CAMBRIDGE IGCSE LEVEL 2
ENTRANCE EXAM
Duration: 60 mins

*Students are **not permitted** to write on or mark the exam paper.*

MATHEMATICS

Question 1

(i) In this part, use the fact that 1 light year = 9.46×10^{15} metres.

The distance of the star Sirius from the Sun is 8.6 light years.

Calculate the distance, in kilometres, of Sirius from the Sun.

Give your answer in standard form. [2]

(ii) The distance of the star Proxima Centauri from the Sun is 3.97×10^{13} km.

A space probe travels at 60 000 km/h.

Calculate the time taken for the probe to travel from the Sun to Proxima Centauri.

Give your answer in years, correct to three significant figures. [3]

[N12/II/4(c)]

Question 2

(a) One day Amit works from 08 00 until 17 00.
The time he spends on filing, computing, writing and having lunch is in the ratio

Filing: Computing: Writing: Lunch = 2 : 5 : 4 : 1.

Calculate the time he spends

(i) writing, [1]

(ii) having lunch, giving this answer in minutes. [1]

(b) The amount earned by Amit, Bernard and Chris is in the ratio 2 : 5 : 3.
Bernard earns $855 per week.
Calculate how much

(i) Amit earns each week, [1]

(ii) Chris earns each week. [1]

(c) After 52 weeks Bernard has saved $2964.
What fraction of his earnings has he saved?
Give your answer in its lowest terms. [2]

(d) Chris saves $3500 this year. This is 40% more than he saved last year.
Calculate how much he saved last year. [3]

LIVEWORKSHEETS

Question 3

Sara has $3000 to invest for 2 years.
She invests the money in a bank which pays simple interest at the rate of 7.5% per year.
Calculate how much interest she will have at the end of the 2 years.

Question 4

$\mathscr{E} = \{-2\frac{1}{2}, -1, \sqrt{2}, 3.5, \sqrt{30}, \sqrt{36}\}$
$X = \{integers\}$
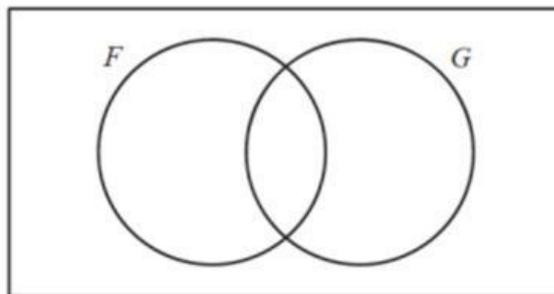$Y = \{irrational\ numbers\}$
List the members of   [1]

(a) X,

(b) Y.   [1]

Question 5
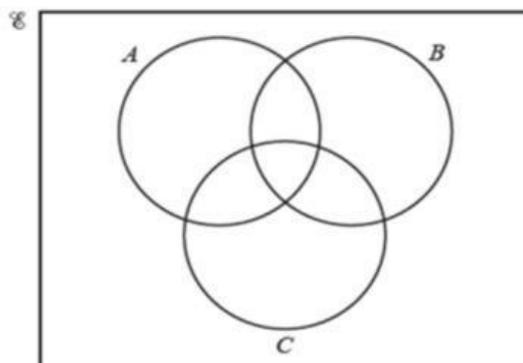
(a) In this Venn diagram, shade the region $F \cup G'$.

[1]

(b) $\mathscr{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$
$A = \{x: x\ \text{is an odd number}\}$
$B = \{x: x\ \text{is a square number}\}$
$C = \{x: x\ \text{is a multiple of 3}\}$

(i) Write all the elements of $\mathscr{E}$ in the Venn diagram below.   [2]

(ii) Another number is included in the set $\mathscr{E}$.
This number is in the region $A' \cap B \cap C$.   [1]
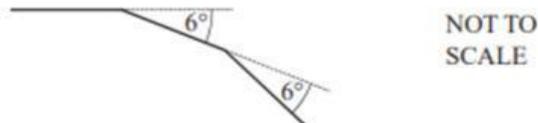
Write down a possible value for this number.

Question 6

A circle has a radius of 8.5 cm correct to the nearest 0.1 cm.

The lower bound for the area of the circle is $p\pi$cm².
The upper bound for the area of the circle is $q\pi$cm².

