowledge and Applications | 10 minutes |
| SECTION 3 | Writing Task | 30 minutes |

Instructions

Please read this page carefully, but do not open the question paper until you are ready to start.

It is recommended that you do not look at the answers to Sections 1 and 2 until you have completed all three sections of this paper.

Speed as well as accuracy is important on Sections 1 and 2, and you are advised to ***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 the questions. Unless otherwise stated, all questions are worth one mark.

The Writing Task in Section 3 provides an opportunity for you to

- select, develop and organise ideas and
- communicate them effectively in writing.

Before you begin writing, think carefully about what you need to say and the ways in which the organisation and layout of your response might help convey your message. Diagrams etc. may be used if they enhance communication.

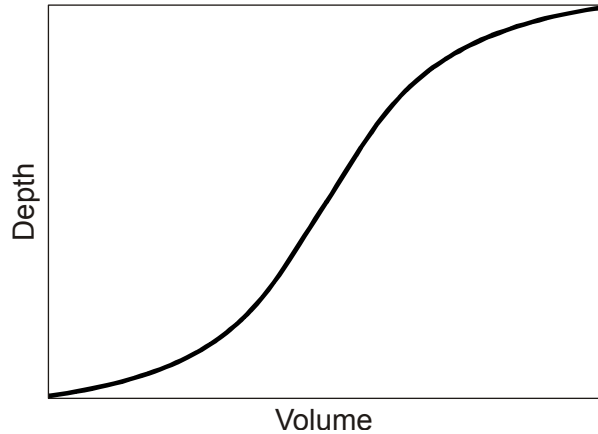
Take care to show how well you can write and be concise, clear and accurate.

Any rough work should be done on this question paper.

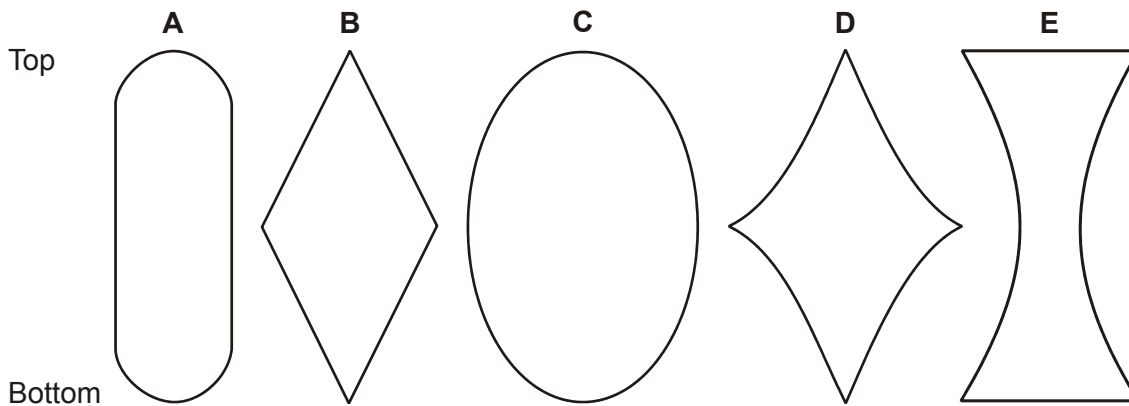
Calculators and dictionaries should NOT be used.

SECTION 1 Aptitude and Skills 20 minutes

- 1 A farmer has an underground water tank which he decided to calibrate by adding known volumes of water and measuring the depth using a dip-stick. His calibration graph is shown below. The horizontal cross section of the tank is circular at all points.



Which **one** of the following shows a possible vertical cross sectional shape of the tank?



- 2 'The UK government wishes to increase the number of young people from poorer families entering university education. However, it has recently changed the way in which it provides financial support for students. Whereas it used to provide grants that the student did not need to repay, it now provides loans that the student must repay when he or she enters employment. Research shows that students from poorer families are more likely to be deterred from going to university by the prospect of debt.'

Which **one** of the following is an inference that can be drawn from the passage above?

- A Students from poorer families are less interested in entering university.
- B Universities will not be willing to help meet the government's target.
- C The government's action is likely to deter poorer students from going to university more than richer.
- D The prospect of debt is a deterrent to all students, not just the poorer ones.
- E Maintenance grants were too expensive for the government to fund.

- 3 Doctors in Great Britain can work for the public health service, a commercial service, or both. 30% of doctors in Great Britain work, at least some of the time, for the commercial sector. On the basis of this information alone, deduce which of the following statements are true of doctors in Great Britain.

