



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

**COMBINED SCIENCE**

**0653/12**

Paper 1 Multiple Choice

**October/November 2012**

**45 minutes**

Additional Materials: Multiple Choice Answer Sheet  
Soft clean eraser  
Soft pencil (type B or HB is recommended)



**READ THESE INSTRUCTIONS FIRST**

Write in soft pencil.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Write your name, Centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.

There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A, B, C** and **D**.

Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

**Read the instructions on the Answer Sheet very carefully.**

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Any rough working should be done in this booklet.

A copy of the Periodic Table is printed on page 20.

This document consists of **19** printed pages and **1** blank page.



1 What is diffusion?

- A net movement of molecules down a concentration gradient
- B net movement of molecules up a concentration gradient
- C total movement of molecules down a concentration gradient
- D total movement of molecules up a concentration gradient

2 Water enters a plant cell.

In what order does the water pass through the cell structures before reaching the vacuole?

- A cell surface membrane → cell wall → cytoplasm
- B cell wall → cell surface membrane → cytoplasm
- C cell wall → cytoplasm → cell surface membrane
- D cytoplasm → cell wall → cell surface membrane

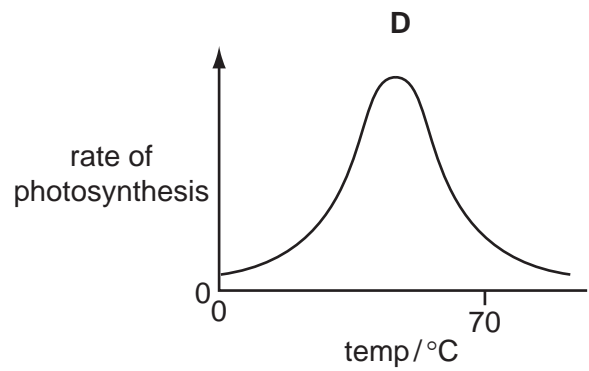
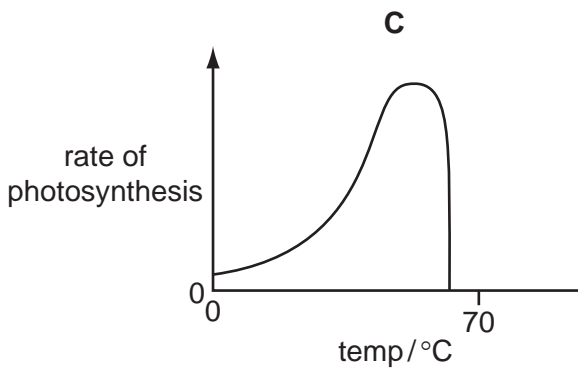
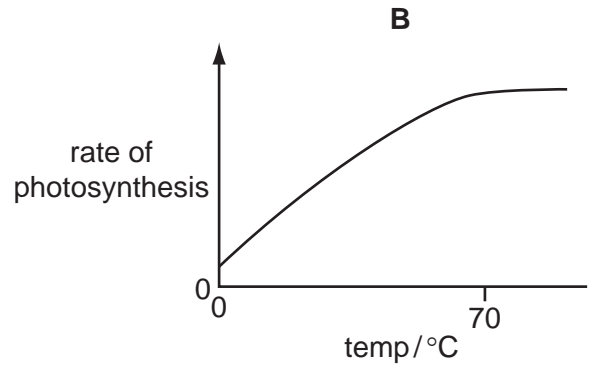
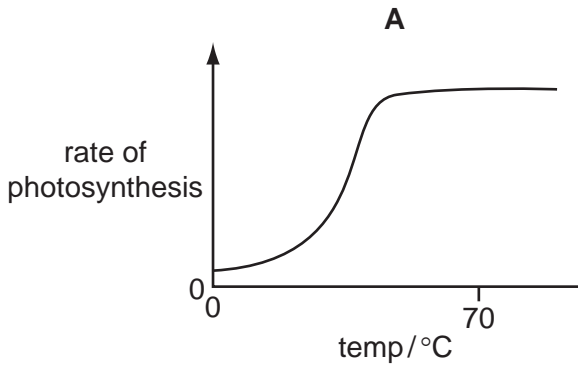
3 Water moves through the stomata of leaves during transpiration.

In which direction, and in which form, does it move?

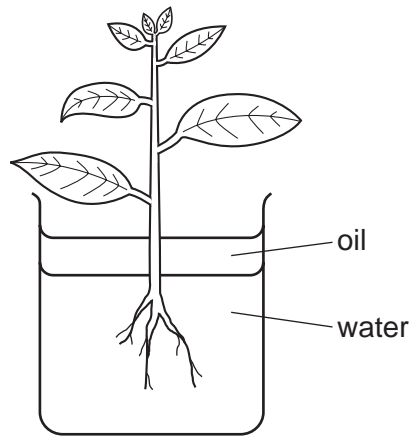
	direction	form
A	into the leaf	liquid
B	into the leaf	vapour
C	out of the leaf	liquid
D	out of the leaf	vapour

4 The chemical reactions in photosynthesis depend on enzymes.

Which graph shows the effect of temperature on the rate of these reactions?