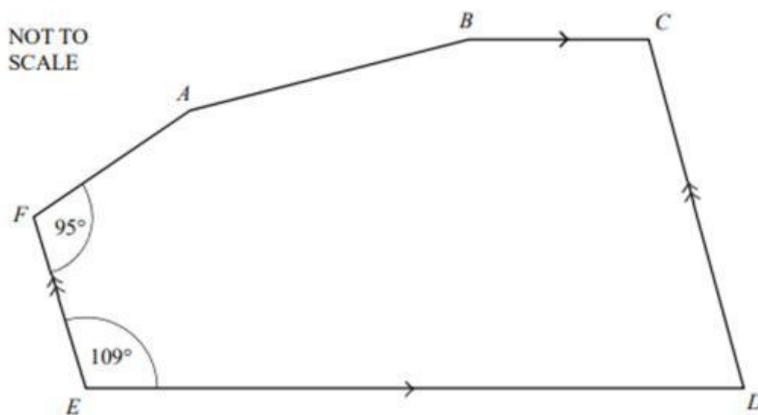Find the value of p and the value of q. [3]

Question 7

NOT TO SCALE

The diagram shows two of the exterior angles of a regular polygon with n sides.
Calculate n. [2]

Question 8

In the hexagon ABCDEF, BC is parallel to ED and DC is parallel to EF.
Angle DEF = 109° and angle EFA = 95°.
Angle FAB is equal to angle ABC.
Find the size of

(a) angle EDC,

(b) angle FAB.

Question 9

A shopkeeper paid £30 (cost price) for a coat. She wishes to place a price tag on it so that she can offer a 10% discount on the price marked on the tag and still make a profit of 20% on the cost price. What price should she mark on the tag?

PHYSICS

Multiple Choice

1.   A box is placed on the ground. An upward force of 15 N is needed to lift the box at constant speed. Which row correctly describes the box?

	mass of the box	weight of the box
A	1.5 kg	15 N
B	15 N	1.5 kg
C	15 N	150 kg
D	150 kg	15 N

2.   Brakes are used to slow down a moving car.
Into which form of energy is most of the kinetic energy converted as the car slows down?
A chemical   **B** elastic   **C** thermal   **D** sound

3.   A drawing pin (thumb tack) has a sharp point at one end and a flat surface at the other end.
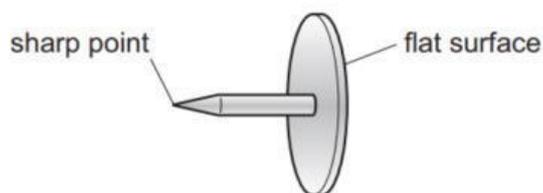
The pin is pushed into a wooden board. How do the pressure and the force at the sharp point compare with the pressure and the force on the flat surface?

	force at the sharp point	pressure at the sharp point
A	greater than on the flat surface	greater than on the flat surface
B	greater than on the flat surface	less than on the flat surface
C	the same as on the flat surface	greater than on the flat surface
D	the same as on the flat surface	less than on the flat surface

4.   Which row describes the arrangement and the motion of the molecules in a gas?

	arrangement	motion
A	far apart	move freely
B	far apart	vibrate only
C	tightly packed	move freely
D	tightly packed	vibrate only

5.   A liquid turns into a gas. This occurs only at one particular temperature, and the change happens throughout the liquid. What is this process called?
A boiling   **B** condensation   **C** evaporation   **D** fusion

6. In a cold country, a bicycle has been left outside all night. The cyclist finds the plastic hand grips feel less cold to the touch than the steel handlebars.

Which row correctly describes the temperature and the property of the two materials?

|	the temperature of the two materials	the property of the two materials
A	the temperature of the steel is much lower than that of the plastic	the plastic is a better thermal conductor than the steel
B	the temperature of the steel is much lower than that of the plastic	the steel is a better thermal conductor than the plastic
C	the steel and the plastic are both at the same temperature	the plastic is a better thermal conductor than the steel
D	the steel and the plastic are both at the same temperature	the steel is a better thermal conductor than the plastic

7. The diagram shows a tent made from a new material.

What type of material should the tent be made of to reflect the radiant energy from the Sun?

	material texture	material surface colour
A	dull	black
B	dull	white
C	shiny	black
D	shiny	white