- 1 Some doctors work only in the public health service.
- 2 More doctors work in the public health service than the commercial sector.
- 3 Some doctors spend more time on commercial work than in the public health service.

- A 1 only
B 2 only
C 1 and 2 only
D 2 and 3 only
E 1, 2 and 3

- 4 At the end of daylight saving time, when clocks should be put back one hour, Julie puts hers forward one hour by mistake. Her friend Clare completely forgets about it and leaves hers unchanged. They had arranged to meet at 11 am the following day.

If neither realises her mistake before going to keep the appointment, what will happen?

- A Julie arrives 2 hours after Clare
B Julie arrives 1 hour after Clare
C They arrive at the same time
D Julie arrives 1 hour before Clare
E Julie arrives 2 hours before Clare

- 5 'The use of animals for experiments for medical research has been criticised by many animal rights campaigners as morally wrong. Some campaigners use extreme tactics to gain public attention. But they ignore the many benefits which advances in medicine have for animals themselves. The development of antibiotics, for example, has helped animals as well as humans. If the animal population as a whole derives benefit from experiments on only a small minority of animals, those experiments are morally acceptable.'

Which of the following expresses the conclusion of the above passage?

- A Animal rights are less important than human rights.
B Animals benefit from the results of experimentation.
C There is clear moral justification for all animal experiments.
D Only those experiments that benefit animals as well as humans are acceptable.
E The use of animals for experiments in non-medical research is morally wrong.

- 6 An open cylindrical container made from sheet metal of uniform thickness has a mass of 800 g. When completely filled with water the total mass is 15.6 kg.

What would be the total mass of a cylindrical container full of water made from the same sheet metal (of the same thickness) but with double the diameter and double the height?

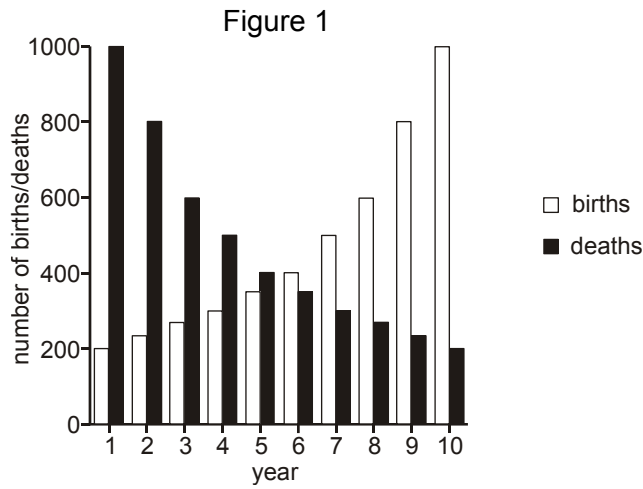
- A 118.4 kg
- B 121.6 kg
- C 124.8 kg
- D 128 kg
- E 131.2 kg

- 7 'Increases in blood pressure associated with old age are endemic in developed countries, but are rarely seen in underdeveloped countries where people tend to maintain a high level of physical activity throughout their lives. At the other end of the age-range, obesity and diabetes are more common among young people in developed countries, where largely sedentary lifestyles give limited opportunity for exercise.'

