



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

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COMBINED SCIENCE

0653/11

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.

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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**.

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

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- 1 Water enters a plant cell.

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

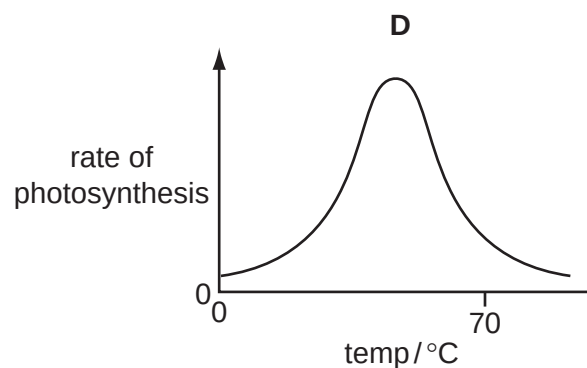
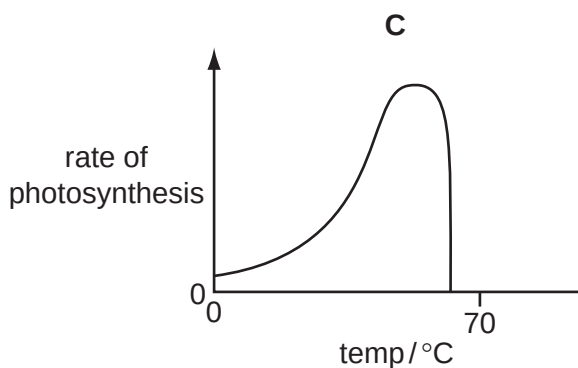
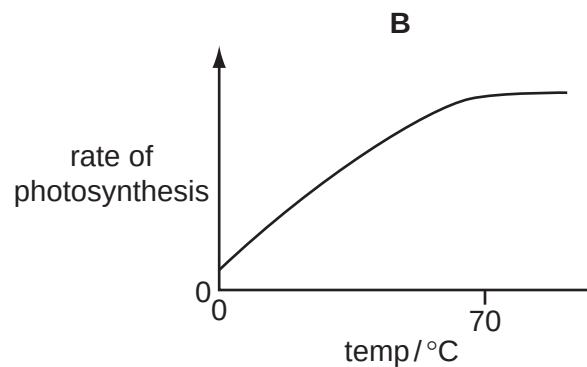
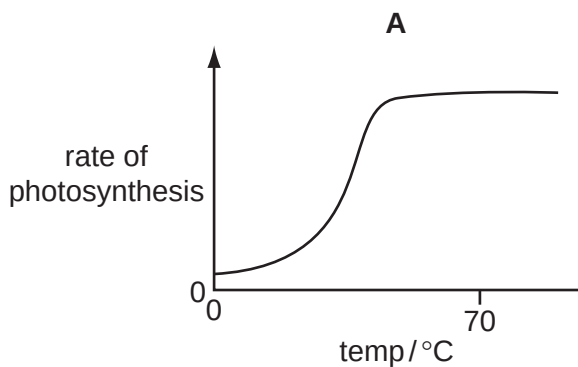
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- A net movement of molecules down a concentration gradient
- B net movement of molecules up a concentration gradient
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- 3 The chemical reactions in photosynthesis depend on enzymes.

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



- 4 Water moves through the stomata of leaves during transpiration.

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

	direction	form
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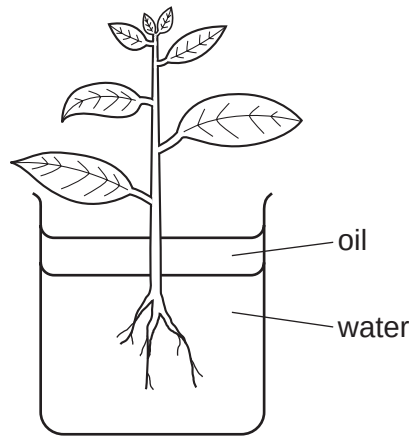
- 5 Which of these places parts of the alimentary canal in the order in which food passes through them?

- A** oesophagus → colon → small intestine
- B** small intestine → oesophagus → rectum
- C** small intestine → rectum → anus
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- 6 Which part of blood contains haemoglobin?

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- 7 The diagram shows a plant in a container of water. The layer of oil stops the water ev

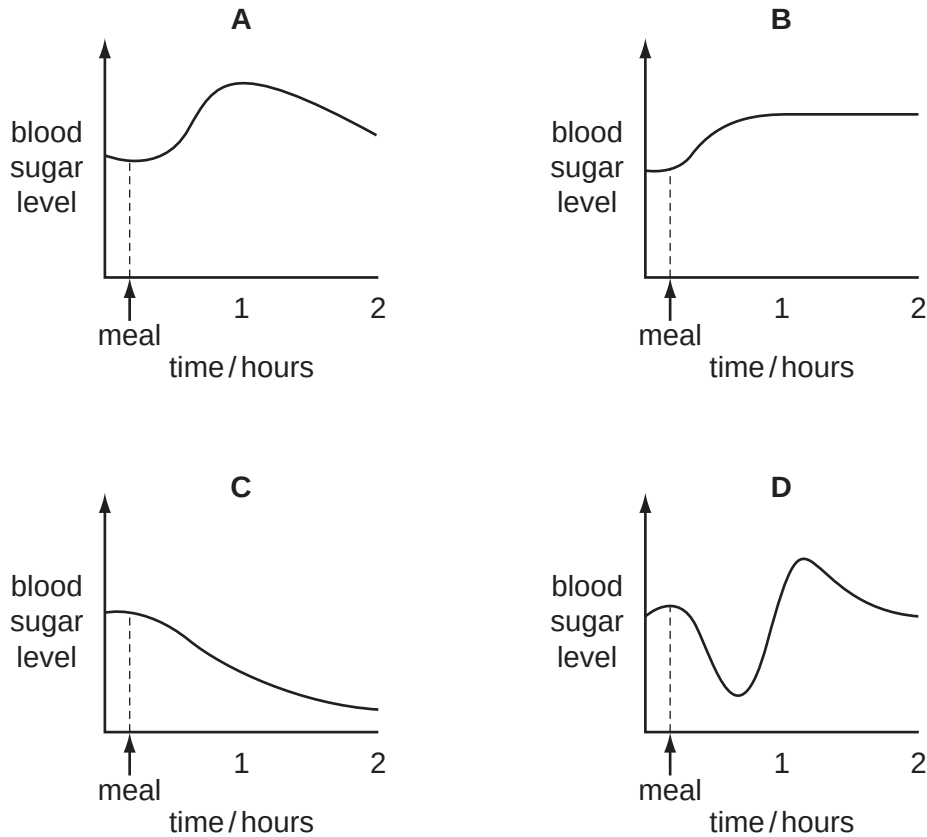


When set up, the apparatus weighs 296 g.
After two hours it weighs 292 g.

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

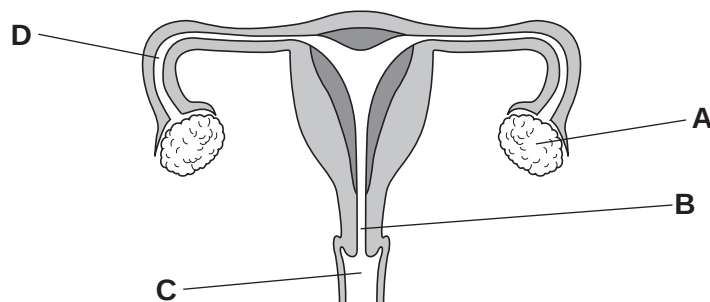
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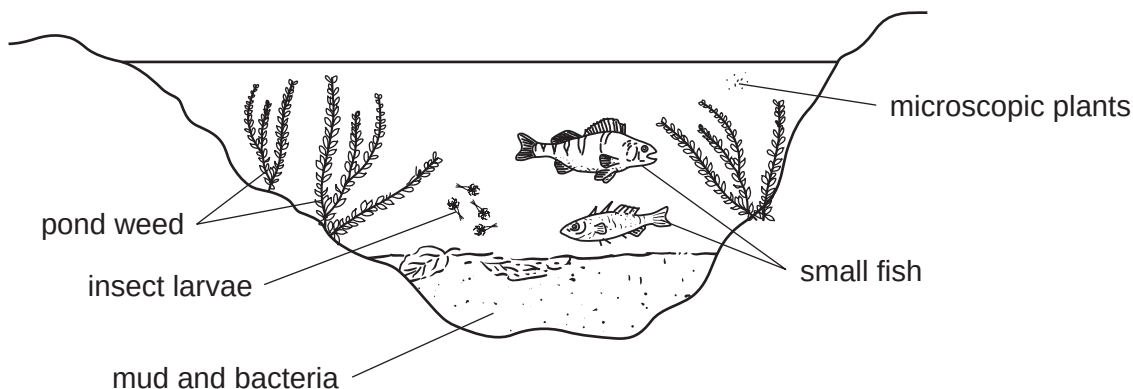
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- Where is the egg fertilised?



