PSYCHOLOGICAL and BEHAVIOURAL SCIENCES ADMISSIONS ASSESSMENT

SPECIMEN PAPER   80 minutes

SECTION 1

INSTRUCTIONS TO CANDIDATES

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

This paper contains **three** parts, **A, B,** and **C**.

All candidates should complete **Part A** Thinking Skills (22 questions).

All candidates should then complete **one** further part chosen from:

Part B	Mathematics and Biology (30 questions)
Part C	Reading Comprehension (24 questions)

A separate text booklet is provided for **Part C**.

You are advised to spend 40 minutes on **Part A** and 40 minutes on your chosen part.

There are no penalties for incorrect responses, only marks for correct answers, so you should attempt all of the questions in your **two** parts.

Questions ask you to show your choice between options. Choose the **one** option you consider correct and record your choice on the separate answer sheet. If you make a mistake, erase thoroughly and try again.

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

Please complete the answer sheet with your candidate number, centre number, date of birth, and name.

You can use the question paper and text booklet for rough working. Only your responses on the answer sheet will be marked.

Dictionaries and calculators may NOT be used.

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

This question paper consists of 50 printed pages and 2 blank pages

PV1

Paper content

PART A Thinking Skills

1   If people go to a foreign country, they should try to learn at least some of the language of that country because, whilst it is difficult to pick up a good command of a foreign language in a short time, learning just a little of a foreign language helps you to find out more about the country itself, and its people's customs and mannerisms. As well as this, it means that you can function more easily by being able to ask for directions or just by being able to order what you want at a restaurant, which is much less embarrassing than pointing and arm-waving.

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

A   It is easier to function in a country if you have learnt the language of that country.

B   You will find out more about a country if you learn the language of that country.

C   It is difficult to learn a foreign language in a short time.

D   When people visit a foreign country they should try to learn some of the language.

E   Speaking a foreign language is easier than having to use sign language.

2   Two neighbours work for the same company and share the journey to work, driving alternately in strict rotation. They work Monday to Friday each week and every other Saturday. They always work the same Saturdays as each other.

What is the maximum number of days either of them has to drive in a calendar month?

A   11

B   12

C   13

D   14

E   15

3 In the UK 45% of the workforce is female, but the percentage of women in senior positions, both in the professions and in business, is considerably lower. This is unfair to women, and also bad for the economy, in that those who are promoted to senior positions may not be the most able. Women may be discouraged from seeking promotion because employers require senior employees to work long and inflexible hours. Women may also be perceived as being unwilling to subordinate the demands of family to the demands of the job. So employers must be urged to offer flexibility in working hours, and to seek to move away from the UK's culture of long working hours.

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

A Most women are not interested in seeking promotion to senior positions.

B Men would not object to the promotion of a higher percentage of women.

C Women would be better leaders than men if they were promoted to senior positions.

D Women are no less likely than men to have the abilities required for working in senior positions.

E Working hours would be more flexible if employers promoted more women to senior positions.

4 Central Avenue is a long straight road, several kilometres long. Both my home and my office are on Central Avenue, and the diagram below shows their positions, together with two sets of traffic lights that lie in between.
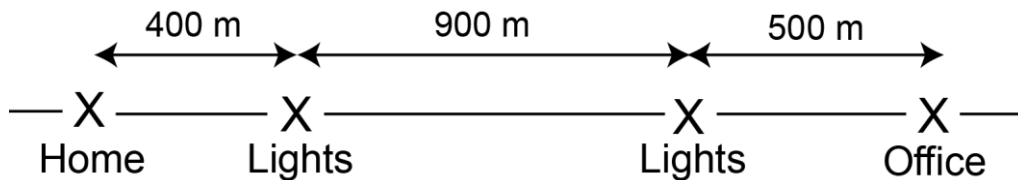
Both sets of lights turn to green for Central Avenue traffic simultaneously, showing green for exactly two minutes, turning green again exactly two minutes later.

I cycle to work every morning at a steady speed of 5 metres per second (except, of course, whilst waiting at traffic lights).

What is the **longest** time I can expect my journey to work to take?

A 6 minutes

B 7 minutes

C 8 minutes

D 9 minutes

E 10 minutes

5 In the UK, house prices have risen at far greater rates than inflation, fuelled by unprecedented levels of borrowing. Because of these high prices, owning their own home has become unaffordable for many people. Those who are able to 'own' their own home must do so burdened by a huge level of debt. Since the recent financial crisis can be attributed in part to those who were unable to meet the repayments on their debts, governments should attempt to tackle the problem at its root and take action to prevent a continued rise in house prices above the level of inflation.

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

A The gap between the average house price and average salary has continued to widen over the past five years.

B House prices have fallen sharply and are no longer increasing at such dramatic rates.

C Mortgage companies are more reluctant to lend money without substantial deposits.

D There are few practical interventions that governments could make to lower house prices.

E Many people are dependent on the value of their property increasing more than the value of their loan in order to pay off their mortgage.

6 Below is Thomas Leslie Fuller's brass paperweight, which shows his initials.
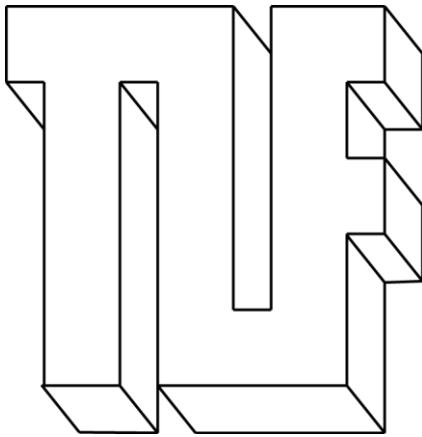
Which one of the following is not a side view of the paperweight when it is placed flat on a table (either side up)?

A

B

C

D

E

[Turn over

7 During the Industrial Revolution, clever entrepreneurs realised canals were a cost-effective, efficient way to move goods around the country. Gradually, however, canal carriage was replaced by other modes of transportation that were faster and cheaper. In twenty-first century Britain, most businesses choose to use road haulage as a means of transportation. With the rise in fuel costs and introduction of 'low emission' zones, road haulage is now becoming less practical and economical. As the roads grind to a halt, it will not be long before the canals once again become the backbone of goods transportation.

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

A Canal transport is unlikely to be as fast as road haulage.

B Canals are not as convenient as the road network.

C It may be possible to make road haulage cheaper.

D It may be very expensive to re-open the disused canals.

E Canals may not be the only alternative to road haulage.

8 The table below shows the energy values for the main foods used by volunteer wardens at a wild bird reserve to prepare a variety of feed mixes.

Food	Energy per 100 g (calories)
mealworms	150
peanuts	560
apples	350
oats	370
niger seed	480
cheese	400
sunflower seeds	500
raisins	300
sunflower hearts	600
suet	800

A trainee volunteer has been asked to prepare a sample of a special mix to provide exactly 5 000 calories. He has weighed out the first four ingredients but cannot read the required mass of the final ingredient because of an ink blot. This is what has been weighed out so far:

mealworms 150 g, apples 150 g, raisins 250 g, suet 125 g

What mass of sunflower seeds must be used to complete the task successfully?

A 500 g

B 520 g

C 540 g

D 560 g

E 680 g

9 There is often concern about the large quantities of money earned by top singers. It could be argued that there are many ways in which this money could be spent that would be beneficial to a large number of people. However, these people are receiving high earnings because they are the best at what they do, and those who are better than others at what they do should be rewarded.

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

A To become a doctor requires a much longer course of study than other professions; therefore, doctors should receive a higher rate of pay than members of those other professions.

B When making the decision about who should be accepted onto the course, the bottom third of the applicants based on the results were eliminated immediately.