8. A ray of light is incident on a plane mirror. A student measures the angle of incidence *i* and the angle of reflection *r*
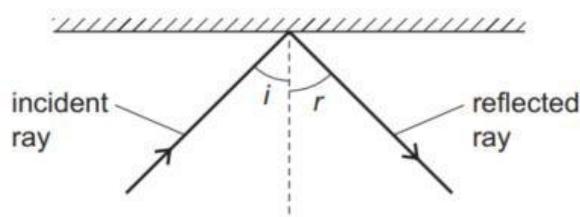
The student varies the angle of incidence and then plots a graph of *r* against *i*. What does the graph look like?
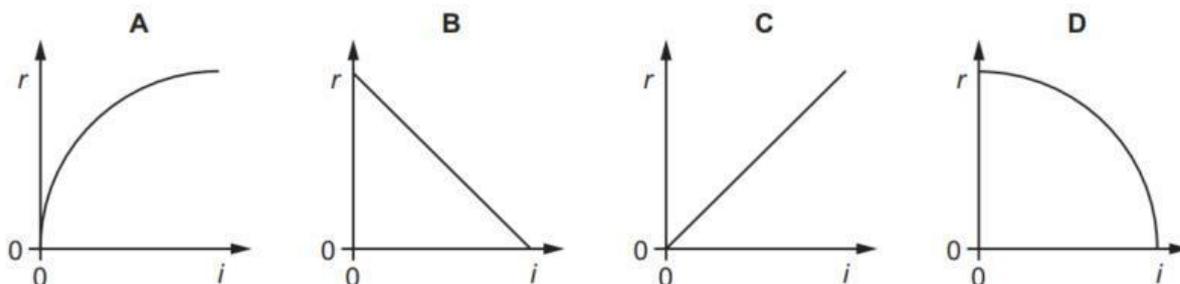
9. Which row gives a possible set of values for the speed of sound in ice, in water and in steam?

	speed of sound in ice (m/s)	speed of sound in water (m/s)	speed of sound in steam (m/s)
A	500	1500	4000
B	1500	4000	500
C	4000	500	1500
D	4000	1500	500

10. A plastic rod is rubbed with a dry cloth. The rod becomes positively charged. Why has the rod become positively charged?
    A It has gained electrons.   B It has gained neutrons.
    C It has lost electrons.   D It has lost neutrons.

SHORT ANSWER

1. The graph shows how the speed of a car varies during part of a journey.
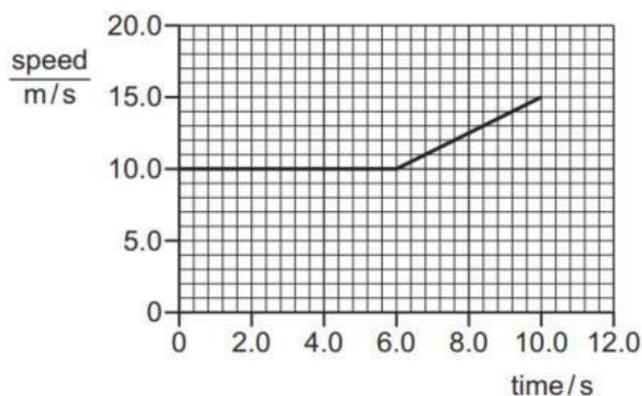
What is the acceleration of the car between 6.0 s and 10.0 s?

2. A student has an irregularly shaped piece of metal, a beaker of water and a measuring cylinder, as shown in Fig. 2.1.
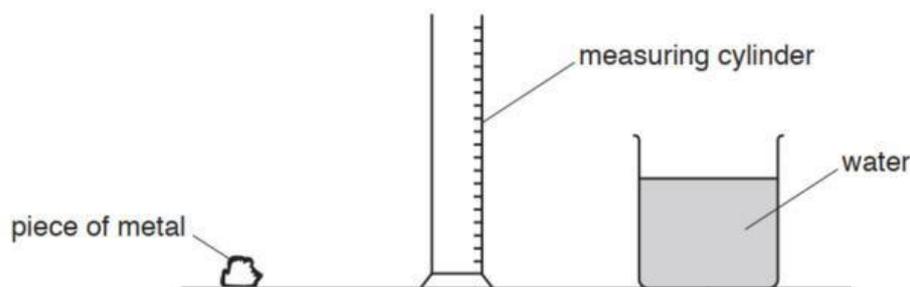

Fig. 2.1

The student measures the mass of the piece of metal. Its mass is 146g.
a. State the name of the tool used to measure the mass.

b. He pours 50 cm³ of water into the graduated cylinder, then places the metal piece inside. At this point, the water level in the cylinder is 70 cm³. Calculate the volume of the metal piece.

c. Calculate the density of the metal. State the unit.