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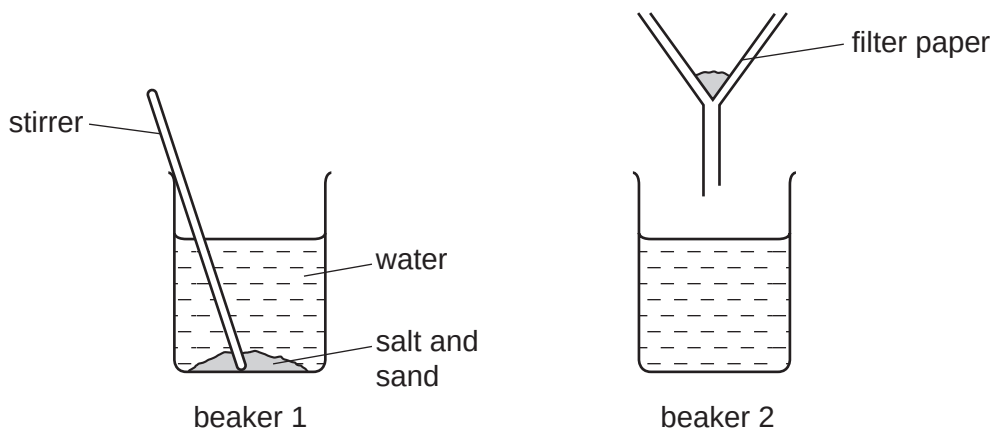
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- 1 carbon dioxide
- 2 methane
- 3 nitrogen
- 4 oxygen

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

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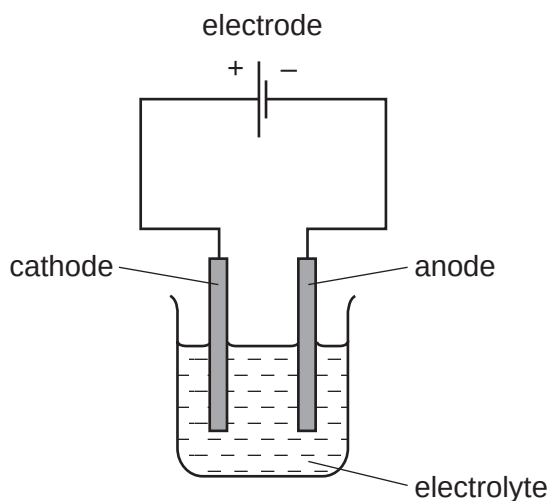


The contents of beaker 1 are filtered.

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

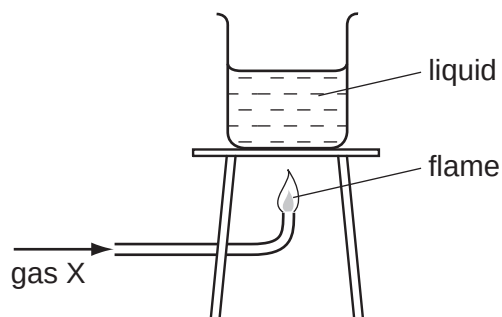
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Which label on the diagram is correct?

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- C electrode
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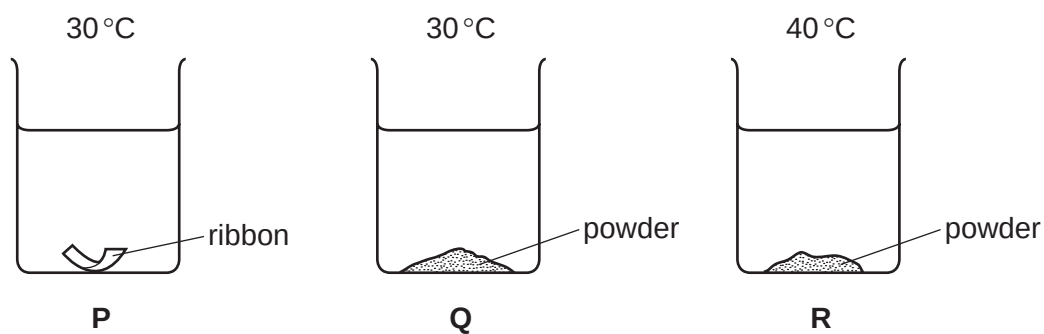
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Which row is correct?

	gas X could be	the burning of gas X is exothermic
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C	oxygen	✓
D	oxygen	x

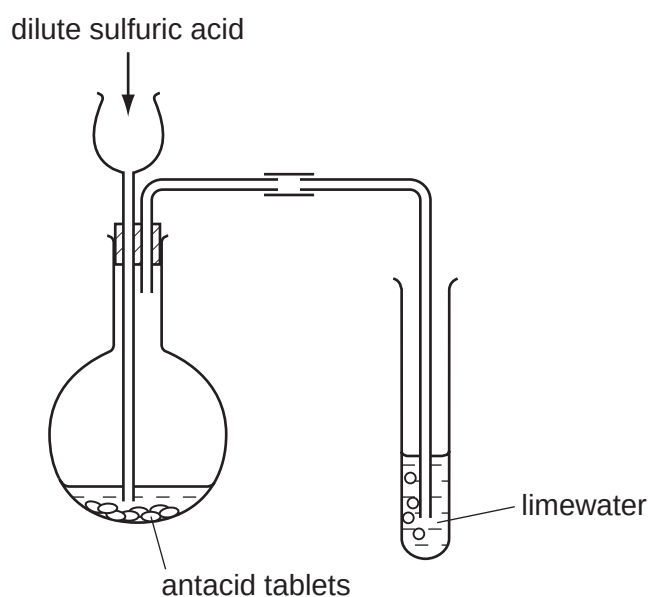
- 18 In the beakers, equal masses of magnesium are added to equal volumes of acid concentration.



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

	slowest	→	fastest
A	P	Q	R
B	P	R	Q
C	Q	P	R
D	Q	R	P

- 19 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

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

Which two elements have similar chemical properties?

[illegible]

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

- 1 density
- 2 melting point
- 3 reactivity

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

Which type of substance is platinite?

A alloy
B hydrocarbon
C ionic compound
D transition metal

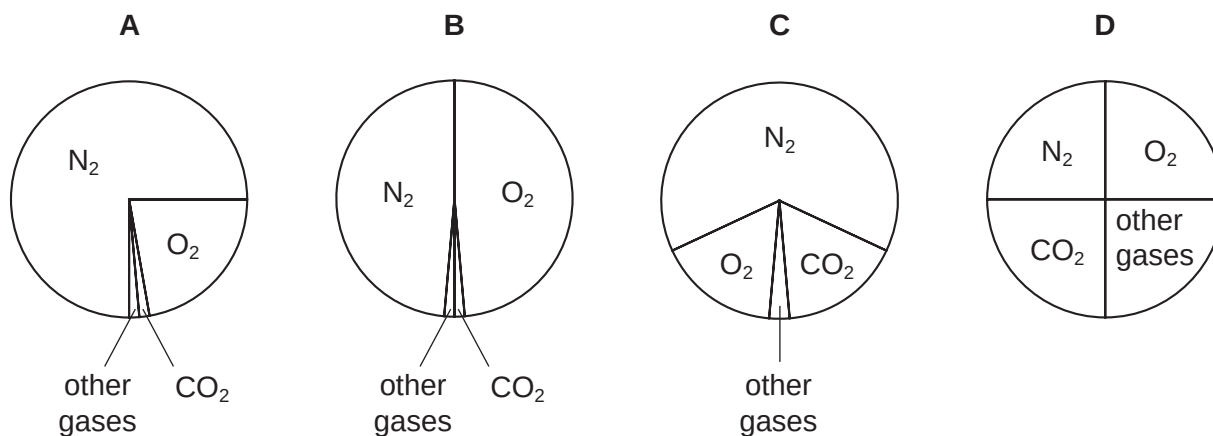
24 Element X is unaffected by acids and is used in an alloy to make jewellery.

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

Which words correctly complete gaps 1 and 2?

	1	2
A	an unreactive	harder
B	an unreactive	softer
C	a reactive	harder
D	a reactive	softer

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



26 A hydrocarbon fuel is burned completely.



What are X and Y?

	X	Y
A	CO	H_2
B	CO	H_2O
C	CO_2	H_2
D	CO_2	H_2O

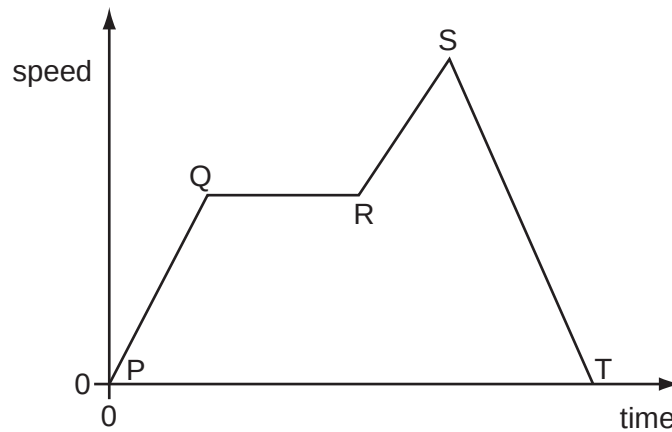
27 Petroleum is a source of hydrocarbon fuels.