- 5 The diagram shows a plant in a container of water. The layer of oil stops the water evaporating.

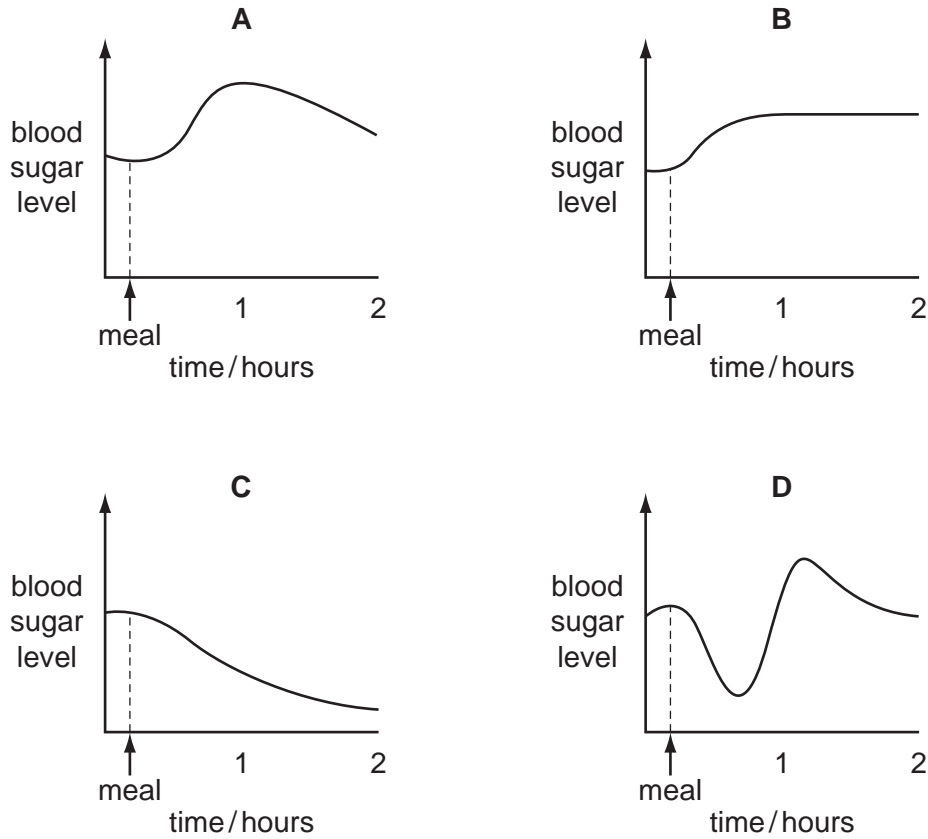


When set up, the apparatus weighs 296 g.  
After two hours it weighs 292 g.

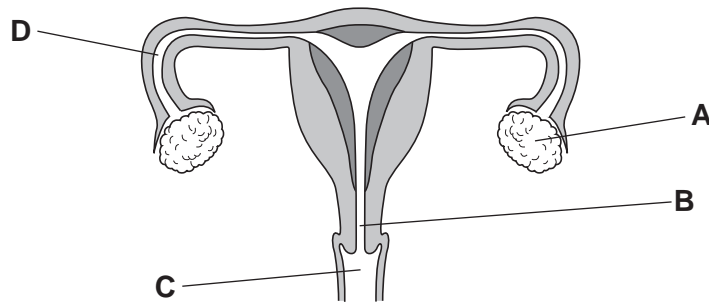
What is the rate of transpiration?

- A 150 g water/hour
  - B 148 g water/hour
  - C 4 g water/hour
  - D 2 g water/hour
- 6 Which of these places parts of the alimentary canal in the order in which food passes through them?
- A oesophagus → colon → small intestine
  - B small intestine → oesophagus → rectum
  - C small intestine → rectum → anus
  - D stomach → colon → small intestine
- 7 Which part of blood contains haemoglobin?
- A plasma
  - B platelets
  - C red blood cells
  - D white blood cells

- 8 A person does not eat for several hours but then has a meal rich in carbohydrate. Which graph shows how the person's blood sugar level changes after the meal?



- 9 The diagram shows the human female reproductive system. Where is the egg fertilised?



- 10 Which structures in flowers contain female gametes?

- A anthers
- B ovules
- C stamens
- D stigmas

11 It is possible to grow plants that are genetically identical.

What are plants grown in this way called?