3. Energy sources used to generate electricity are shown in the box.

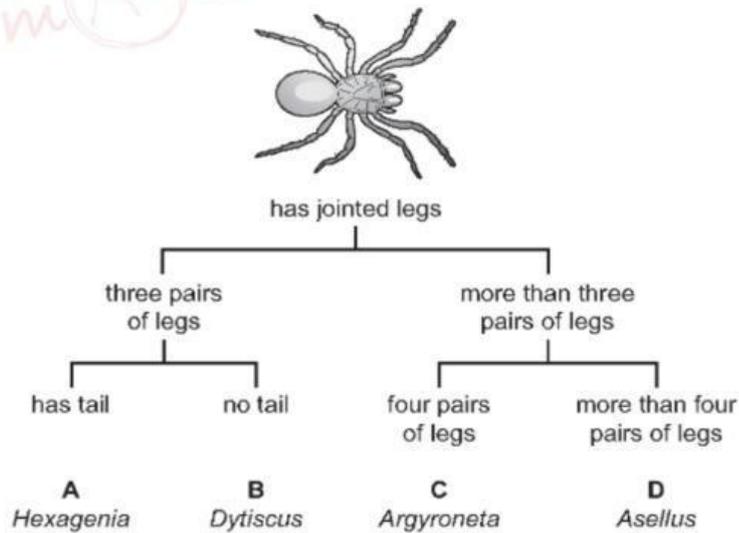| gas	oil	tides	waves	wind

Which energy sources are non-renewable?

Draw a ring around **each** energy source that is non-renewable.

BIOLOGY

Q1.

Use the key to identify the animal shown in the diagram.

has jointed legs

three pairs of legs — more than three pairs of legs

has tail — no tail — four pairs of legs — more than four pairs of legs

A *Hexagenia* — B *Dytiscus* — C *Argyroneta* — D *Asellus*

Q2.

Some yeast, sugar and water are mixed in a test-tube. The diagrams show the test-tube at the start and after one hour.

yeast, sugar and water

bubbles of gas

at start   after one hour
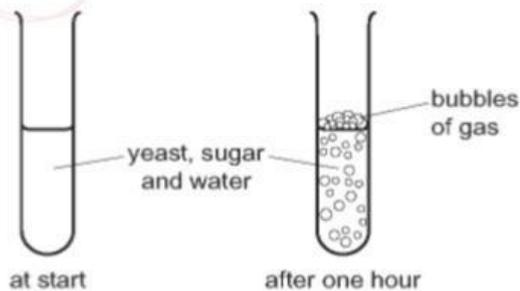
Which process causes this change?

A   growth

B   reproduction

C   respiration

D   sensitivity

LIVEWORKSHEETS

Q3.

The actual thickness of the leaf shown in the diagram is $2000\,\mu m$, but its thickness in the diagram is $50\,mm$.
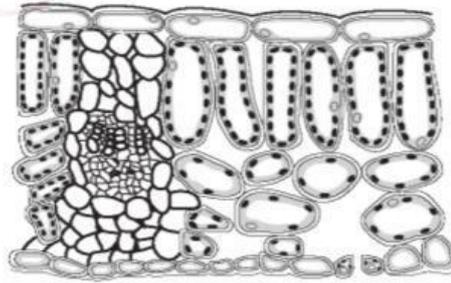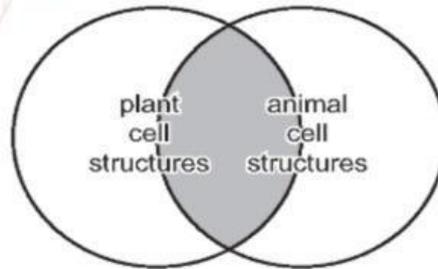

What is the magnification of the diagram?

| A | $\times 0.025$ | B | $\times 25$ | C | $\times 100$ | D | $\times 100\,000$ |

Q4.

The shaded area of the diagram represents structures found in both plant and animal cells.

Which cell structure is from the shaded area?
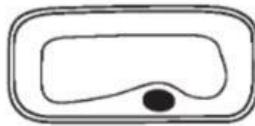
A   cell membrane

B   cell wall

C   chloroplast

D   large vacuole

Q5.

Which structure provides the best surface for diffusion?