Other fuels are coal and wood.

Which of these are fossil fuels?

	coal	wood	petroleum
A	yes	yes	no
B	yes	no	yes
C	no	yes	yes
D	yes	yes	yes

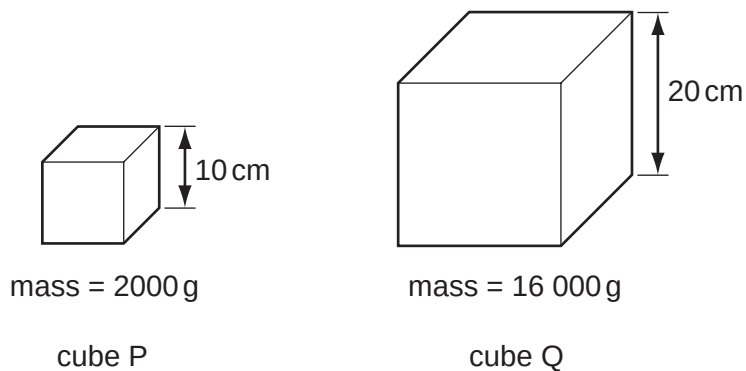
28 The diagram is a speed/time graph for a car travelling along a city street.



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

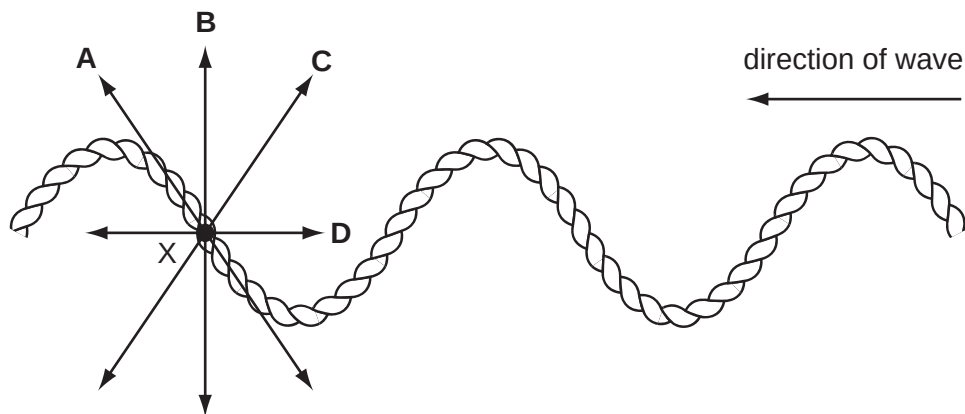
- 29 The diagram shows two cubes P and Q. The lengths of their sides and their masses are



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
- 30 What is the unit of work?
- A joule
 - B kilogram
 - C newton
 - D watt
- 31 The melting point of water is 0°C and the boiling point of water is 100°C .
- Which statement about water is correct?
- A At 100°C boiling occurs throughout the water.
 - B Between 0°C and 100°C the lowest energy molecules escape.
 - C Between 0°C and 100°C water does not evaporate.
 - D Ice only melts when its temperature is above 0°C .
- 32 In which state(s) of matter can convection occur?
- A solids and liquids
 - B solids and gases
 - C liquids and gases
 - D liquids only

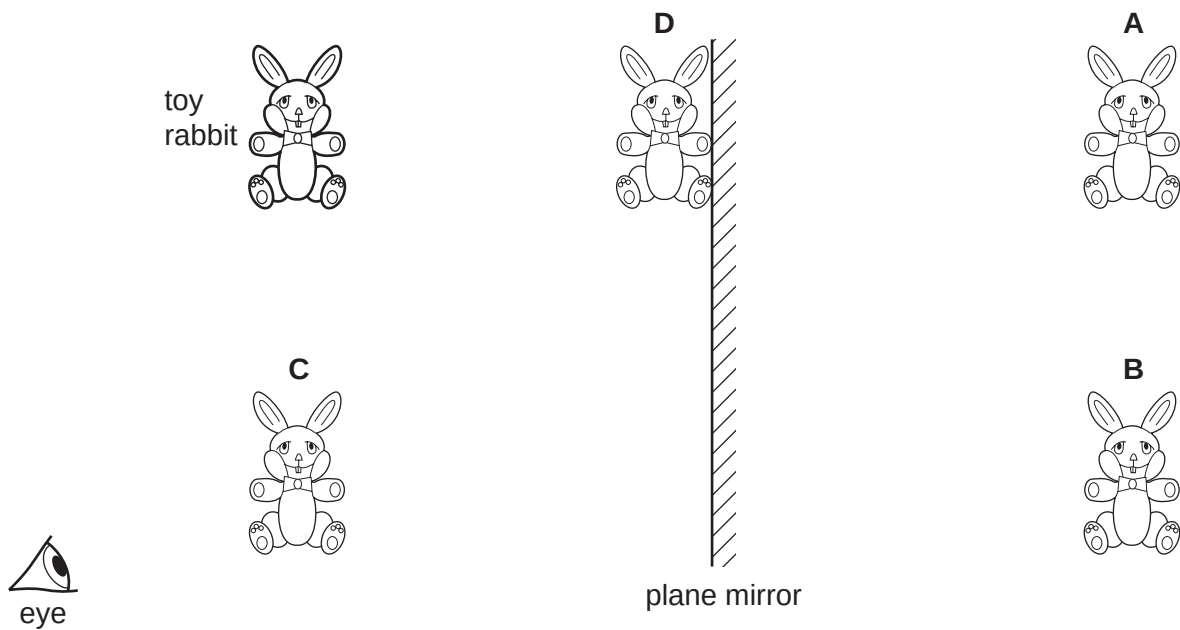
- 33 A wave is sent along a rope in the direction shown in the diagram.



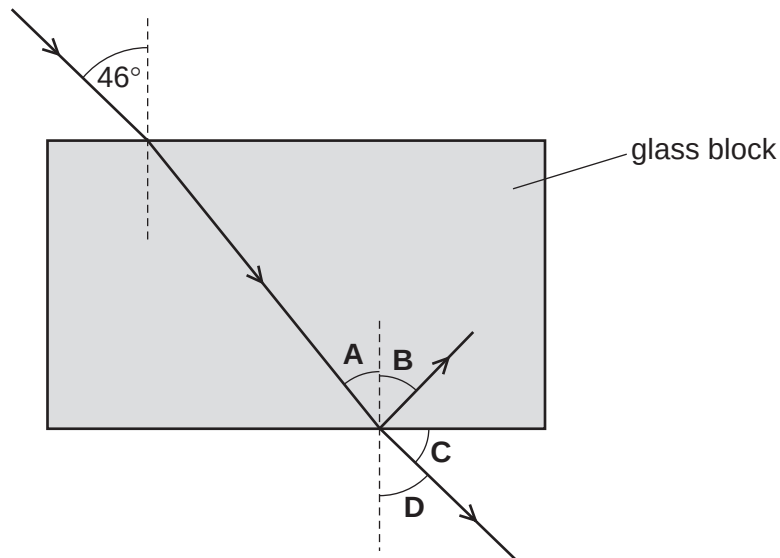
Which arrow shows the direction of vibration of the rope at point X?

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

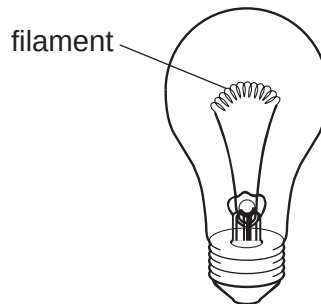
At which position is the image seen?



- 35** A ray of light strikes one face of a parallel-sided glass block. The angle of incidence is 46° . 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° ?



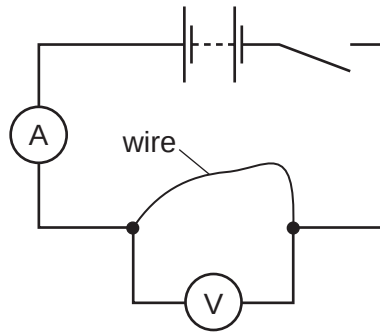
- 36** The diagram shows a filament lamp.



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

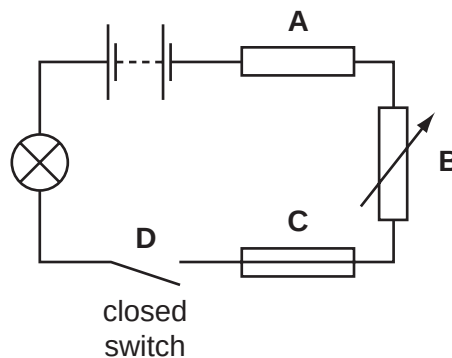


When the switch is closed, the ammeter reads 2 A and the voltmeter reads 10 V.