- A clones
- B gametes
- C seeds
- D zygotes

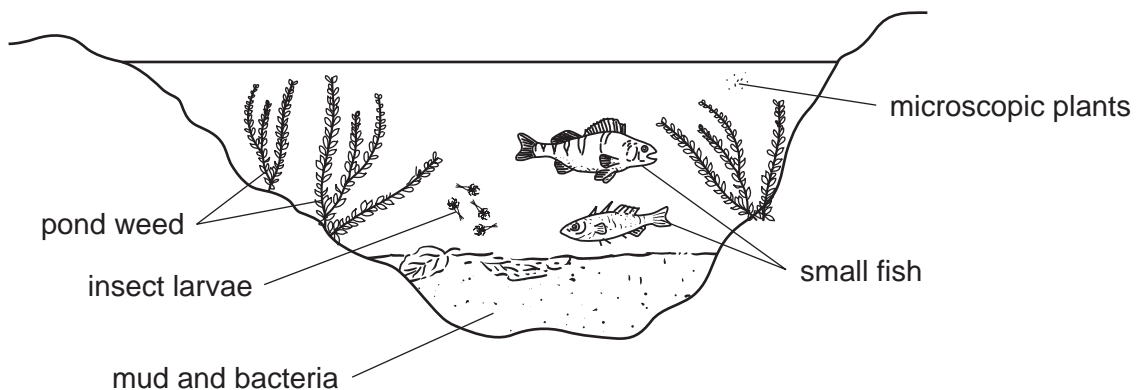
12 Some of the gases present in the atmosphere are listed.

- 1 carbon dioxide
- 2 methane
- 3 nitrogen
- 4 oxygen

Which gases increase global warming when their levels in the atmosphere increase?

- A 1 and 2
- B 1 and 4
- C 2 and 3
- D 3 and 4

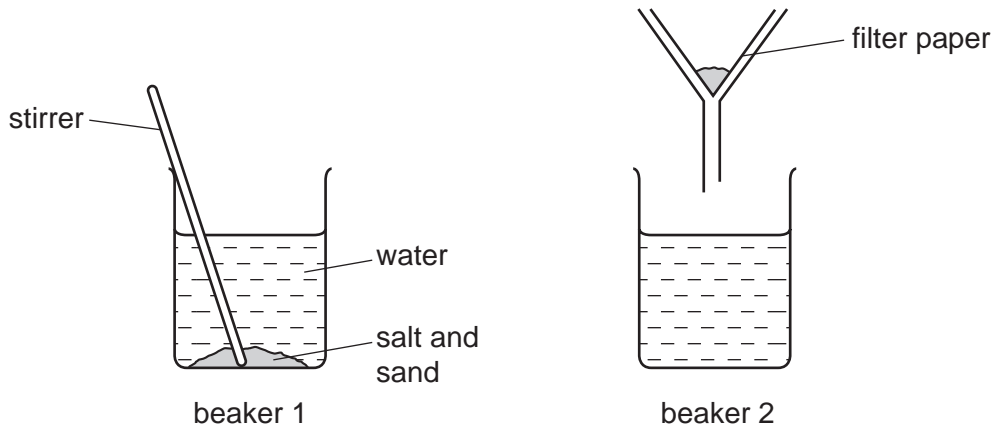
13 The diagram shows the organisms in a pond.



Which is a food chain in this pond?

- A bacteria → pond weed → insect larvae → small fish
- B microscopic plants → insect larvae → small fish → bacteria
- C pond weed → small fish → bacteria → microscopic plants
- D small fish → insect larvae → microscopic plants → pond weed

14 The apparatus shown is used to remove sand from a mixture of salt and sand.



The contents of beaker 1 are filtered.

What is obtained in beaker 2?

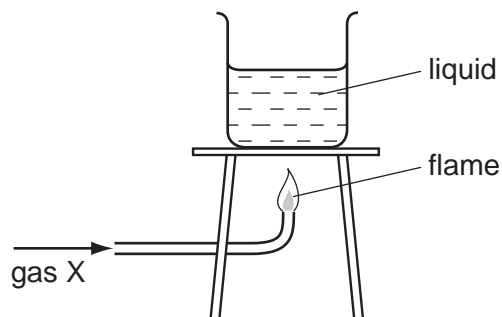
- A a mixture of an element and a compound
- B a mixture of two compounds
- C one compound only
- D one element only

15 The electronic configurations of four elements are given.

Which element is found on the left-hand side of the Periodic Table?

- A 2                      B 2, 8, 7                      C 2, 8, 8                      D 2, 8, 8, 2

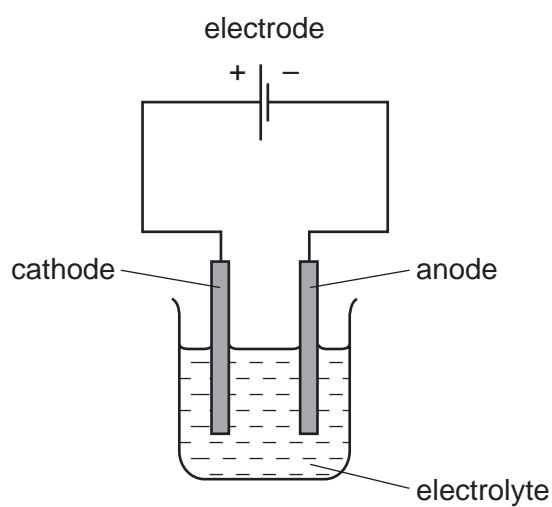
16 The diagram shows gas X burning and heating a liquid.