C Since efficiency is the most important aspect of the work, the end of year bonus was awarded to the member of staff who had made the best use of time over the year.

D When deciding on the member of staff to be promoted, the director of the company looked at the records of the applicants and chose the one who had done the most overtime in the past year.

E The prize for the best film was decided by taking the one that made the most money at the box office in its opening week.

10 Sue takes her dog Freya to the park. She throws a stick for Freya to fetch. Freya runs to collect the stick and bring it back to Sue. While Freya is collecting the stick, Sue walks slowly towards Freya.

Which one of the following graphs could correctly show the distance between Sue and Freya?

A

B

C

D

E

[Turn over
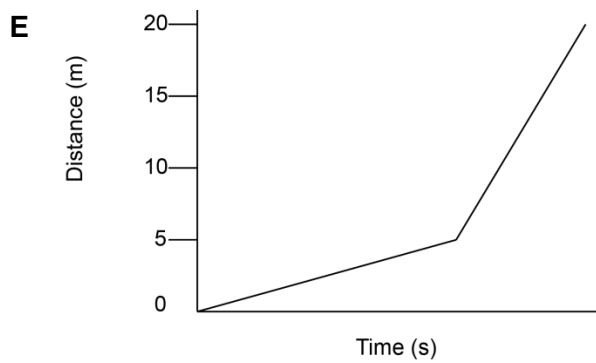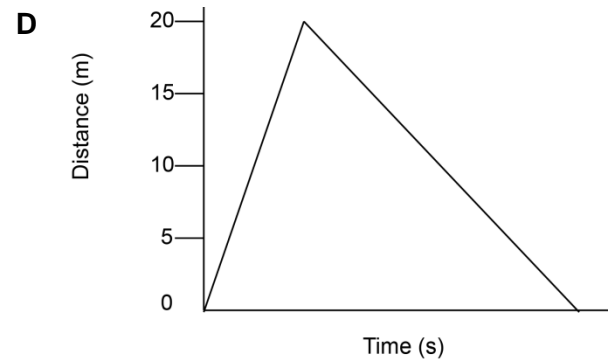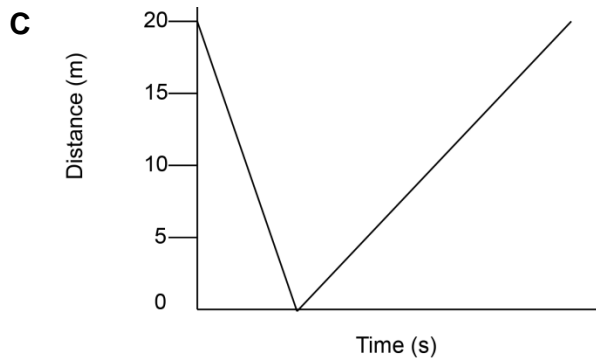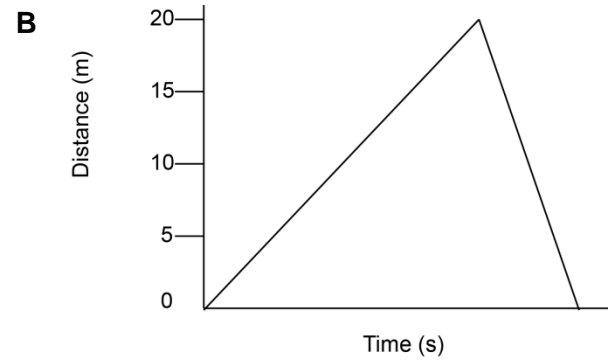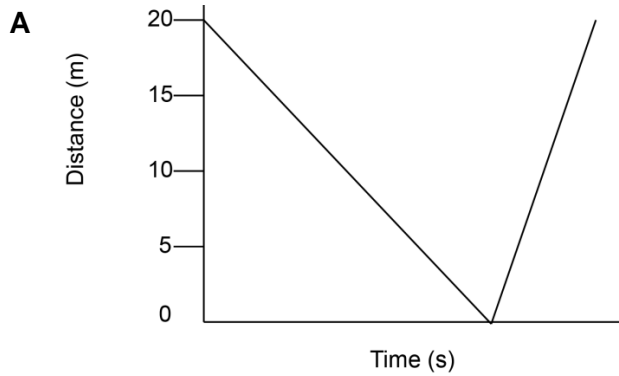
11 How long will it be before we realise that force feeding our children with junk TV is just as bad as allowing them to eat nothing but junk food? Children are impressionable, we know that, so why do parents allow them to gain their insights into life through a TV screen? I've heard so many 'concerned' mothers and fathers complaining about playground violence, petty crime and early sexual awareness in their children, yet they allow them to watch all sorts of rubbish on TV. Rather than blame outside influences over which they have no control, they should recognise they have answers closer to home – they're called common sense and a remote control.

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

A Some parents should do more to regulate what their children watch on TV.

B Some parents are not concerned by what their children watch on TV.

C Some parents are genuinely not concerned about the way their children behave.

D Some parents do not have any influence over the way their children behave.

E Some parents do not believe that what their children watch on TV is causing them to behave badly.

12 Whenever my friend Alistair writes to me he does so entirely in code. He always uses symbols for letters but changes the code each time, so any particular symbol does not necessarily stand for the same letter of the alphabet on the next occasion he writes.

I always start to crack the code by looking at how he has written his name at the end of his email. For instance, last time he was:

In my last email to him I asked him when he intends to visit me next. Today I have received a reply consisting of just one word as follows:

When can I assume that he intends to appear?

A TOMORROW

B THURSDAY

C SATURDAY

D NOVEMBER

E SOMETIME

13 If you want to remain alert, drinking caffeinated coffee is not the way to do it. In a recent experiment, almost 400 volunteers agreed to abstain from coffee for at least 16 hours. They were then given either coffee or a placebo (fake coffee substitute) and tested for alertness. The study found little difference in the responses of the participants, regardless of whether they had taken real coffee or the substitute. This suggests that frequent coffee drinkers develop a tolerance to both the anxiety-producing and stimulatory effects of caffeine. In fact the stimulating effects experienced by regular coffee drinkers when they have their first drink of the day may be the result of the coffee reversing the symptoms of caffeine withdrawal.

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

A Drinks that contain caffeine do not provide important benefits.

B The reason that people drink coffee is to help them remain alert.

C People who do not drink coffee do not have problems relating to anxiety.

D There are drinks that better help people to remain alert.

E The stimulating effects from drinking coffee wear off in the 16 hours following the drink.

14 David has a new on-board bicycle computer but has not learned all the functions yet, so can only read the total mileage and average speed of all of the journeys since he fitted it. On his first journey using it he covered 15 km at an average speed of 30 km/h. He can work out from this that the journey took him 15/30 hours or exactly 30 minutes. After the second journey, his total mileage was 24 km and overall average speed 32 km/h.

What was his average speed on the second journey?

A 18 km/h

B 31 km/h

C 34 km/h

D 36 km/h

E 45 km/h

15 There was a 17 per cent decline in public library use in the UK between 1993 and 2003 according to a report by CABE (The Commission for Architecture and the Built Environment). They suggest this is not due to a lack of public interest in reading books. Rather it is the authoritarian style and image of libraries with their rules about silence and fines for late returns of books. Those few libraries that have moved away from this image such as the one in Bournemouth, which provide cafes and 'chill-out' zones, have seen a 40 per cent increase in library use. Therefore it is clear that the future of the function of the UK library service will be more assured if all libraries follow this lead.

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

A The decline in public library use has not occurred in other European countries.

B The main users of public libraries are school children looking for reference books.

C Bookshops have experienced an increase in sales since 1993.

D The use of computers in libraries has increased over the same period.