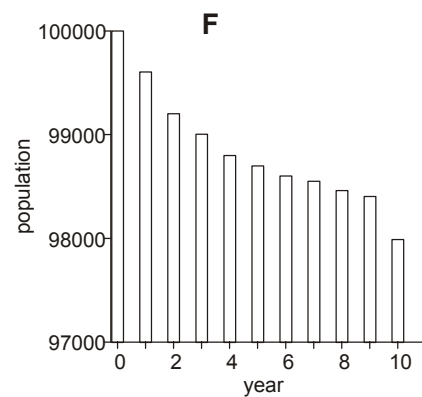
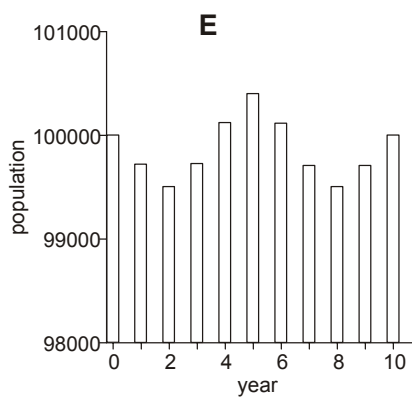
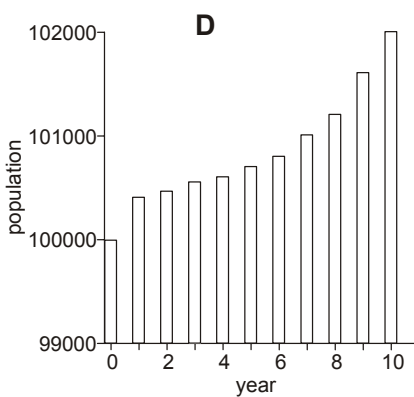
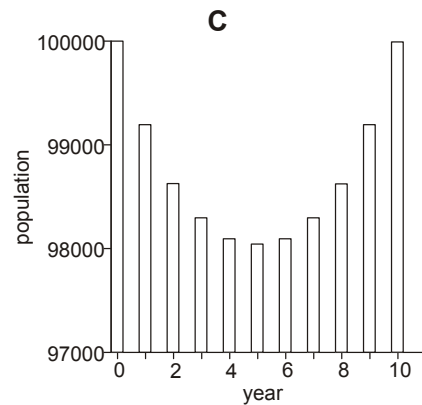
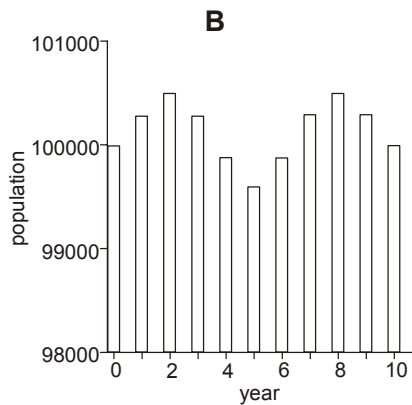
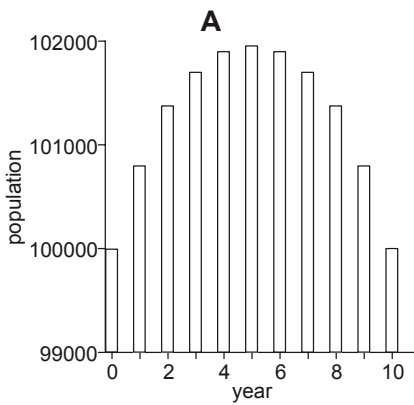
Which one of the following can be drawn as a conclusion from the passage above?

- A Further gains in longevity in developed countries will not be achievable without a change in lifestyle.
- B People who do not take sufficient exercise will suffer from obesity and diabetes.
- C People gain no benefit from physical activity unless it continues into old age.
- D Lifelong exercise is associated with maintaining good health.
- E Young people are more affected by lack of exercise than old people.

- 8 Figure 1 shows the number of births and deaths recorded during each year, over a ten-year period on an island. The total population at the start of the ten-year period was 100 000 people.



Assuming there is not any immigration or emigration on the island, which of the following shows the total population over the ten-year period?



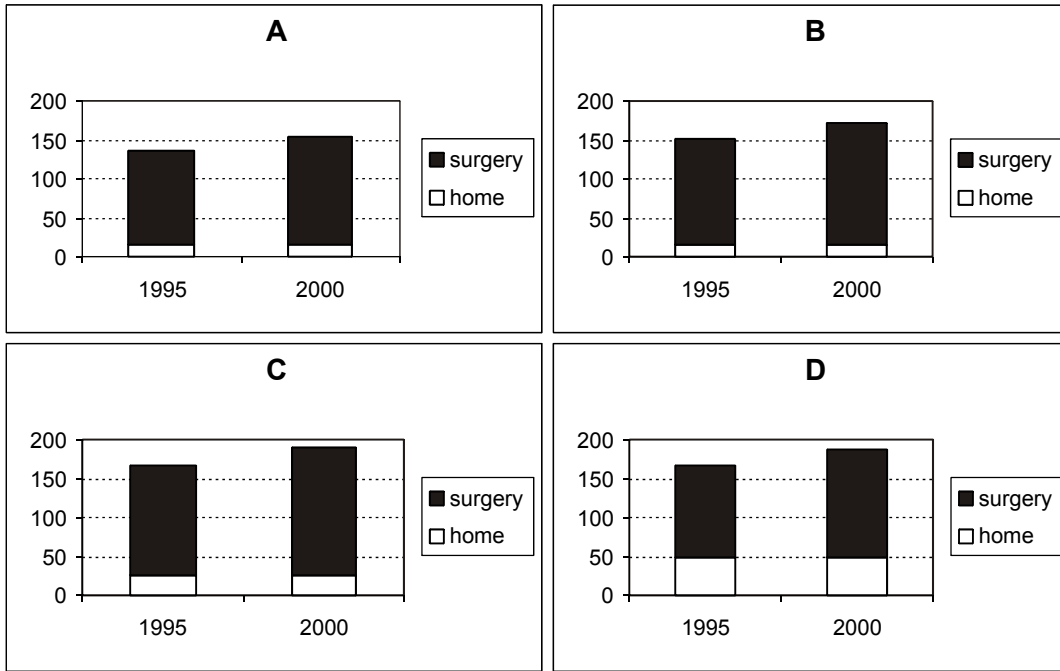
Questions 9 to 12 refer to the following information:

The table below shows statistics for consultations by family doctors in the country of Santesia for the years 1995 and 2000. Santesia has a population of approximately 10 million and there are 5000 family doctors (these figures have not changed significantly over the five years between the two surveys).

| | 1995 | 2000 |
|--|------|-------|
| Average number of surgery sessions a week | 8.5 | 8.4 |
| Average length of a surgery session (min) | 140 | 165 |
| Average length of a consultation (min:sec) | 9:59 | 10:00 |
| Average time spent on home visits a week (min) | 408 | 412 |
| Average length of a home visit (min) | 25.5 | 25.0 |
| Average number of patients seen per week | 135 | 155 |

- 9 To the nearest hour, how many hours a week did the average family doctor spend on surgery and home visits in 1995?
- 10 If the doctors work for 50 weeks per year, approximately how many times did the average patient see their family doctor in 2000?
- A 2
- B 3
- C 4
- D 8
- E 13
- 11 Which **one** of the following contributed most to the rise in numbers of patients seen per week between 1995 and 2000?
- A average length of a surgery session
- B average length of a consultation
- C average time spent on home visits per week
- D average length of a home visit

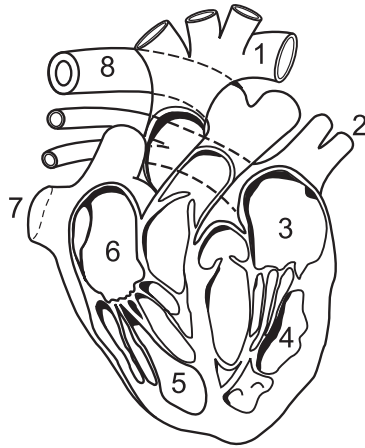
- 12 Which **one** of the following bar charts best represents the average numbers of patients seen per week in home and surgery consultations during the two years?



END OF SECTION 1

SECTION 2 Scientific Knowledge and Applications 10 minutes

- 1 The diagram shows a view from the front of a section through the heart and associated blood vessels.

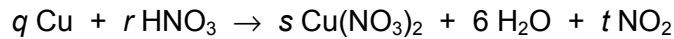


Which sequence of numbers shows the course of blood flow from the point of entry to the heart from the lungs, to its eventual exit from the heart to supply the lungs?

- A 2 → 3 → 4 → 8 → 1 → 5 → 6 → 7
 B 2 → 3 → 4 → 1 → 7 → 6 → 5 → 8
 C 7 → 6 → 5 → 8 → 2 → 3 → 4 → 1
 D 7 → 6 → 5 → 1 → 8 → 4 → 3 → 2
 E 8 → 5 → 6 → 7 → 2 → 3 → 4 → 1
 F 8 → 5 → 6 → 7 → 1 → 4 → 3 → 2
- 2 Which **one** of the following is **not** equal to volts?

- A $\frac{\text{joules}}{\text{coulombs}}$
 B amperes \times ohms
 C $\frac{\text{watts}}{\text{amperes}}$
 D $\sqrt{\text{watts} \times \text{ohms}}$
 E $\sqrt{\frac{\text{watts}}{\text{coulombs}}}$

- 3 The equation summarises the reaction of copper and dilute nitric acid.



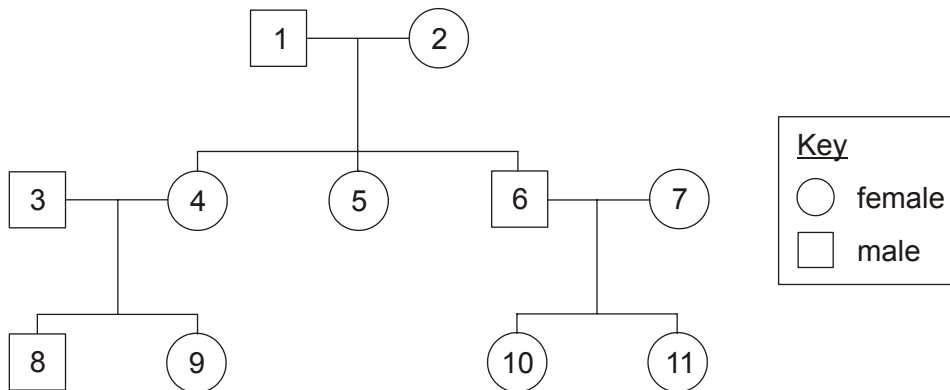
What values of q , r , s and t are needed to balance the equation?