Which row is correct?

	gas X could be	the burning of gas X is exothermic
<b>A</b>	hydrogen	✓
<b>B</b>	hydrogen	x
<b>C</b>	oxygen	✓
<b>D</b>	oxygen	x

17 The diagram shows a simple cell.

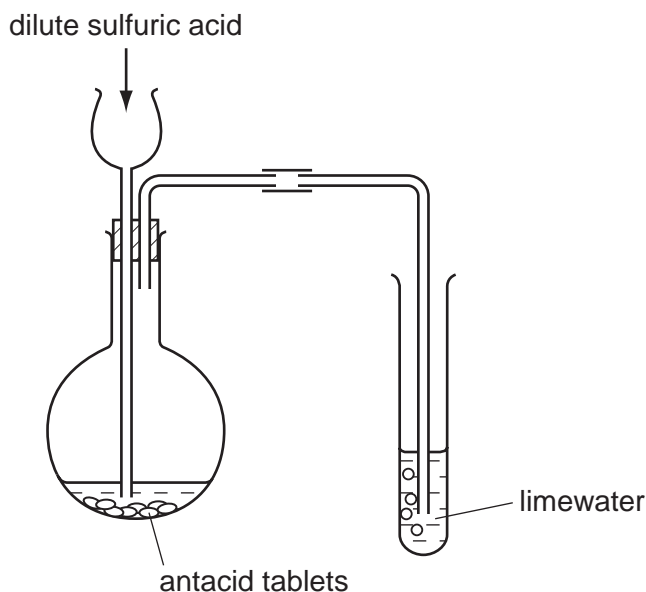


Which label on the diagram is correct?

- A** anode
- B** cathode
- C** electrode
- D** electrolyte



18 Dilute sulfuric acid is added to antacid tablets in the apparatus shown.

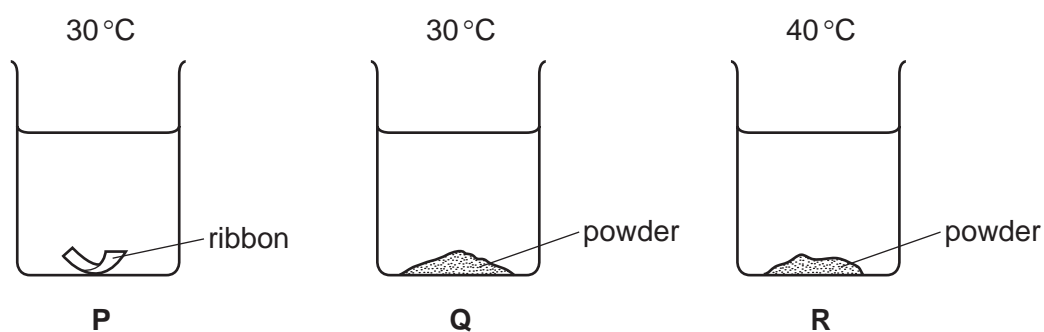


The limewater turns milky.

What does the experiment show these antacid tablets contain?

- A magnesium
- B magnesium carbonate
- C magnesium hydroxide
- D magnesium oxide

19 In the beakers, equal masses of magnesium are added to equal volumes of acid of the same concentration.



What is the order of the speed of reaction in the beakers?

	slowest	→	fastest
<b>A</b>	P		R
<b>B</b>	P		Q
<b>C</b>	Q		R
<b>D</b>	Q		P

20 Which ion gives a white precipitate **both** with aqueous sodium hydroxide **and** with aqueous ammonia?

- A  $\text{Cu}^{2+}(\text{aq})$       B  $\text{Fe}^{2+}(\text{aq})$       C  $\text{Fe}^{3+}(\text{aq})$       D  $\text{Zn}^{2+}(\text{aq})$

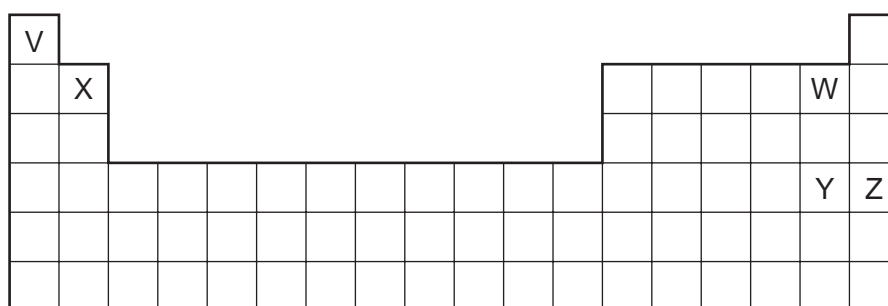
21 Platinite is a material used for parts of light bulbs. It is made by mixing iron and zinc.