E Few people who use new-style libraries use them to borrow books.

16 My current membership of the squash club is about to expire and so I wish to renew it. The options available to me are given in the table below and have not changed since I joined as a new member six months ago (a change in membership type counts as a renewal, not a new member).

Membership type	Length	Extras	New member (£)	Renewal price (£)
Bronze	1 year	none	10	8
Silver	6 months	free locker	25	18
	1 year	free locker	45	28
Gold	6 months	free locker free competition entry	40	32
	1 year	free locker free competition entry	75	52

I am currently a Gold member, but I do not want to enter competitions any more as I play only once a month. I do need a locker when I visit and the normal cost to hire a locker is £2 per visit. I want to choose a membership that will give me the smallest possible total cost for a full year.

What will be the difference between the amount that I will pay now and the amount I paid six months ago?

A I will pay £32 less.

B I will pay £30 less.

C I will pay £12 less.

D I will pay £8 less.

E I will pay £5 more.

17   The most popular theory about the origin of the Moon is that it was formed from debris breaking off the Earth in a planetary collision 4.5 billion years ago. If this were true, the Moon would be made of the same material as is found on Earth. Examination of Moon rocks shows this to be the case, although there is little iron in Moon rocks. However, this can be explained because, according to the theory, the material that formed the Moon would have come from the Earth's crust, not its iron-rich core. Thus we should accept the theory as true.

Which one of the following identifies the flaw in the above argument?

   A   The popularity of a theory is not what determines its truth.

   B   Evidence that is inconsistent with a theory proves that the theory is false.

   C   The explanation offered in the passage is not consistent with the theory.

   D   Evidence that confirms a theory's predictions does not prove that the theory is true.

   E   A theory that is not consistent with the facts should be rejected, not modified.

18   The table shows the number of children in the town of Lancester aged 11 and 16 who play various sports after school.

Sport	11-year-olds	16-year-olds
Football	120	181
Cricket	120	133
Hockey	55	66
Swimming	104	150
Tennis	123	149
Squash	51	97

In which sport was the proportion of 11-year-old to 16-year-old children nearest to that for swimming?

   A   Football

   B   Cricket

   C   Hockey

   D   Tennis

   E   Squash

19 The credit crisis has significantly damaged pensions and pensioners. Millions of people coming up to retirement now, without a final salary pension, are at risk of poverty. It is previous government policy decisions, not just the credit crisis, that are to blame. We have had a pensions crisis building up for the last few years. One should always take responsibility for one's mistakes. Therefore, the Government must act!

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

A If I had not tried to carry so many plates at once I would not have dropped some when I slipped, so I should replace the broken ones.

B My dog always attacks people who come to the house, so I keep her in the back garden.

C The Government should take action to help people who have lost possessions in the recent floods.

D We should all feel responsible for our own future security so it is right that the Government provides a safety net.

E While there are some situations for which we cannot plan, if we fail to insure ourselves we only have ourselves to blame.

20   The table below shows the mean maximum daily temperature for Oxford for each year from
     1905 to 1920 along with a 5-year moving average (the value shown beside 1920 is the average
     from 1916 to 1920 inclusive). Three values are missing from the table.

Year	Mean maximum daily temperature	5-year moving average
1905	13.4	13.40
1906	14.4	13.56
1907	13.4	13.60
1908	13.7	13.66
1909	x	y
1910	13.3	z
1911	14.9	13.66
1912	13.7	13.72
1913	14.2	13.82
1914	14.7	14.16
1915	13.6	14.22
1916	13.3	13.90
1917	12.8	13.72
1918	13.8	13.64
1919	13.0	13.30
1920	13.8	13.34

What value should be in the position marked 'y'?

A   13.30

B   13.58

C   13.64

D   13.66

E   13.72

21 We need to find solutions to the problem of high levels of carbon dioxide emissions. A number of solutions are being proposed but one of the most promising is that of using willow trees as a fuel for generating electricity. There are many environmental advantages in using willow. Burning wood has the environmental advantage that in doing so one releases into the atmosphere only as much carbon dioxide as the trees themselves absorbed. In addition, plantations of willows will not only support the insects on which songbirds feed, but also, being trees that thrive in wet areas, they will help to conserve our threatened wetlands. Other countries, such as Sweden, have already recognised the advantages of using willow for fuel. We should follow their example.

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

A We need to solve the problem of the high rate of carbon dioxide emissions.

B We should use willow trees as a means of generating electricity.

C Using willow as a fuel will reduce the level of carbon dioxide emissions.

D Planting willows on a large scale will help conserve our wildlife.

E There are many environmental advantages in using willow trees for fuel.

22 The West Water Canoe School offers tuition in basic canoeing skills. There are 18 canoes for students to use. The school offers a minimum instructor to student ratio of 1:6 and a minimum of two instructors for any group.

Instructors are hired by the centre on a casual basis and are paid only for the time they actually work. Instructors are paid £6 per hour and are expected to use their own canoes.

The cost for students depends on the numbers in the group and the length of the session. Costs are set out in the table below.

Number in group	Cost per student for first hour	Cost per student for subsequent hours
1 to 2	£12	£10
3 to 6	£10	£8
7 to 10	£8	£6
more than 10	£7	£5

What is the maximum profit the centre can make from a group after paying the instructors for a two-hour session?

A £108

B £180

C £198

D £216

E £360

PART B Mathematics and Biology

23 A square piece of metal has a semicircular piece cut out of it as shown. The area of the remaining metal is 100 cm^2.
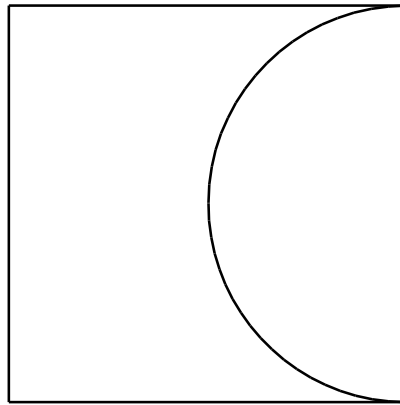
[diagram not to scale]

Which one of the following is a correct expression for the length of the side of the square in centimetres?

A $20\sqrt{\dfrac{2}{8-\pi}}$

B $10\sqrt{\dfrac{2}{4-\pi}}$

C $20\sqrt{\dfrac{2}{8+\pi}}$

D $10\sqrt{\dfrac{1}{8-\pi}}$

E $20\sqrt{\dfrac{1}{4-\pi}}$

24 In a right-angled triangle PQR the hypotenuse is the side PR.

The length of side PQ is 20 cm and the ratio RQ:PQ is 1:2

What is the length of the perpendicular from the hypotenuse to the point Q?

A $8\sqrt{5}$ cm

B $10\sqrt{2}$ cm

C $2\sqrt{5}$ cm

D $5\sqrt{2}$ cm

E $4\sqrt{5}$ cm

[Turn over

25 A cube has sides of unit length. What is the length of a line joining a vertex to the midpoint of one of the opposite faces (the dashed line in the diagram below)?
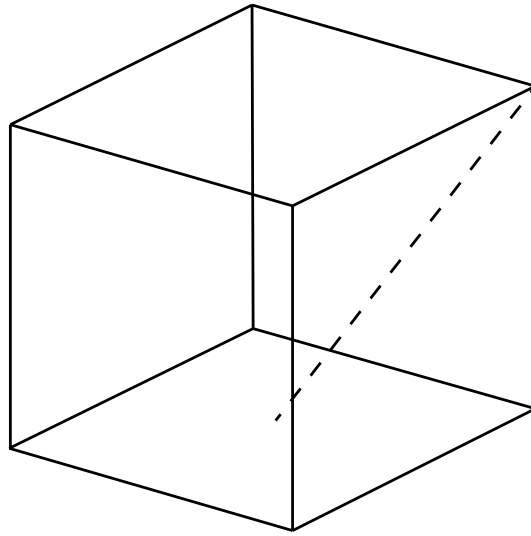
[diagram not to scale]

A $\sqrt{\dfrac{3}{2}}$

B $\sqrt{2}$

C $\sqrt{\dfrac{5}{2}}$

D $\sqrt{3}$

E $\sqrt{5}$

26 If you look at a clock and the time is 9.45, what is the angle between the hour and the minute hands?

A 0°

B 7.5°

C 15°

D 22.5°

E 30°

27 The right-angled triangle shown has horizontal and vertical sides measuring $(4+\sqrt{2})$ cm and $(2-\sqrt{2})$ cm respectively.