- 4 The mass of an atom of uranium is 4×10^{-25} kg.

What is the mass, in milligrams, of 8 million atoms of uranium?

- A 3.2×10^{-18}
 B 3.2×10^{-17}
 C 3.2×10^{-16}
 D 3.2×10^{-15}
 E 3.2×10^{-12}

- 5 The diagram shows a family tree.



The grandfather, individual 1, carries a recessive allele on his X chromosome. Which other individuals could have inherited this allele?

- A 3,4,5,6
 B 3,4,5,7
 C 4,5,6,8
 D 4,5,8,9
 E 5,8,9,10
 F 6,8,9,11

- 6 In the citric acid cycle, succinic acid, $C_4H_6O_4$, is converted into fumaric acid, $C_4H_4O_4$.

This is an example of which one of the following chemical changes?

- A oxidation
- B reduction
- C neutralisation
- D dehydration

- 7 Three of the characteristic phenomena demonstrated by waves are reflection, refraction and diffraction.

How many of these phenomena cause the frequency of the wave to change?

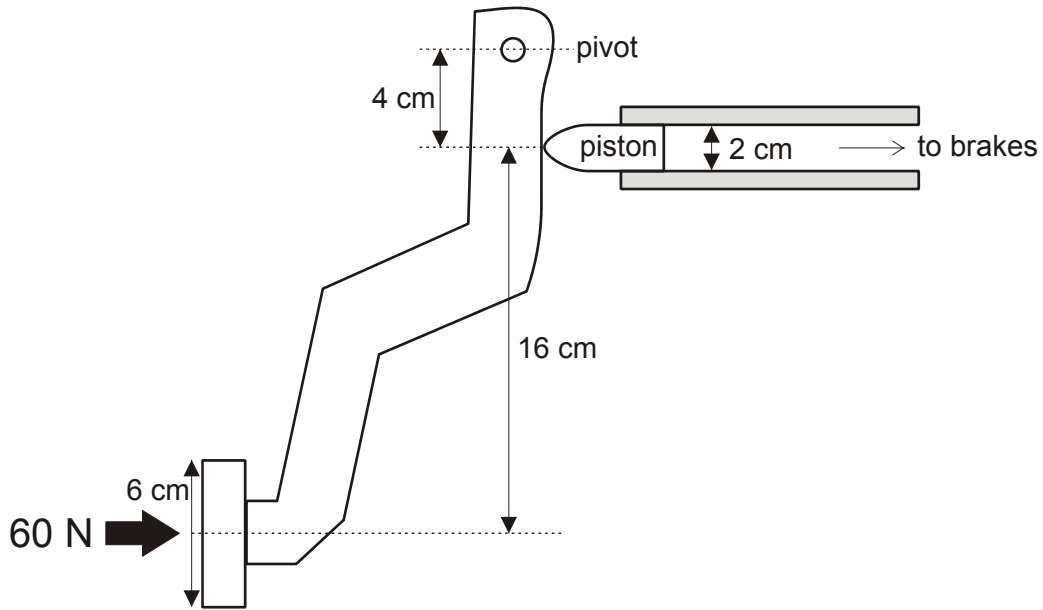
- A 0
- B 1
- C 2
- D 3

- 8 An oxide of tungsten contains 79.31% by mass of tungsten.

What is the formula of this oxide? (relative atomic masses: O = 16; W = 184)

- A WO
- B WO₂
- C WO₃
- D W₂O₃
- E W₃O₄

- 9 The diagram shows a simplified version of the brake pedal of a car.



A driver applies a force of 60 N to the pedal. What force is applied to the piston?

- A 15 N
- B 20 N
- C 180 N
- D 240 N
- E 300 N
- F 540 N

END OF SECTION 2

SECTION 3 Writing Task 30 minutes

Our genes evolved for a Stone Age life style. Therefore, we must adopt Stone Age habits if we are to be healthy.

Write a unified essay in which you address the following:

Explain the logical connexion between the two sentences.

What might be the practical implications if we were to agree with the reasoning?

Discuss the extent to which the argument is valid.

END OF SECTION 3

Disclaimer

The opinions expressed in this paper are not to be taken as the opinions of the University of Cambridge Local Examinations Syndicate (UCLES) or any of its subsidiaries.