A   atrium

B   bronchioles

C   ileum

D   trachea
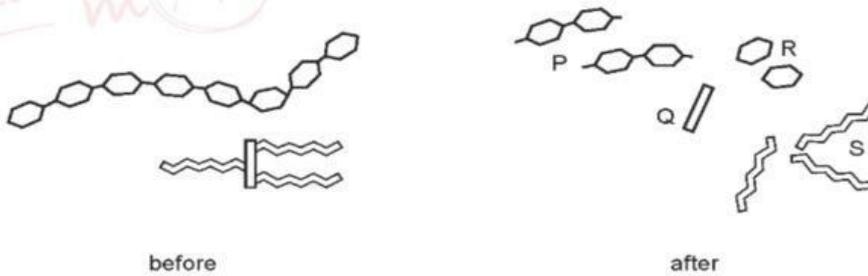
Q6.

The diagram shows a plant cell.

What is the appearance of this cell after it has been placed in pure water for 30 minutes?

A

B

C

D
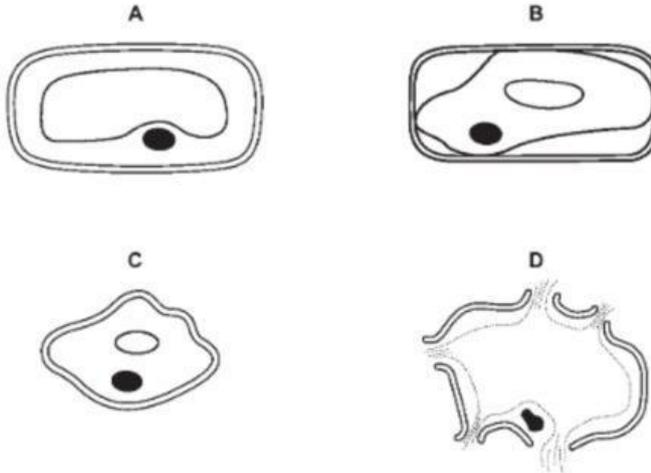
Q7.

The diagram shows two food molecules before and after they have been digested by enzymes.

before   after

What identifies the products of fat digestion?

A   P and R   B   P and S   C   Q and R   D   Q and S

Q8.   Four foods were tested for each of the following nutrients:

fat (using ethanol);

protein (using the biuret test);

reducing sugar (using Benedict's solution),

Which food contains protein and fat?

	colour of result of food test		
	purple / lilac	brick-red / orange	milky-white
A	✓	✗	✓
B	✓	✗	✗
C	✗	✓	✓
D	✗	✓	✗

key
✓ = nutrient present
✗ = nutrient absent

Q9.

Which substance catalyses the breakdown of fats to fatty acids and glycerol?

A   adrenaline

B   alcohol

C   bile

D   lipase

Q10.

Which group of compounds ensures that metabolic reactions take place effectively?

A   carbohydrates

B   enzymes

C   fatty acids

D   hormones

Q11.   An experiment was done using the apparatus shown in the diagram.

The carbon dioxide content of the water in each tube was measured at the start and again three hours later.

In which tube would there be a **decrease** in carbon dioxide content?
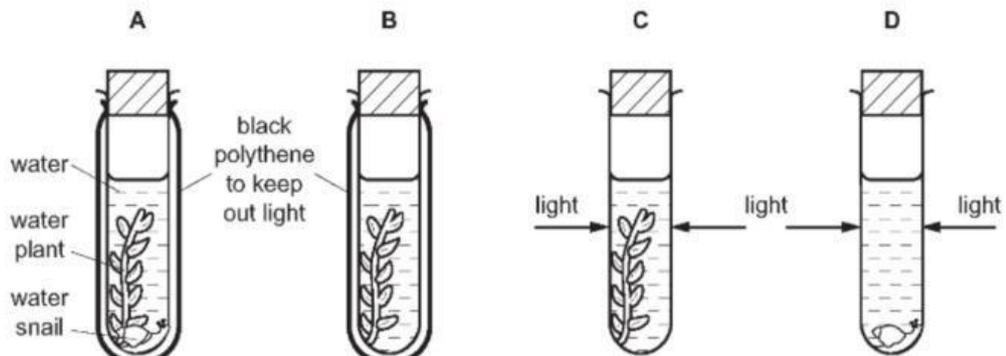
Q12.