[diagram not to scale]

(2 - √2) cm

(4 + √2) cm
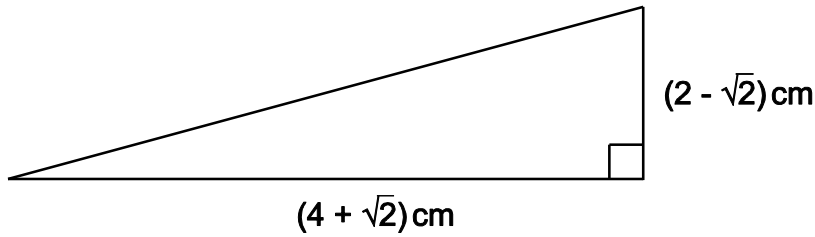
Calculate the area of the triangle.

A $(5+3\sqrt{2})$ cm^2

B $(3-\sqrt{2})$ cm^2

C $(3+3\sqrt{2})$ cm^2

D $(5-\sqrt{2})$ cm^2

28 A solid sphere of radius r fits inside a hollow cylinder. The cylinder has the same internal diameter and length as the diameter of the sphere.

The volume of a sphere is $\dfrac{4}{3}\pi r^3$, where r is the radius of the sphere.

What fraction of the space inside the cylinder is taken up by the sphere?

A $\dfrac{1}{4}$

B $\dfrac{1}{3}$

C $\dfrac{1}{2}$

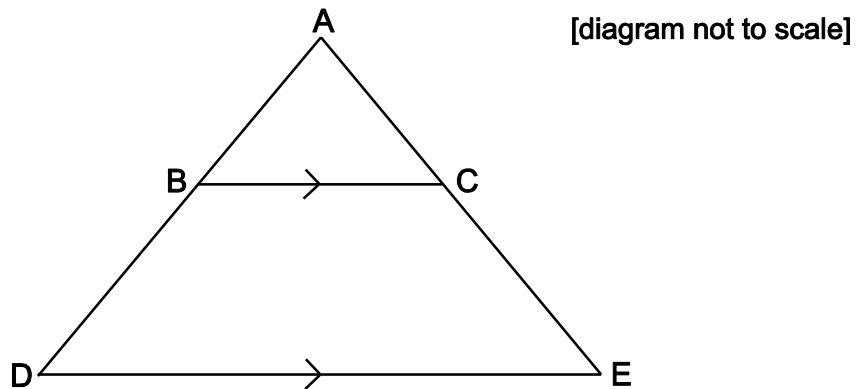**D** $\dfrac{2}{3}$

E $\dfrac{3}{4}$

29 Which of the expressions below has the largest value for $0 < x < 1$?

A $\dfrac{1}{x}$

B x^2

C $\dfrac{1}{(1+x)}$

D $\dfrac{1}{\sqrt{x}}$

E $\sqrt{x}$

30 A shape is formed by drawing a triangle ABC inside the triangle ADE.

BC is parallel to DE.

$AB = 4\,cm$ $BC = x\,cm$ $DE = x + 3\,cm$ $DB = x - 4\,cm$

[diagram not to scale]

Calculate the length of DE.

A 5 cm

B 7 cm

C 9 cm

D $4 + 2\sqrt{7}$ cm

E $7 + 2\sqrt{7}$ cm

31 Two variables are connected by the relation: $P \propto \dfrac{1}{Q^2}$

Q is increased by 40%.

To the nearest percent, describe the change in P in percentage terms.

    A   29% decrease

    B   44% decrease

    C   49% decrease

    D   51% decrease

    E   80% decrease

    F   96% decrease

32 Three variables x, y and z are known to be related to each other in the following ways:

    x is directly proportional to the square of z.
    y is inversely proportional to the cube of z.

Which of the following correctly describes the relationship between x and y?

    A   The square of x is directly proportional to the cube of y.

    B   The square of x is inversely proportional to the cube of y.

    C   The cube of x is directly proportional to the square of y.

    D   The cube of x is inversely proportional to the square of y.

    E x is directly proportional to y^6.

33 In the triangle PQR shown below:
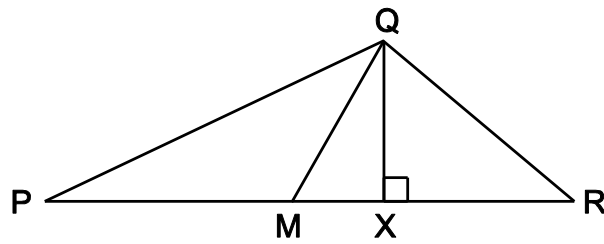
[diagram not to scale]

X lies on PR

$\angle QXR$ is 90°

$\dfrac{QX}{PX} = \dfrac{1}{6}$

$\dfrac{QX}{XR} = \dfrac{2}{3}$

M is the midpoint of PR.

What is $\dfrac{QX}{MX}$?

A $\dfrac{1}{9}$

B $\dfrac{5}{12}$

C $\dfrac{4}{9}$

D $\dfrac{1}{2}$

E $\dfrac{5}{6}$

34 Solve the inequality $x^2 \geq 8 - 2x$

A $x \geq 4$

B $x \leq 2$ and $x \geq -4$

C $x \geq -2$ and $x \leq 4$

D $x \geq 2$ or $x \leq -4$

35 The total surface area of a cylinder, measured in square centimetres, is numerically the same as its volume, measured in cubic centimetres.

The radius of the cylinder is r cm, the height is h cm.

Express h in terms of r.

A $h = \dfrac{2r}{r-2}$

B $h = \dfrac{2r}{r+2}$
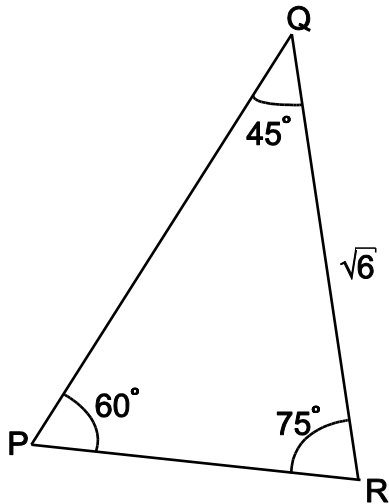
C $h = r+2$

D $h = r-2$

E $h = 2r(r-2)$

36 In triangle PQR:

$$\angle QPR = 60°$$
$$\angle PQR = 45°$$
$$\angle QRP = 75°$$
$$RQ = \sqrt{6} \text{ units}$$

[diagram not to scale]

Find the length of side PR.

A 2

B $\sqrt{3}$

C $\sqrt{2}$

D $\sqrt{6}$

37 The square PQRS is positioned so that its vertices are at the points with coordinates:
$(1, 1)$, $(-1, 1)$, $(-1, -1)$ and $(1, -1)$.

The square is rotated clockwise through 90° about the origin and then reflected
in the line $y = x$.

Which transformation will return the square to its original orientation?