Which type of substance is platinite?

- A alloy  
B hydrocarbon  
C ionic compound  
D transition metal

22 The diagram shows an outline of the Periodic Table.

Which two elements have similar chemical properties?



- A V and W      B V and X      C W and Y      D Y and Z

23 Element X is unaffected by acids and is used in an alloy to make jewellery.

X is .....1..... transition metal and the alloy is .....2..... than the pure element.

Which words correctly complete gaps 1 and 2?

	1	2
<b>A</b>	an unreactive	harder
<b>B</b>	an unreactive	softer
<b>C</b>	a reactive	harder
<b>D</b>	a reactive	softer

24 The list shows different properties.

- 1 density
- 2 melting point
- 3 reactivity

Which properties show an increase for elements in Group VII as the group is descended?

- A** 1 only      **B** 1 and 2      **C** 2 and 3      **D** 3 only

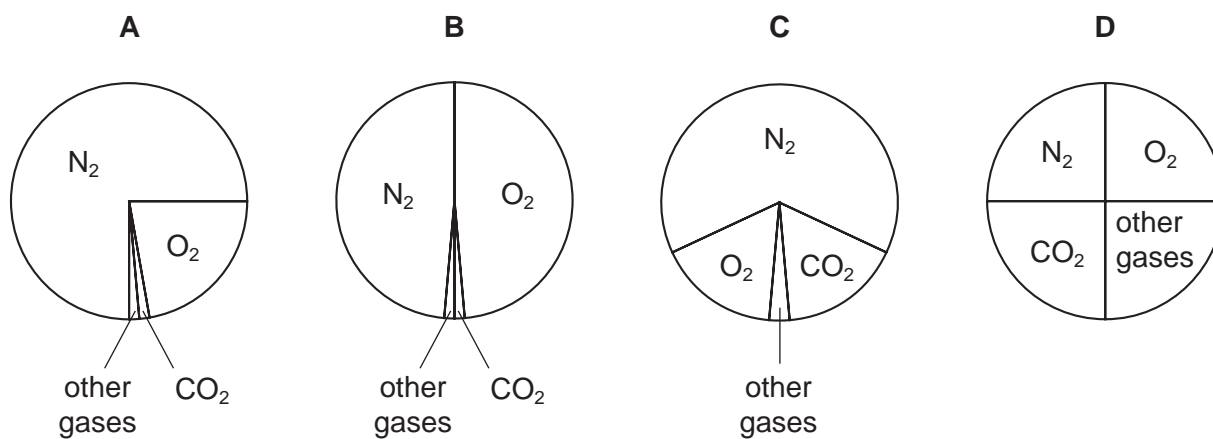
25 Petroleum is a source of hydrocarbon fuels.

Other fuels are coal and wood.

Which of these are fossil fuels?

	coal	wood	petroleum
<b>A</b>	yes	yes	no
<b>B</b>	yes	no	yes
<b>C</b>	no	yes	yes
<b>D</b>	yes	yes	yes

26 Which pie chart correctly shows the proportions of gases in the air?



27 A hydrocarbon fuel is burned completely.



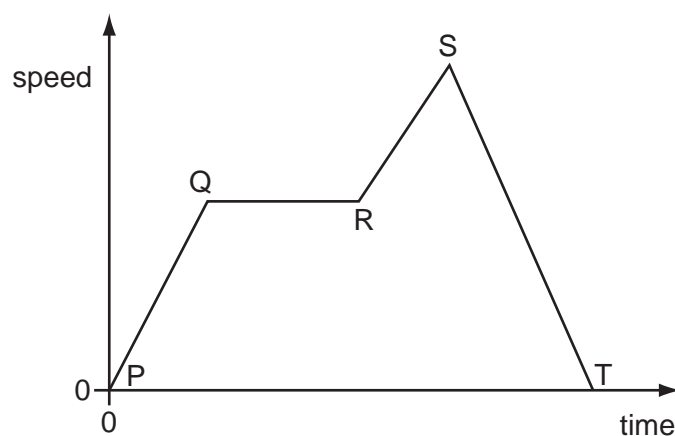
What are X and Y?