What is the resistance of the length of wire?

- A** $0.2\ \Omega$ **B** $5\ \Omega$ **C** $8\ \Omega$ **D** $20\ \Omega$
- 39 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
- 40 When the switch in the circuit shown is closed, the lamp glows dimly.

Which component can be adjusted to make the lamp brighter?



Group

140	Ce Cerium	141	Pr Praseodymium	144	Nd Neodymium	144	Pm Promethium	150	Sm Samarium	152	Eu Europium	157	Gd Gadolinium	159	Tb Terbium	162	Dy Dysprosium	165	Ho Holmium	167	Er Erbium	169	Tm Thulium	173	Yb Ytterbium	175	Lu Lutetium
90	Th Thorium	91	Pa Protactinium	92	U Uranium	93	Np Neptunium	94	Pu Plutonium	95	Am Americium	96	Cm Curium	97	Bk Berkelium	98	Cf Californium	99	Es Einsteinium	100	Fm Fermium	101	Md Mendelevium	102	No Nobelium	103	Lr Lawrencium

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

Key

a	a = relative atomic mass
X	X = atomic symbol
b	b = proton (atomic) number

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

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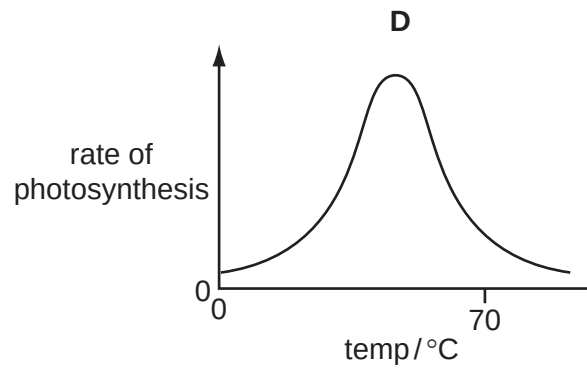
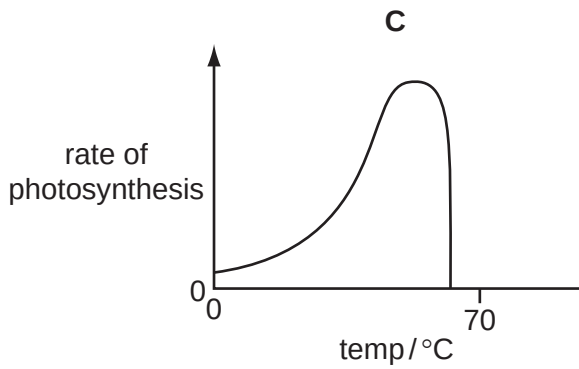
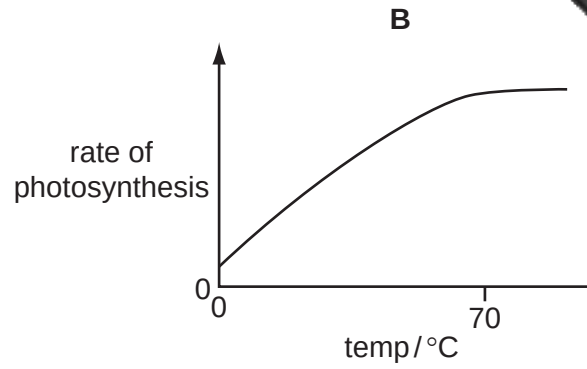
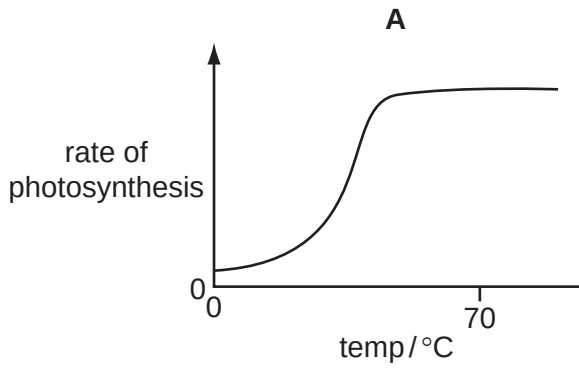
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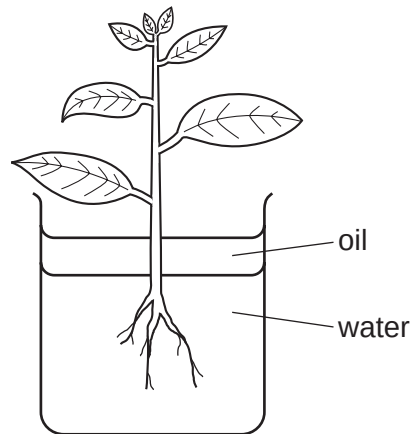
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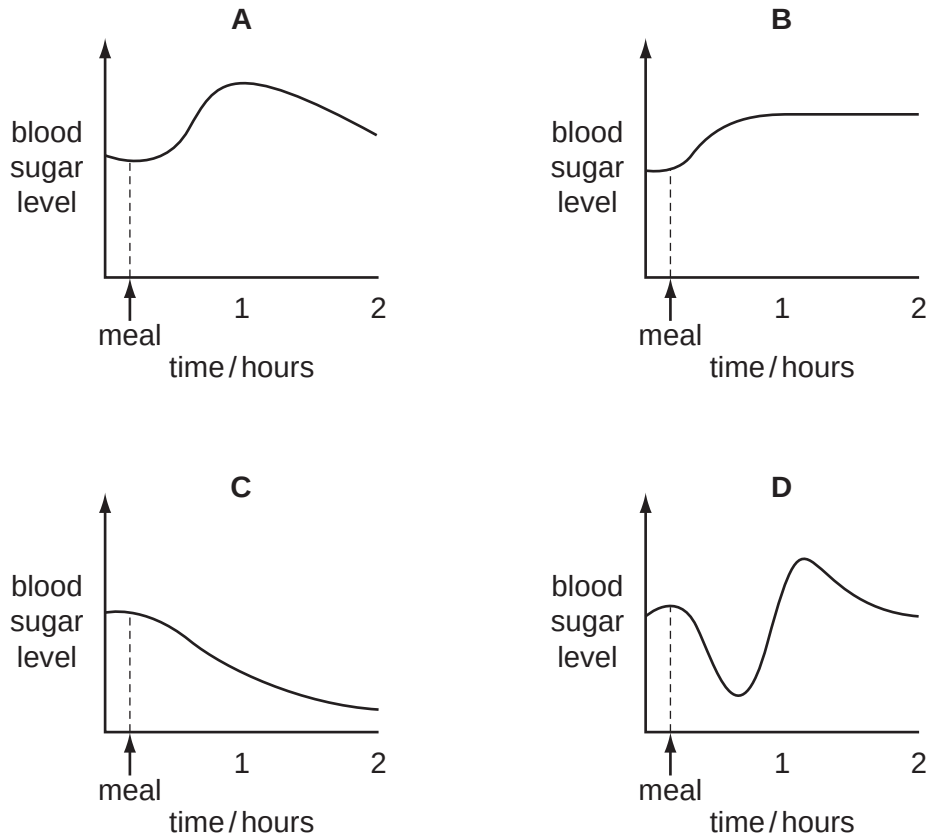


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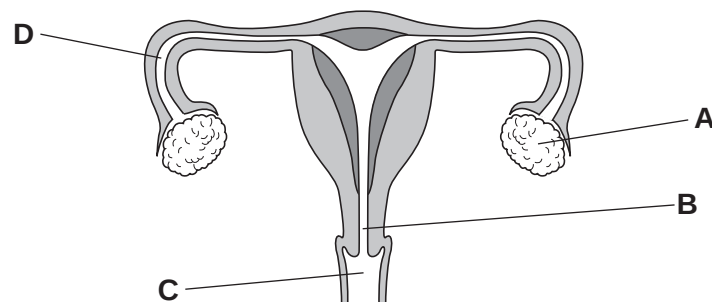
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What are plants grown in this way called?