A A reflection in the x-axis.

B A reflection in the y-axis.

C A reflection in the line $y = -x$.

D A rotation of 90° clockwise about the origin.

E A rotation of 90° anticlockwise about the origin.

38   Which of the following describe(s) a role of mitosis?

   1   formation of gametes

   2   growth of cells

   3   repair of cells

   4   replacement of skin cells

A   1 only

B   2 only

C   3 only

D   4 only

E   1 and 2 only

F   3 and 4 only

G   1, 3 and 4 only

H   1, 2, 3 and 4

[Turn over

39 The graph shows oxygen supply and demand in muscle cells during exercise.
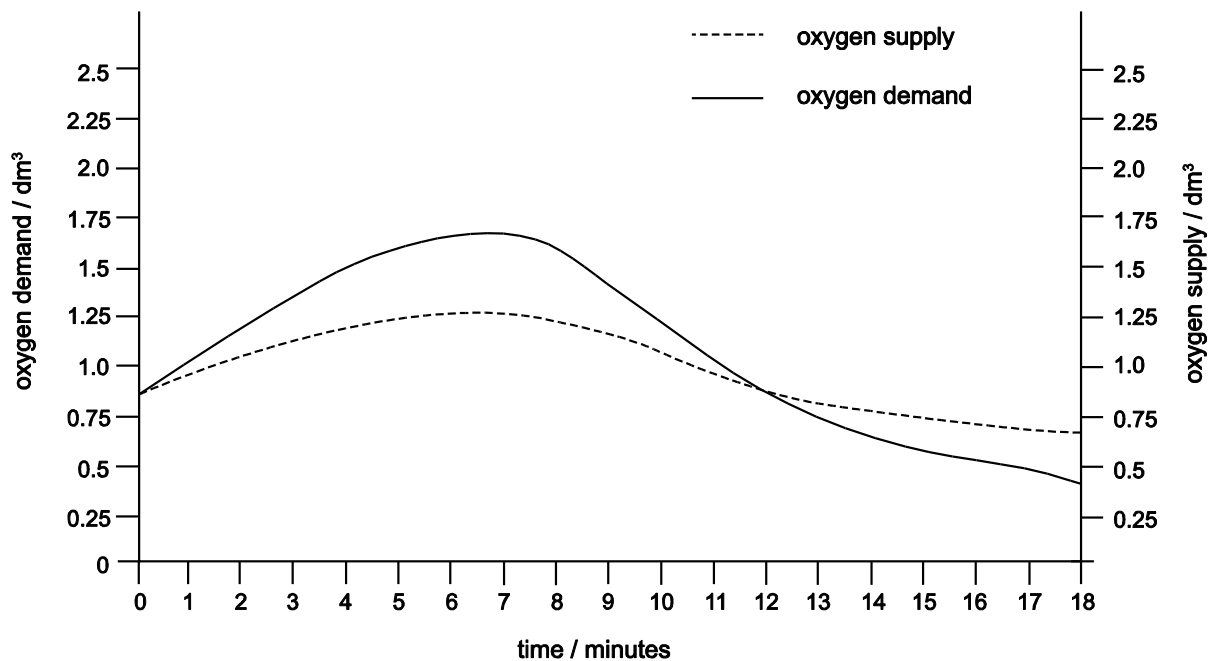
Which statement correctly describes what is happening in the muscle cells between 0 and 11 minutes?

A Anaerobic respiration only is taking place.

B More oxygen is being supplied than is required.

C Aerobic respiration only is taking place.

D Both anaerobic and aerobic respiration are taking place.

40 Which of the four statements below about natural selection are correct?

> **1** Competition occurs between individuals of the same species.
>
> **2** Competition occurs between individuals of different species.
>
> **3** Selection can lead to evolution.
>
> **4** Selection can lead to extinction.

A 1 and 3 only

B 2 and 4 only

C 1, 2 and 4 only

D 1, 3 and 4 only

E 2, 3 and 4 only

F 1, 2, 3 and 4

[Turn over

41 A student carried out an experiment to investigate the effect of temperature on the rate of photosynthesis. All of the other variables were kept constant.

The graph shows the results obtained.
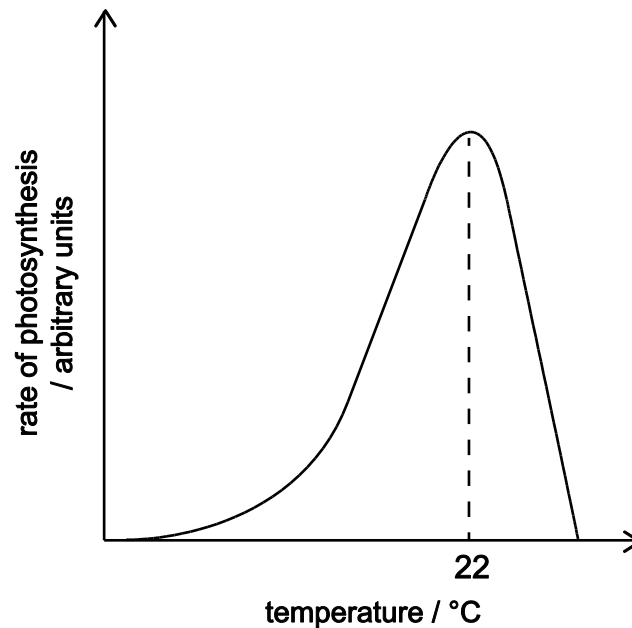
The student considered the graph and made the following conclusions.

1 Up to $22\,°C$ temperature is limiting the rate of photosynthesis.

2 At temperatures higher than $22\,°C$ not all of the enzymes work so the rate of photosynthesis drops.

3 As the temperature increases across the temperature range studied, the rate of photosynthesis increases due to increased kinetic energy.

Which of the student's conclusions is/are correct?

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

42 The karyogram below is a photograph of the chromosomes taken from a single human cell.
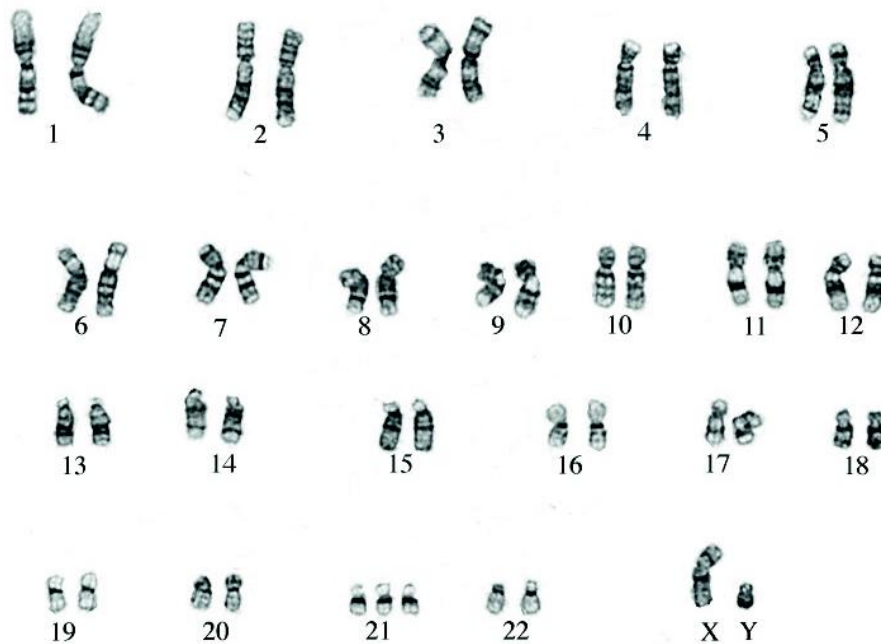
Using the karyogram, which of the following statements is/are correct?