	X	Y
<b>A</b>	CO	H <sub>2</sub>
<b>B</b>	CO	H <sub>2</sub> O
<b>C</b>	CO <sub>2</sub>	H <sub>2</sub>
<b>D</b>	CO <sub>2</sub>	H <sub>2</sub> O

28 What is the unit of work?

- A** joule
- B** kilogram
- C** newton
- D** watt

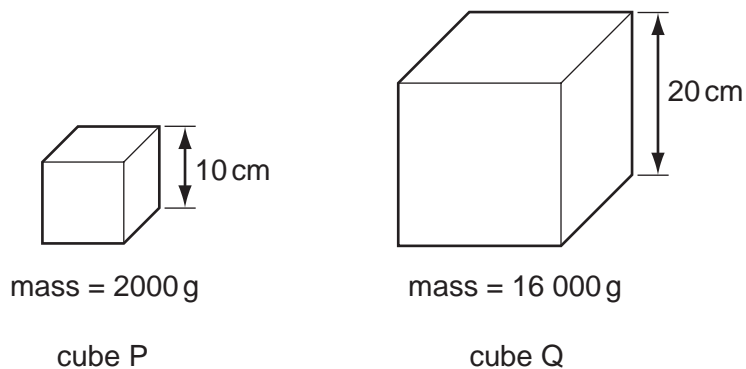
29 The diagram is a speed/time graph for a car travelling along a city street.



Where on the graph is the car moving with changing speed?

- A** PQ, QR, RS and ST
- B** PQ, RS and ST only
- C** PQ and RS only
- D** QR only

30 The diagram shows two cubes P and Q. The lengths of their sides and their masses are given.

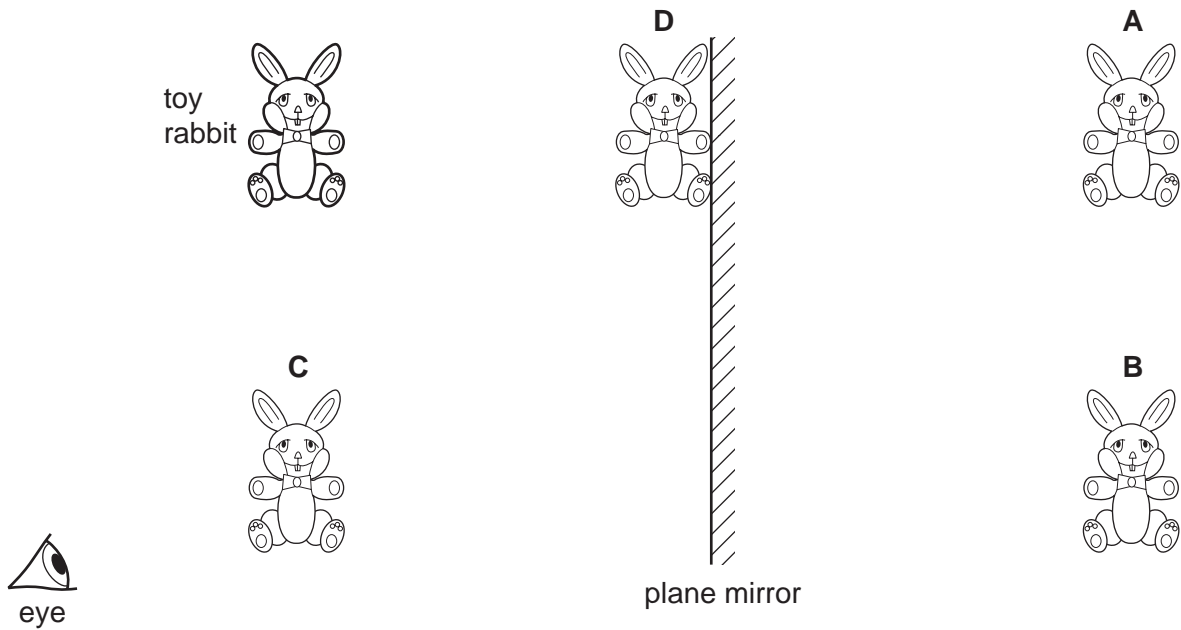


What is the density of the material of cube Q?

- A half that of cube P
  - B the same as that of cube P
  - C twice that of cube P
  - D four times that of cube P
- 31 In which state(s) of matter can convection occur?
- A solids and liquids
  - B solids and gases
  - C liquids and gases
  - D liquids only
- 32 The melting point of water is  $0^{\circ}\text{C}$  and the boiling point of water is  $100^{\circ}\text{C}$ .
- Which statement about water is correct?
- A At  $100^{\circ}\text{C}$  boiling occurs throughout the water.
  - B Between  $0^{\circ}\text{C}$  and  $100^{\circ}\text{C}$  the lowest energy molecules escape.
  - C Between  $0^{\circ}\text{C}$  and  $100^{\circ}\text{C}$  water does not evaporate.
  - D Ice only melts when its temperature is above  $0^{\circ}\text{C}$ .

- 33 The diagram shows the position of the eye of a person looking at the reflection of a toy rabbit in a plane mirror.