What is formed first in a leaf as a result of photosynthesis?

A   chlorophyll

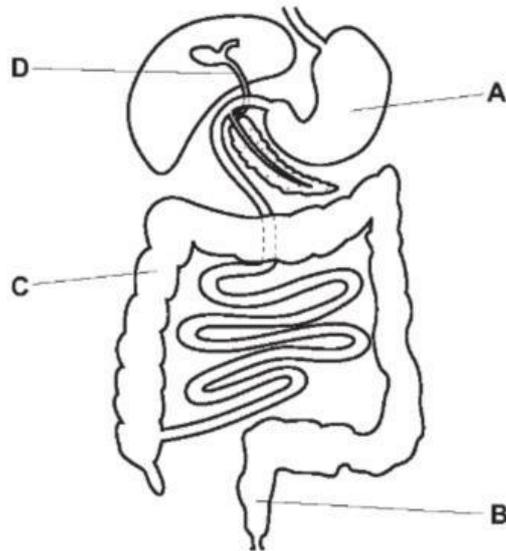B   glucose

C   starch

D   water

Q13.   Which diseases are caused by a lack of iron and a lack of vitamin D?

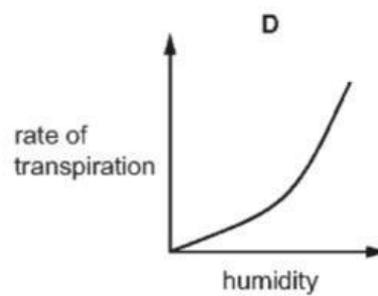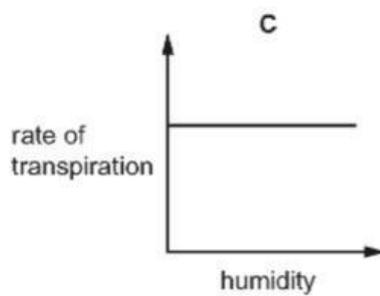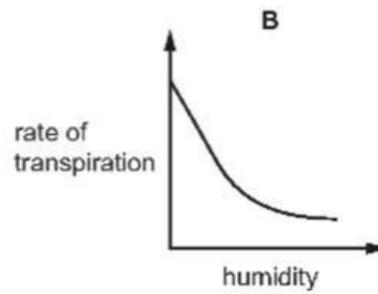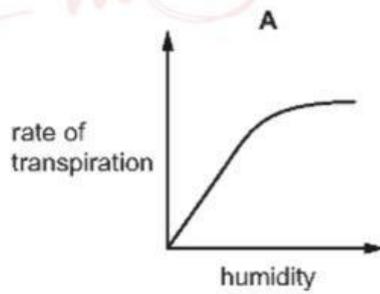|	lack of iron	lack of vitamin D
A	anaemia	soft bones
B	kwashiorkor	anaemia
C	kwashiorkor	soft bones
D	soft bones	anaemia

Q14.

The diagram shows the human alimentary canal.
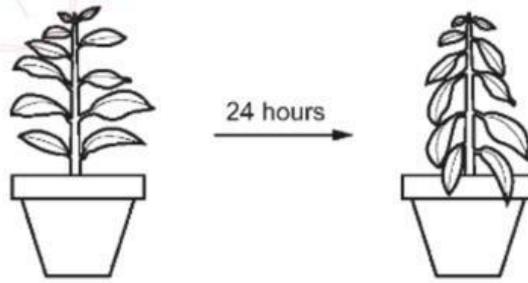
Which labelled part absorbs the most water?

Q15.

Which graph shows most clearly what will happen to the rate of transpiration as humidity increases?

Q16.

The diagram shows a potted plant and the same plant 24 hours later.

What causes the change in the appearance of the plant?

A   Water loss is greater than water uptake.

B   Water moves from the leaves to the stem.