1 The person is healthy with no visible mutations.

2 These chromosomes come from a male cell.

3 The cell used could have been a white blood cell.

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

[Turn over

43 Which of the following statements is/are correct about a stem cell extracted from the bone marrow of a healthy human donor to be given to a patient?

1 It can undergo meiosis to form genetically identical offspring.

2 It may contain 46 chromosomes.

3 It could differentiate to become a white blood cell.

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

H none of them

44 A student studied an area of grassland by randomly distributing 25 equal-sized quadrats.

The student counted the numbers of daisies, dandelions, plantains and buttercups in each quadrat.

| quadrat number	number of			
	daisies	dandelions	plantains	buttercups
1	2	2	0	0
2	4	0	0	0
3	4	0	0	1
4	2	0	0	1
5	1	0	1	1
6	3	0	0	0
7	0	2	0	0
8	0	1	0	2
9	0	0	1	2
10	0	0	2	1
11	2	0	0	1
12	0	3	0	0
13	0	0	0	2
14	0	1	0	0
15	0	0	1	1
16	2	2	0	0
17	0	2	0	0
18	0	0	0	0
19	0	0	3	0
20	0	3	1	0
21	3	0	0	1
22	2	2	0	0
23	0	5	0	0
24	0	1	1	0
25	0	1	2	0

The student then calculated the frequency of occurrence for each type of plant.

Which frequency of occurrence is correct for the daisy species?

A   0.25

B   0.33

C   0.40

D   3.00

E   4.00

[Turn over

45 A person's ear lobes can be attached to the side of their head or unattached. The allele for attached ear lobes is recessive to the allele for unattached ear lobes.

The pedigree diagram below shows the ear lobe attachment in one family.

Key
○ female with unattached ear lobes
□ male with unattached ear lobes
● female with attached ear lobes
■ male with attached ear lobes
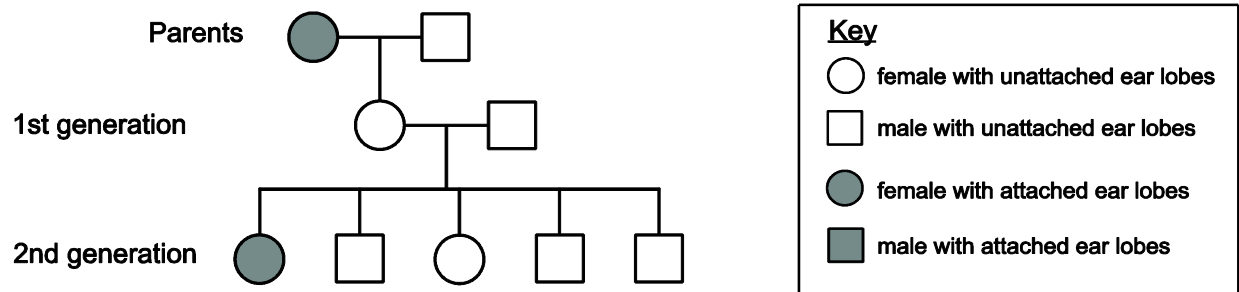
What is the maximum possible number of heterozygous individuals in this pedigree diagram?

A 2

B 3

C 4

D 5

E 6

F 7

G 8

H 9

46 The graph below shows the effect of different concentrations of sodium chloride (NaCl) solution on the percentage haemolysis of human red blood cells. Haemolysis occurs when the cells swell and then burst open.
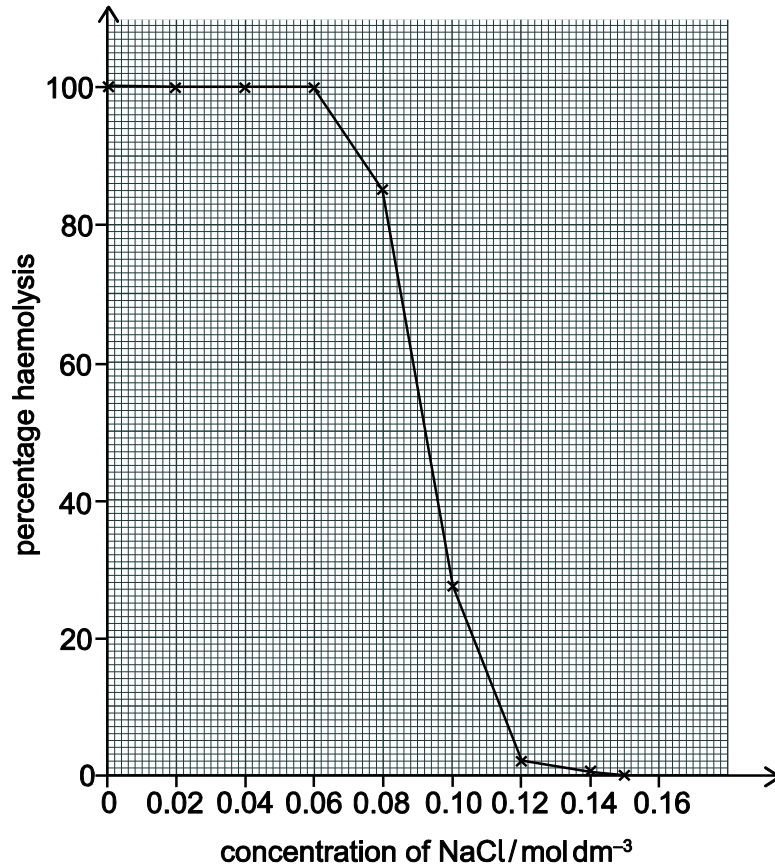

Which letter correctly describes the effect of changing the concentration of NaCl from $0.12\,mol\,dm^{-3}$ to $0.084\,mol\,dm^{-3}$ on percentage haemolysis?
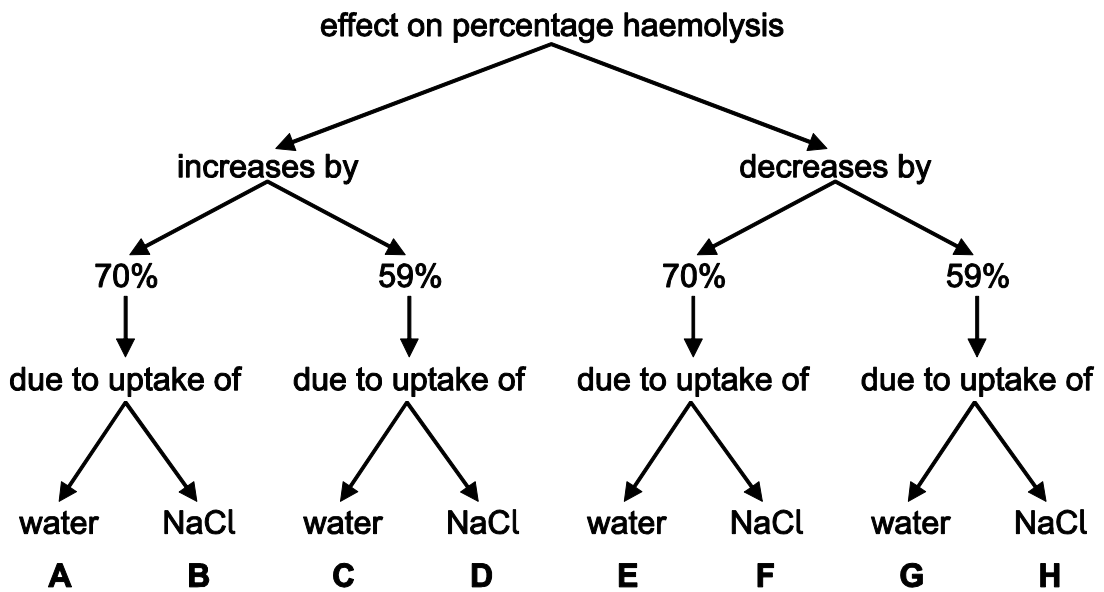
47 An experiment was set up to show the effect of light on shoots subject to the same intensity of light after 24 hours and various different treatments.