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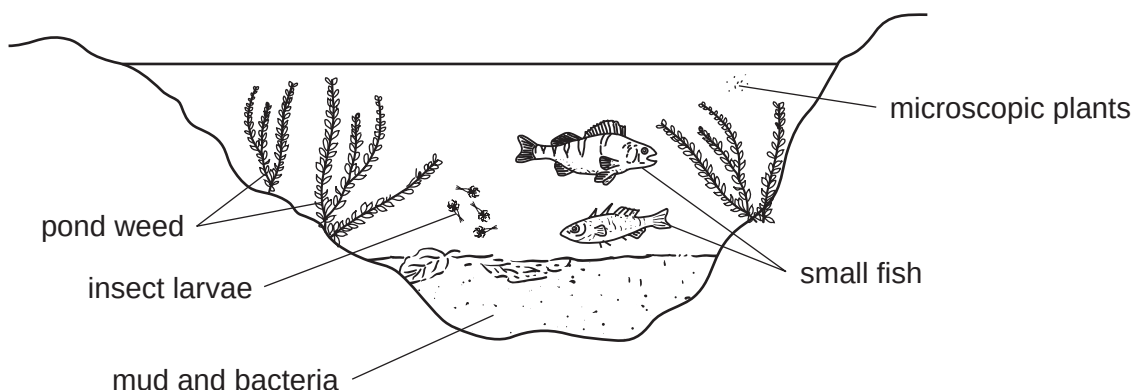
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- 1 carbon dioxide
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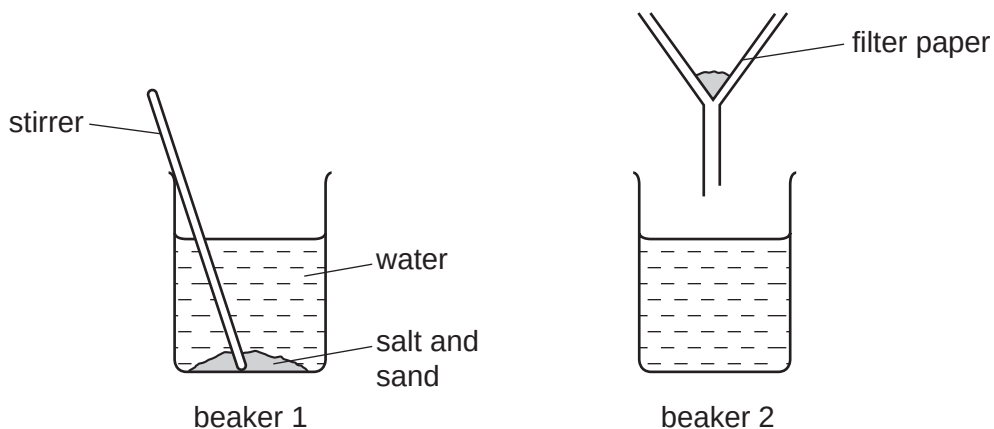
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Which is a food chain in this pond?

- A bacteria → pond weed → insect larvae → small fish
- B microscopic plants → insect larvae → small fish → bacteria
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- 14 The apparatus shown is used to remove sand from a mixture of salt and sand.

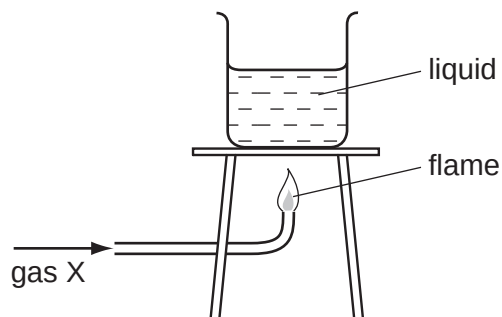


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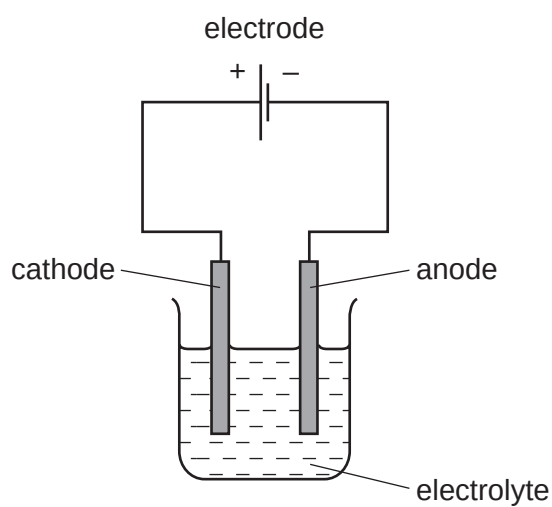
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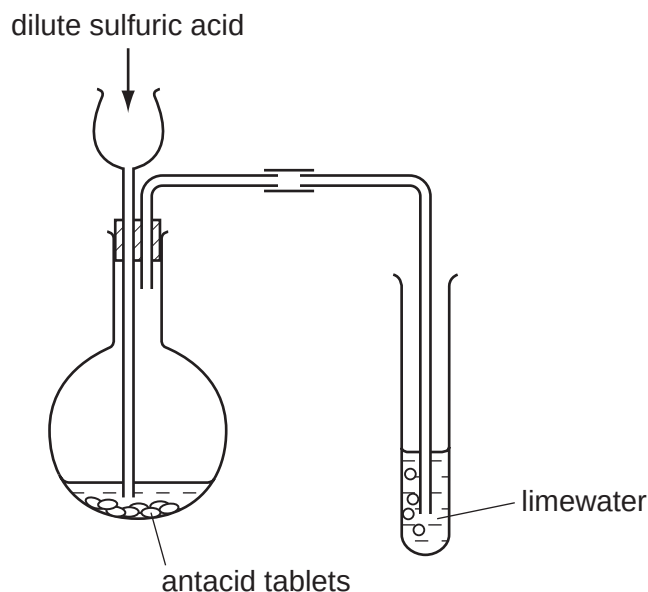
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Which label on the diagram is correct?

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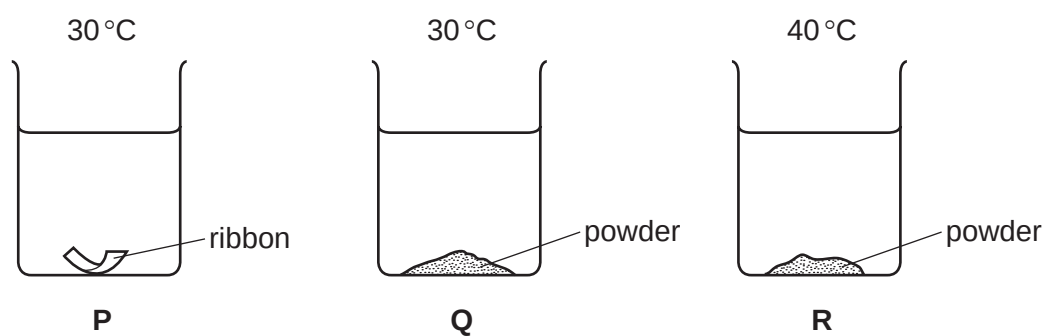
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The limewater turns milky.

What does the experiment show these antacid tablets contain?

- A magnesium
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 - D magnesium oxide
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What is the order of the speed of reaction in the beakers?

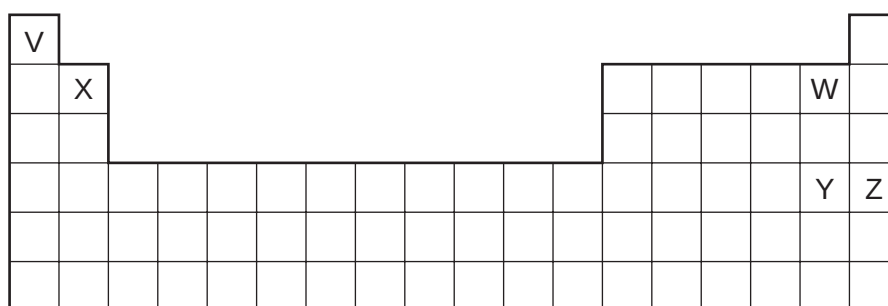
	slowest	→	fastest
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- A** $\text{Cu}^{2+}(\text{aq})$ **B** $\text{Fe}^{2+}(\text{aq})$ **C** $\text{Fe}^{3+}(\text{aq})$ **D** $\text{Zn}^{2+}(\text{aq})$

- Which type of substance is platinite?

- A** alloy
B hydrocarbon
C ionic compound
D transition metal

- Which two elements have similar chemical properties?



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

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

Which words correctly complete gaps 1 and 2?

	1	2
A	an unreactive	harder
B	an unreactive	softer
C	a reactive	harder
D	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

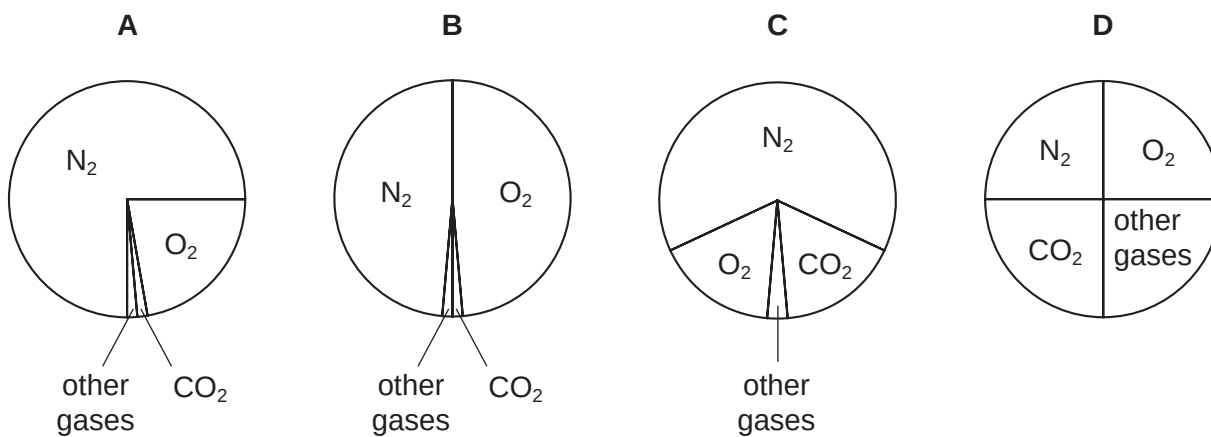
25 Petroleum is a source of hydrocarbon fuels.