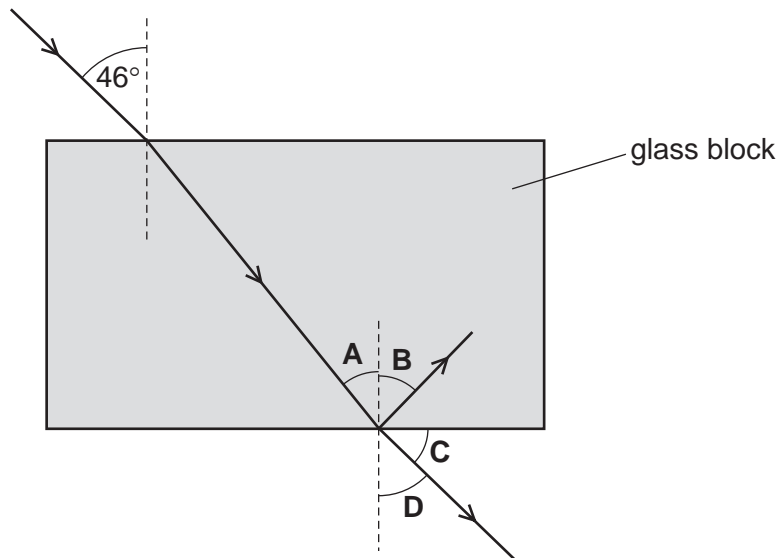
At which position is the image seen?



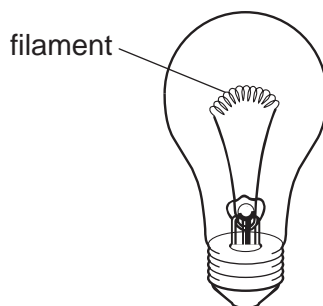
- 34 A ray of light strikes one face of a parallel-sided glass block. The angle of incidence is  $46^\circ$ .

At the opposite face, part of the ray is reflected and part is refracted into the air.

Which other angle has a value of  $46^\circ$ ?



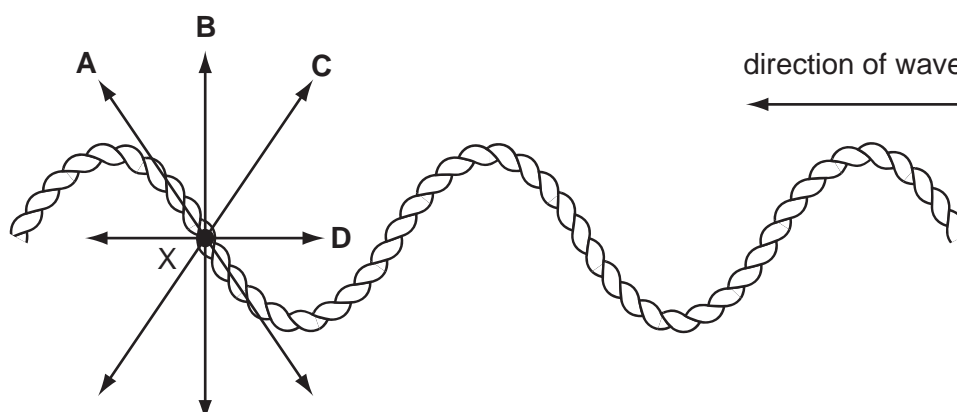
35 The diagram shows a filament lamp.



What are the main types of wave given out by the filament once the lamp is lit?

- A visible light and infra-red
- B visible light and microwaves
- C visible light and radio
- D visible light and ultraviolet

36 A wave is sent along a rope in the direction shown in the diagram.



Which arrow shows the direction of vibration of the rope at point X?

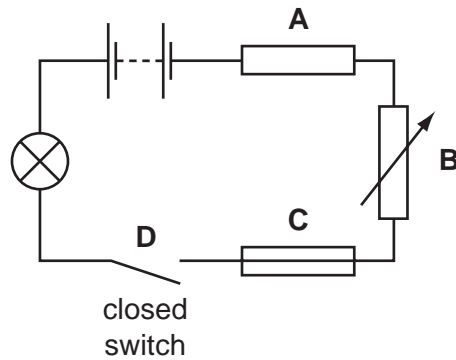
37 A starting pistol is fired. An echo from a wall 150 m away is heard one second later.

What is the speed of sound calculated from these results?

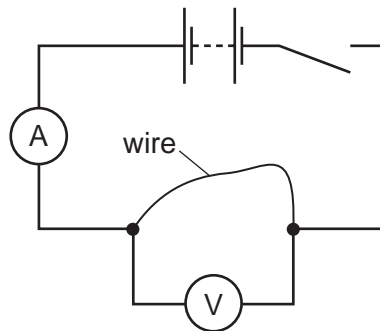
- A 75 m/s
- B 150 m/s
- C 225 m/s
- D 300 m/s

38 When the switch in the circuit shown is closed, the lamp glows dimly.

Which component can be adjusted to make the lamp brighter?



39 A student sets up a circuit to find the resistance of a length of wire.



When the switch is closed, the ammeter reads 2 A and the voltmeter reads 10 V.