At the start of the experiment all the shoots were the same height and all were growing vertically.

The diagram shows the results of an experiment on the effect of light on young shoots, after 24 hours of exposure to the light.
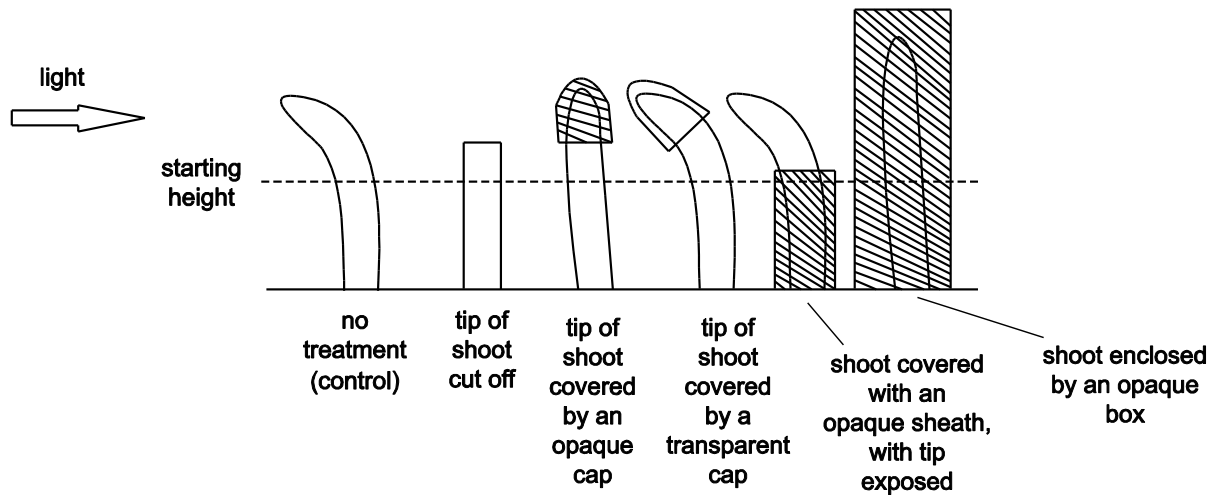
Which of the following statements about the results is/are correct?

1 All uncovered shoots showed a positive phototropic response.

2 Covering any part of the shoot prevented a phototropic response.

3 Shoots grow taller only when exposed to light.

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

H none of them

48 An isolated island in Canada has populations of moose and wolves. Moose are the main source of food for the wolves. The graph shows changes in the populations of the two species of animal from 1959 to 2008.
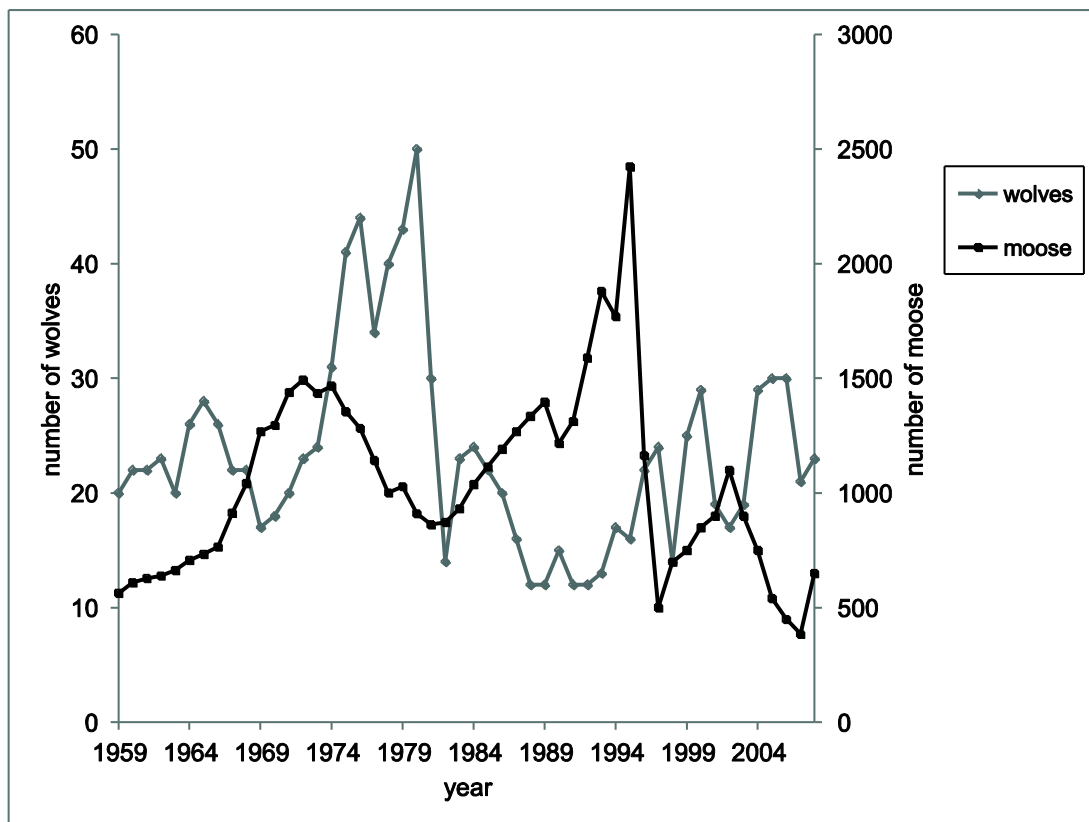
A student listed four trends in the populations of moose and wolves from 1959 to 2008.

1 Increases in wolf population are always after increases in moose population.

2 The wolf population is always lower than the moose population.

3 There were more wolves than moose in 1965.

4 When the wolf population is low there is an increase in the moose population.

Which of the student's statements are correct?

A 1 and 2 only

B 1 and 3 only

C 1 and 4 only

D 2 and 4 only

E 3 and 4 only

49 The sex of a species of fruit fly is determined by the number of X chromosomes relative to the number of non-sex chromosomes (A) in a cell. This is called the X:A ratio.

A fruit fly will be male if X:A $=$ 0.5:1 and female if X:A $=$ 1:1

The Y chromosome contains genes necessary for making sperm.

Which row of the table correctly shows the sex of the five fruit flies with different numbers of these chromosomes?

	XAA	XYAA	XXAA	XXYAA	XXYYAA
A	female	female	female	male	male
B	female	female	male	male	male
C	female	male	female	male	female
D	female	male	female	male	male
E	male	female	male	female	female
F	male	female	male	female	male
G	male	male	female	female	female
H	male	male	female	female	male

50 The diagram shows part of the carbon cycle.
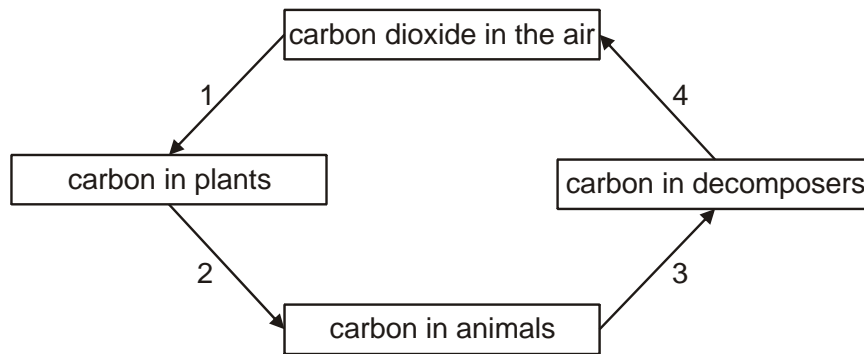
Which row shows the numbered processes that use digestive or respiratory enzymes?

	process or processes that involve digestive enzymes	*process or processes that involve respiratory enzymes*
A	1 only	2 and 3 only
B	2 only	1 and 4 only
C	3 only	2 and 4 only
D	4 only	2 and 3 only
E	2 and 3 only	1 only
F	3 and 4 only	2 only
G	1 and 4 only	3 only
H	2 and 3 only	4 only

[Turn over

51 A student carried out an experiment on an enzyme-catalysed reaction using amylase. The amylase was added to the substrate and left to react.