Other fuels are coal and wood.

Which of these are fossil fuels?

	coal	wood	petroleum
A	yes	yes	no
B	yes	no	yes
C	no	yes	yes
D	yes	yes	yes

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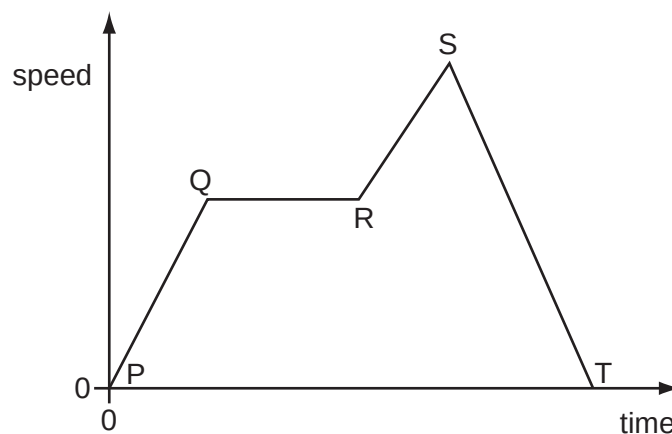
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	X	Y
A	CO	H ₂
B	CO	H ₂ O
C	CO ₂	H ₂
D	CO ₂	H ₂ O

28 What is the unit of work?

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

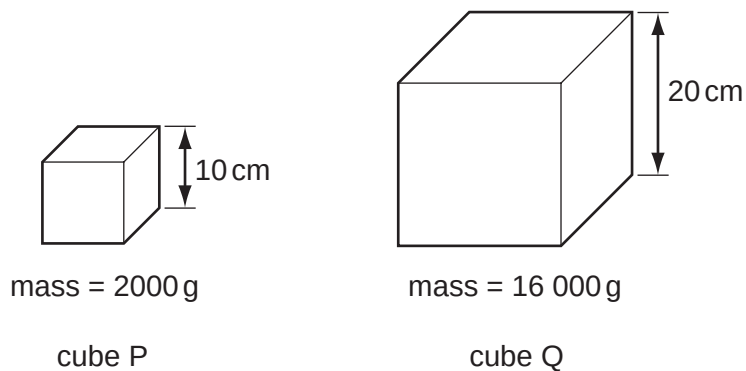
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Where on the graph is the car moving with changing speed?

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- D** QR only

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

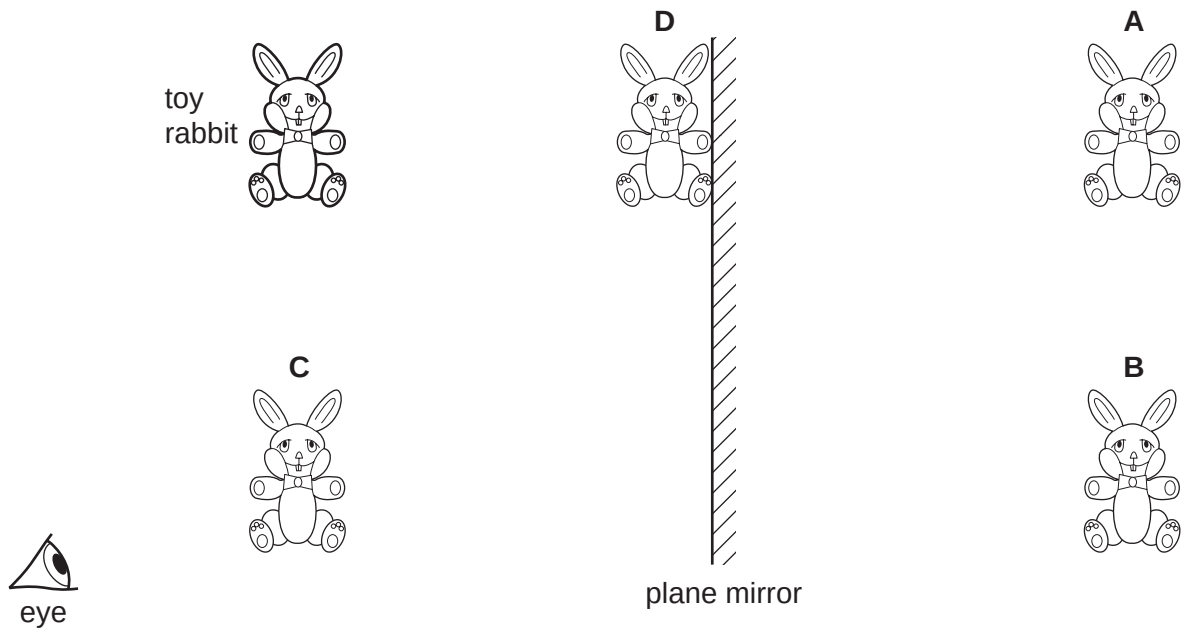


What is the density of the material of cube Q?

- 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°C and the boiling point of water is 100°C .
- Which statement about water is correct?
- A At 100°C boiling occurs throughout the water.
 - B Between 0°C and 100°C the lowest energy molecules escape.
 - C Between 0°C and 100°C water does not evaporate.
 - D Ice only melts when its temperature is above 0°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.

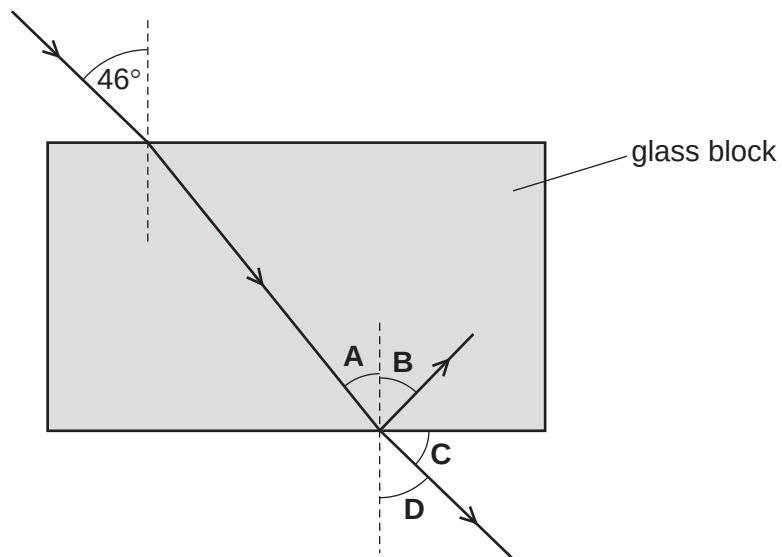
At which position is the image seen?



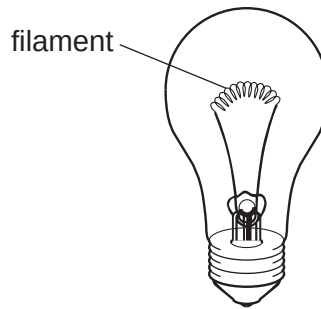
- 34 A ray of light strikes one face of a parallel-sided glass block. The angle of incidence is 46° .

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° ?

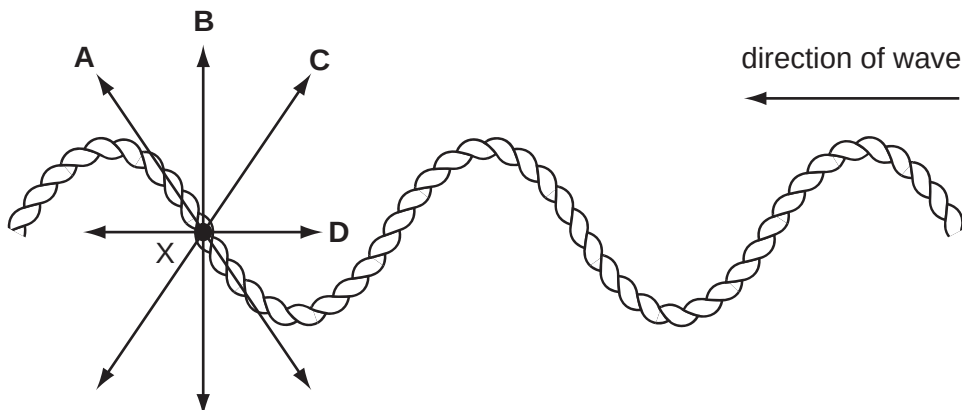


- 35 The diagram shows a filament lamp.



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?