What is the resistance of the length of wire?

- A**  $0.2\ \Omega$       **B**  $5\ \Omega$       **C**  $8\ \Omega$       **D**  $20\ \Omega$



- 40 In an electrical circuit, what is the purpose of a fuse?
- A to connect the metal case of an appliance to the earth
  - B to cut off the electrical supply if too much current flows
  - C to keep an electrical appliance dry in damp conditions
  - D to maintain a steady voltage as the current varies





**DATA SHEET**  
**The Periodic Table of the Elements**

		Group															
		I	II	III	IV	V	VI	VII	VIII	IX	X						
		1 <b>H</b> Hydrogen 1															
		4 <b>He</b> Helium 2															
7	9	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
<b>Li</b> Lithium	<b>Be</b> Beryllium	<b>B</b> Boron	<b>C</b> Carbon	<b>N</b> Nitrogen	<b>O</b> Oxygen	<b>F</b> Fluorine	<b>Ne</b> Neon	<b>Na</b> Sodium	<b>Mg</b> Magnesium	<b>Al</b> Aluminium	<b>Si</b> Silicon	<b>P</b> Phosphorus	<b>S</b> Sulfur	<b>Cl</b> Chlorine	<b>Ar</b> Argon	<b>K</b> Potassium	<b>Ca</b> Calcium
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
<b>K</b> Potassium	<b>Ca</b> Calcium	<b>Sc</b> Scandium	<b>Ti</b> Titanium	<b>V</b> Vanadium	<b>Cr</b> Chromium	<b>Mn</b> Manganese	<b>Fe</b> Iron	<b>Co</b> Cobalt	<b>Ni</b> Nickel	<b>Cu</b> Copper	<b>Zn</b> Zinc	<b>Ga</b> Gallium	<b>Ge</b> Germanium	<b>As</b> Arsenic	<b>Se</b> Selenium	<b>Br</b> Bromine	<b>Kr</b> Krypton
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
<b>Rb</b> Rubidium	<b>Sr</b> Strontium	<b>Y</b> Yttrium	<b>Zr</b> Zirconium	<b>Nb</b> Niobium	<b>Mo</b> Molybdenum	<b>Tc</b> Technetium	<b>Ru</b> Ruthenium	<b>Rh</b> Rhodium	<b>Pd</b> Palladium	<b>Ag</b> Silver	<b>Cd</b> Cadmium	<b>In</b> Indium	<b>Sn</b> Tin	<b>Sb</b> Antimony	<b>Te</b> Tellurium	<b>I</b> Iodine	<b>Xe</b> Xenon
55	56	57	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86
<b>Cs</b> Caesium	<b>Ba</b> Barium	<b>La</b> Lanthanum	<b>Hf</b> Hafnium	<b>Ta</b> Tantalum	<b>W</b> Tungsten	<b>Re</b> Rhenium	<b>Os</b> Osmium	<b>Ir</b> Iridium	<b>Pt</b> Platinum	<b>Au</b> Gold	<b>Hg</b> Mercury	<b>Tl</b> Thallium	<b>Pb</b> Lead	<b>Bi</b> Bismuth	<b>Po</b> Polonium	<b>At</b> Astatine	<b>Rn</b> Radon
87	88	89	†	†	†	†	†	†	†	†	†	†	†	†	†	†	†
<b>Fr</b> Francium	<b>Ra</b> Radium	<b>Ac</b> Actinium															
		*58-71 Lanthanoid series															
		†90-103 Actinoid series															
Key	<div style="display: flex; justify-content: space-between;"> <span>a</span> <span>X</span> <span>b</span> </div> <p style="font-size: small; margin-top: 5px;">           a = relative atomic mass            X = atomic symbol            b = proton (atomic) number         </p>	140	141	144	150	152	157	159	162	165	167	169	173	175			
		<b>Ce</b> Cerium	<b>Pr</b> Praseodymium	<b>Nd</b> Neodymium	<b>Sm</b> Samarium	<b>Eu</b> Europium	<b>Gd</b> Gadolinium	<b>Tb</b> Terbium	<b>Dy</b> Dysprosium	<b>Ho</b> Holmium	<b>Er</b> Erbium	<b>Tm</b> Thulium	<b>Yb</b> Ytterbium	<b>Lu</b> Lutetium			
		58	59	60	62	63	64	65	66	67	68	69	70	71			
		90	91	92	94	95	96	97	98	99	100	101	102	103			
		<b>Th</b> Thorium	<b>Pa</b> Protactinium	<b>U</b> Uranium	<b>Pu</b> Plutonium	<b>Am</b> Americium	<b>Cm</b> Curium	<b>Bk</b> Berkelium	<b>Cf</b> Californium	<b>Es</b> Einsteinium	<b>Fm</b> Fermium	<b>Md</b> Mendelevium	<b>No</b> Nobelium	<b>Lr</b> Lawrencium			

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).

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