C   Water uptake is equal to water loss.
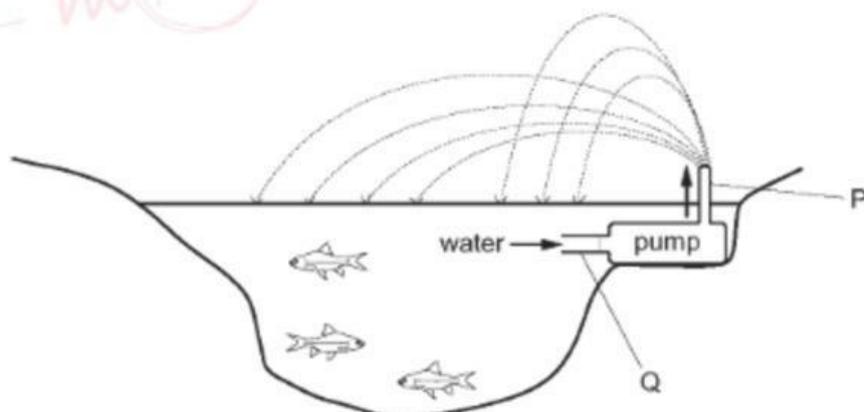
D   Water uptake is greater than water loss.

Q17.

What is a method of reducing the risk of coronary heart disease?

A   angioplasty

B   'by-pass' surgery

C   controlled exercise

D   inserting a stent

Q18.

The diagram shows a garden pond with a fountain worked by a pump. The fountain brings oxygen from the air to fish in the pond.

The system can be compared with part of the human circulatory system. The pump is compared with the heart.

What are P and Q compared with?

	P	Q
A	aorta	pulmonary artery
B	pulmonary artery	vena cava
C	pulmonary vein	vena cava
D	vena cava	aorta

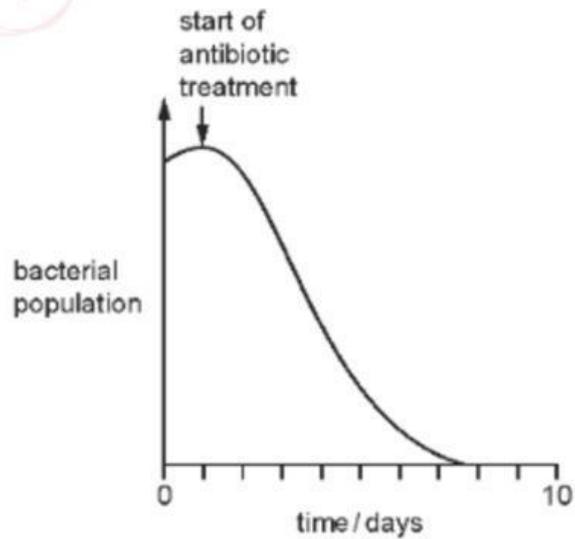**Q19.**

What can be passed from one person to another during blood transfusion?

A cholera

B chronic obstructive pulmonary disease (COPD)

C HIV

D scurvy

Q20.

The graph shows the effect of an antibiotic treatment on bacterial populations in the blood.

What conclusion can be drawn from the graph?

A   Antibiotics are effective against viral and bacterial infections.

B   Antibiotics cause reduction division in bacteria.

C   Antibiotics take ten days to kill all bacteria.

D   Before the start of antibiotic treatment the bacterial population was rising.

Q21.

Which part of a pathogen is recognised by the immune system?

A   active site

B   antibiotic

C   antibody

D   antigen

Q22.

A sample of expired air is collected in a gas jar. Another gas jar contains normal atmospheric air.

A lighted candle is placed inside each gas jar as shown. The time taken for each flame to go out is measured. As the candles burn they use up the oxygen available in the jar.
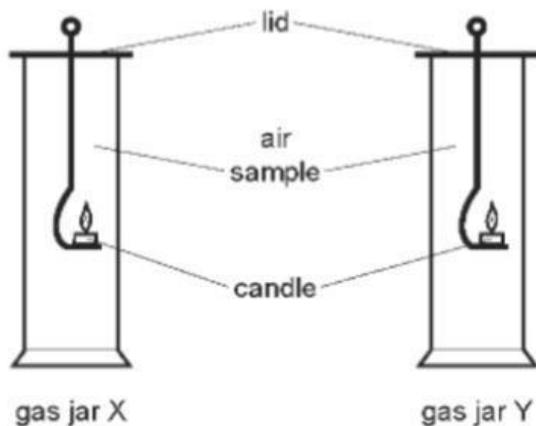
gas jar X   gas jar Y

The table shows the results of this experiment.

gas jar	time for candle flame to go out / s
X	15
Y	9

What is an explanation of the difference between the results in jars X and Y?

A   Jar X contains atmospheric air which has more carbon dioxide.

B   Jar X contains expired air which has more carbon dioxide.

C   Jar Y contains atmospheric air which has less oxygen.

D   Jar Y contains expired air which has less oxygen.