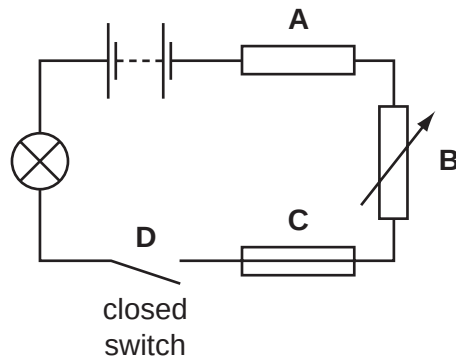
- 37 A starting pistol is fired. An echo from a wall 150 m away is heard one second later.

What is the speed of sound calculated from these results?

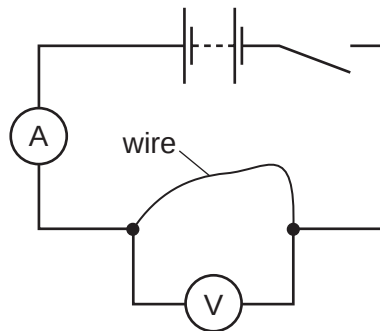
- A 75 m/s
- B 150 m/s
- C 225 m/s
- D 300 m/s

- 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

Group

a	a = relative atomic mass
X	X = atomic symbol
b	b = proton (atomic) number

*58-71 Lanthanoid series
90-103 Actinoid series



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
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COMBINED SCIENCE

0653/13

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)

* 5 8 9 3 1 7 2 6 0 6 *

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.

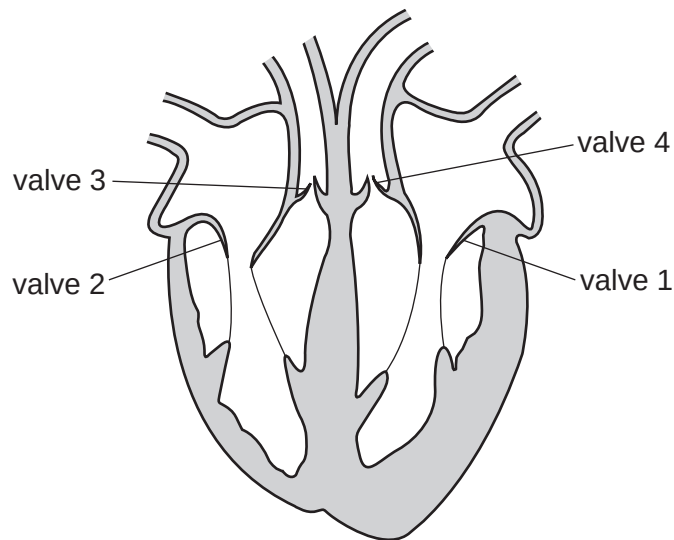


- 1 Water enters a plant cell.

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

- 2 The diagram shows a section through the human heart.



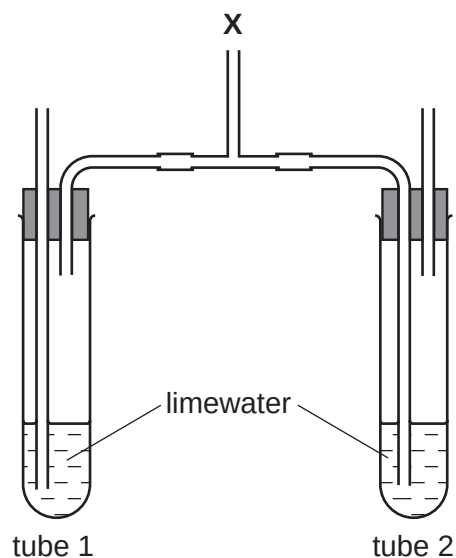
What happens to the valves as blood is being pumped to the lungs?

	valve 1	valve 2	valve 3	valve 4
A	closed	closed	open	closed
B	closed	closed	open	open
C	open	open	closed	closed
D	open	open	closed	open

- 3 How may proteins be used in the body?

	defending against disease	making enzymes
A	✓	✓
B	✓	x
C	x	✓
D	x	x

- 4 The diagram shows an apparatus used to show a difference between inspired and expired air.



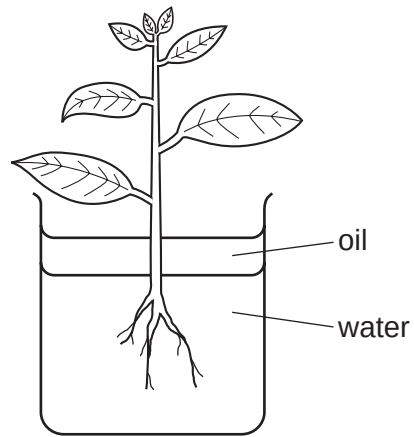
A student breathes in and out gently through tube **X**.

What will be the result after 10 breaths?

	lime water in test-tube 1	lime water in test-tube 2
A	clear	clear
B	clear	milky white
C	milky white	clear
D	milky white	milky white

- 5 Which part of blood contains haemoglobin?
- A** plasma
 - B** platelets
 - C** red blood cells
 - D** white blood cells
- 6 Which statement about enzymes is always correct?
- A** They are made of carbohydrate.
 - B** They work best at high temperatures.
 - C** They speed up chemical reactions.
 - D** They work inside living cells.

- 7 The diagram shows a plant in a container of water. The layer of oil stops the water ev

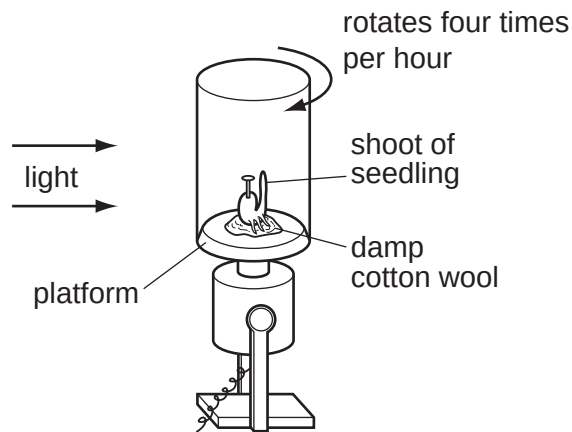


When set up, the apparatus weighs 296 g.
After two hours it weighs 292 g.

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

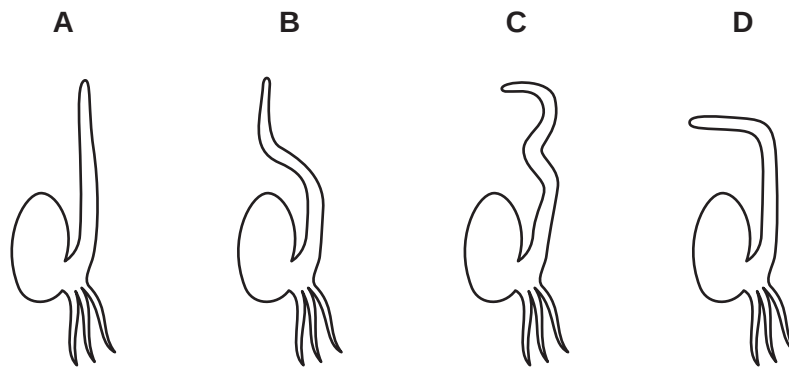
- 8 The diagram shows a seedling fixed to a platform.



The platform is stationary for two days. The platform is then rotated four times every hour for the next two days.

During all four days, the light source remains stationary.

Which shows the appearance of the seedling after the four days growth?

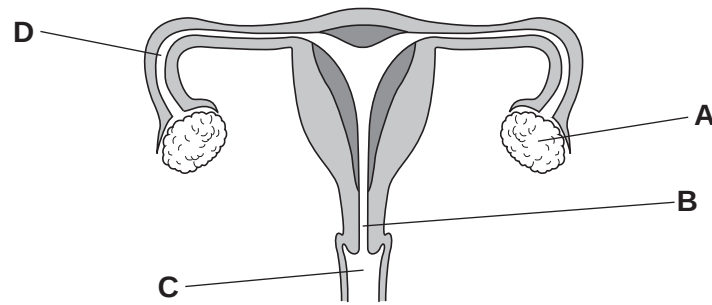


- 9 Which row shows the features of asexual reproduction in plants?

	gametes produced	involves pollination but not fertilisation	offspring genetically different from parents
A	no	no	no
B	no	yes	yes
C	yes	no	yes
D	yes	yes	no

10 The diagram shows the human female reproductive system.

Where is the egg fertilised?