The graph shows the results of this experiment.
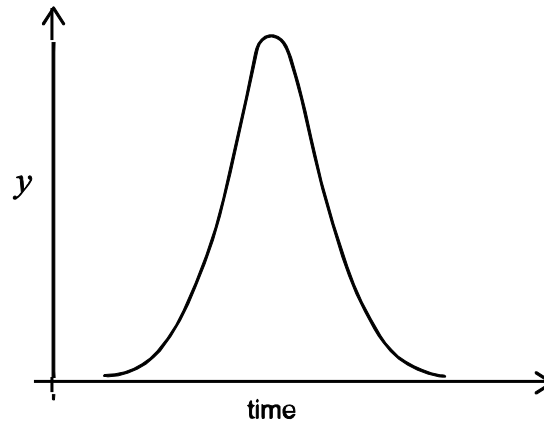
What should the label be on the *y*-axis?

A enzyme concentration

B enzyme-substrate complex concentration

C pH

D product concentration

E substrate concentration

52   Which of the statements about the genetic modification of a bacterium to produce human insulin are correct?

1   Human insulin DNA is cut out using an enzyme.

2   This DNA is inserted into the nucleus of a bacterium.

3   The modified bacterium is cultured.

4   The bacterial cells are injected into humans with diabetes.

A   1 and 2 only

B   1 and 3 only

C   2 and 4 only

D   3 and 4 only

E   1, 2 and 3 only

F   1, 3 and 4 only

[Turn over

PART C Reading Comprehension

For Part C, you will need to refer to the separate text booklet

Task 1

Look at the two texts on page 3. For questions 53 – 58, choose the option (A, B, C or D) which you think fits best according to the texts.

---

53 What view of e-democracy is proposed by the writers of Abstract One?

    A   It is preferable to traditional forms of democratic participation.

    B   It can be a useful catalyst for democratic reform.

    C   It represents the future of democratic government.

    D   It is merely one of several viable approaches to e-government.

54 In Abstract One 'active civic engagement', as an end for governmental ICT use, is contrasted with

    A   'greater civic participation in democratic reform'.

    B   'one-way information provision and service delivery'.

    C   'processes of actual e-democracy'.

    D   'two-way, ongoing dialogue'.

55 According to Abstract Two, a central purpose of the article is

    A   to reduce the number of models needed for a complete analysis of e-democracy.

    B   to make a link between the theory and practice of e-democracy.

    C   to introduce an entirely new model of e-democracy.

    D   to reject existing models of e-democracy.

                    [Turn over

56 What do the authors of Abstract Two suggest about the four models of e-democracy they use?

    A They may contain imperfections in terms of their analysis.

    B They may not be entirely accurate representations of actual e-democracy implementations.

    C They set a standard for real world implementations of democracy to aspire to.

    D They represent the only forms that e-democracy could ever feasibly take.

57 Which abstract or abstracts assume that changes to democracy are to be welcomed?

    A Neither abstract

    B Both abstracts

    C Abstract One only

    D Abstract Two only

58 Which abstract or abstracts suggest that a successful application of e-democracy may require a blend of approaches?

    A Neither abstract

    B Both abstracts

    C Abstract One only

    D Abstract Two only

Task 2

Look at the four texts on pages 4 and 5. For questions 59 – 66, choose the option (A, B, C or D) which you think best answers the question.

---

59   Which writer suggests that the moral decisions of humans may be arrived at in a similar way to those of animals? ....

60   Which writer mentions the view of one discipline that certain kinds of data about animal morality are irrelevant? ....

61   Which writer strongly rejects the suggestion that the responses of animals to one another are comparable to those of humans? ....

62   Which writer is reporting two sides of a debate between practitioners within a particular discipline? ....

63   Which writer says that the reactions of animals can provide insights into evolution? ....

64   Which writer gives an example of actions that are intended to strike the modern reader as absurd? ....

65   Which writer says that a recently unacceptable view of non-human capabilities has now been accepted? ....

66   Which writer mentions attempts to excuse the suffering caused to animals? ....

[Turn over

Task 3

Look at the text on pages 6 and 7. For questions 67 – 76, choose the option (A, B, C or D) which you think fits best according to the text.

---

67 The writer suggests that when using anthropological material to study the ancient Greeks, E.R. Dodds was aware that

A this was a controversial approach.

B this might be inappropriate for his subject matter.

C this was not the most recent development in the field.

D this would provide valuable insights into ancient legends.

68 In paragraph 2, what feature of the work influenced by cultural anthropologists does the writer suggest is useful?

A its empathy with the views of its subjects

B its ability to adapt to modern beliefs

C its achievement of a sense of distance

D its identification of atypical social structures

69 In paragraphs 2 and 3, the writer concedes that the methods of cultural anthropology could be effective for studying the ancient Greeks, since these methods

A avoid exposing the subjects to unfamiliar modern concepts.

B can investigate universal features of societies.

C insist on a factual rather than an imaginative interpretation.

D have rejected any possibility of interaction with the subjects.

70   What similarity between modern humans and ancient Greeks will the writer address in this study?

    A   the similarities between cultures and histories

    B   images shared at an unconscious level by all humans

    C   the manner in which we understand events and emotions

    D   universal human needs such as eating and reproduction

71   In paragraph 4, the writer suggests it is difficult for cultural anthropology researchers to avoid

    A   suspicion from those being investigated.

    B   providing explanations which are oversimplified.

    C   being over-influenced by the ideas of others.

    D   assuming a different status from their subjects.

72   The writer says that when studying our relations to the ancient Greeks, 'the situation is different' because of

    A   the social and cultural achievements of the Greeks.

    B   the link that ancient Greece has to our own lives.

    C   the extent of European dominance on other cultures.

    D   the variety displayed by the society of the ancient Greeks.

73   What does the writer say in paragraph 4 about other traditions in the modern world?

    A   They do not affect the way we learn about the Greeks.

    B   They require a fundamental reinterpretation of Greek history.

    C   They do not undermine the prime importance of Greek history.

    D   They have become more important with globalisation.

[Turn over

74   In paragraph 5, the writer exploits a distinction between

    A   self-understanding and self-criticism.

    B   modernity and other traditions.

    C   knowledge of language and culture.

    D   modern ideas and those of the ancient Greeks.

75   What does 'untimely' mean in the quote from Nietzsche?

    A   occurring too late to be helpful

    B   unintelligible to modern society

    C   badly chosen

    D   not fitting into current ways of thinking

76   What is the writer's main aim in this extract?

    A   to recommend that methods similar to those of cultural anthropology should be applied to studies of ancient Greece

    B   to justify the study of the relationship between the thought of the ancient Greeks and the modern world

    C   to describe how modernity has both used and distorted the ideas of the ancient Greeks

    D   to compare the degree of self-understanding of people in the modern world with that of the ancient Greeks

END OF TEST

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