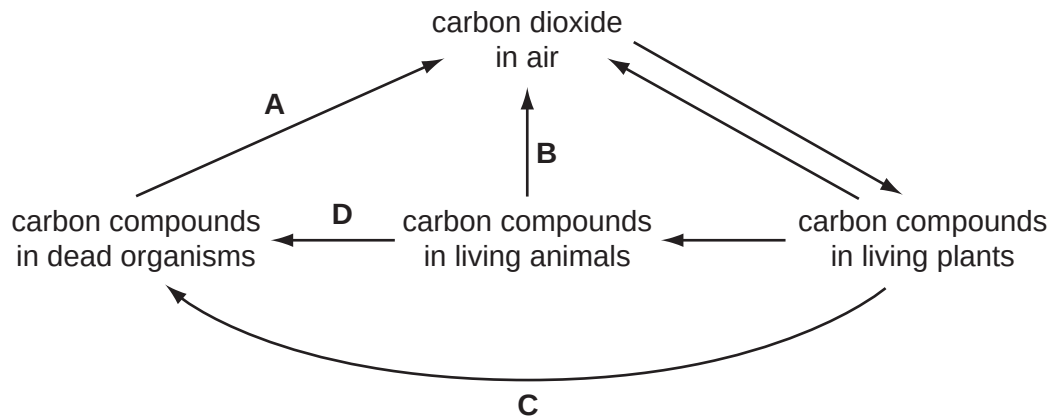


11 Which environmental conditions are normally necessary for seed germination?

	light	oxygen	suitable temperature	water
A	no	yes	no	yes
B	no	yes	yes	yes
C	yes	no	yes	no
D	yes	yes	yes	yes

12 The diagram shows part of the carbon cycle.

Which arrow represents respiration by decomposers?



13 Which two gases contribute most to global warming?

- A** carbon dioxide and methane
- B** carbon monoxide and carbon dioxide
- C** methane and oxygen
- D** oxygen and carbon monoxide

14 A method for separating a mixture of two solid salts has the following steps.

- 1 Shake with water.
- 2 Filter the resulting liquid.
- 3 Wash the residue on the filter paper.
- 4 Evaporate the filtrate until crystals form.

For which two salts does this method work?

- A** barium chloride and barium nitrate
- B** barium nitrate and silver nitrate
- C** barium sulfate and silver chloride
- D** silver chloride and silver nitrate

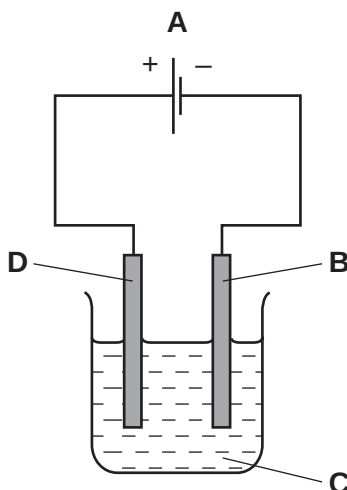
15 Fluorine and chlorine are in Group VII of the Periodic Table.

Which number increases by one between these two elements?

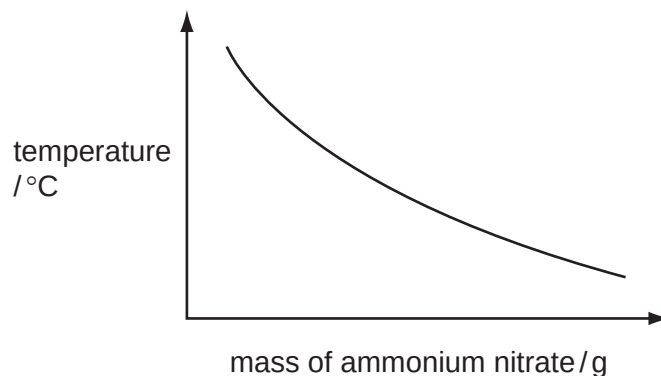
- A** the number of atoms in one molecule
- B** the number of electron shells in one atom
- C** the number of outer shell electrons in one atom
- D** the number of protons in one atom

16 The diagram shows a simple cell.

Which label is the electrolyte?

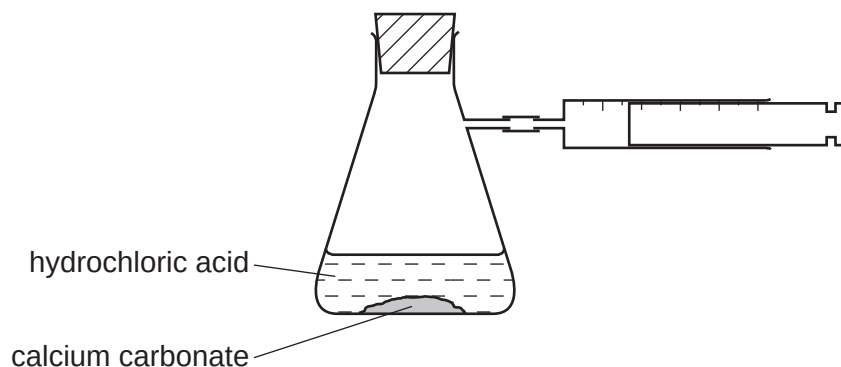


- 17 The graph shows how the temperature of water changes as ammonium nitrate is dissolved.



What does the graph show?

- A The ammonium nitrate does not dissolve readily.
 - B The dissolving is endothermic.
 - C The dissolving is exothermic.
 - D The solution freezes.
- 18 The apparatus below is used to investigate the speed of reaction between calcium carbonate and hydrochloric acid.



Which conditions produce the greatest speed of reaction?

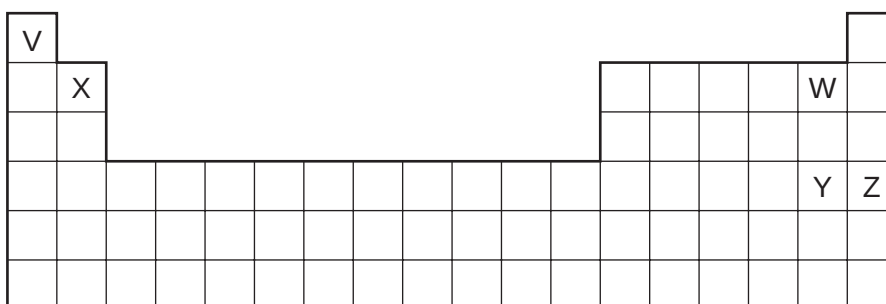
	form of calcium carbonate	concentration of hydrochloric acid
A	lumps	high
B	lumps	low
C	powder	high
D	powder	low

- What is the correct test for this gas?

- 20** Which row correctly shows the pH of each type of solution?

	acidic	alkaline	neutral
A	9	5	7
B	7	9	5
C	5	9	7
D	5	7	9

- Which two elements have similar chemical properties?



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

- 22 Two non-metallic elements, X and Y, are in the same group of the Periodic Table.

X is higher in the group than Y.

Which row shows the Group that includes elements X and Y and which element is more reactive

	Group	more reactive element
A	I	X
B	I	Y
C	VII	X
D	VII	Y

- 23 The diagram shows a knife used in a kitchen to prepare vegetables.



Why is the knife blade made of stainless steel and **not** pure iron?

- A** It is a compound but iron is an element.
- B** It is easier to polish than is iron.
- C** It is more brittle than iron.
- D** It is more resistant to corrosion than is iron.

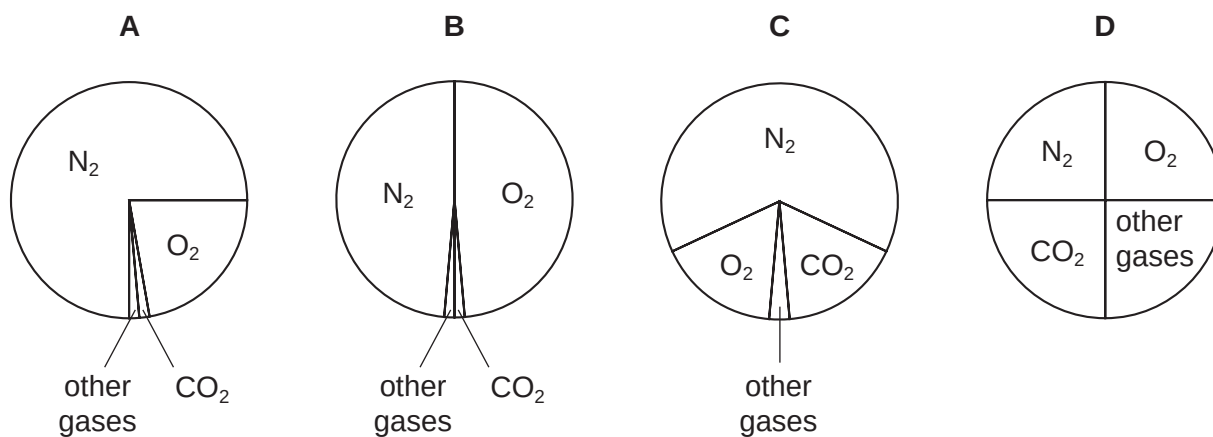
24 Reactions of three metals are listed in the table.

metal	reacts with cold water	reacts with dilute hydrochloric acid
P	no	yes
Q	no	no
R	yes	yes

What is the order of reactivity of the metals?

	most reactive	→	least reactive
A	P	Q	R
B	Q	R	P
C	R	P	Q
D	R	Q	P

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



- 26 A hydrocarbon fuel is burned completely.



What are X and Y?

	X	Y
A	CO	H ₂
B	CO	H ₂ O
C	CO ₂	H ₂
D	CO ₂	H ₂ O

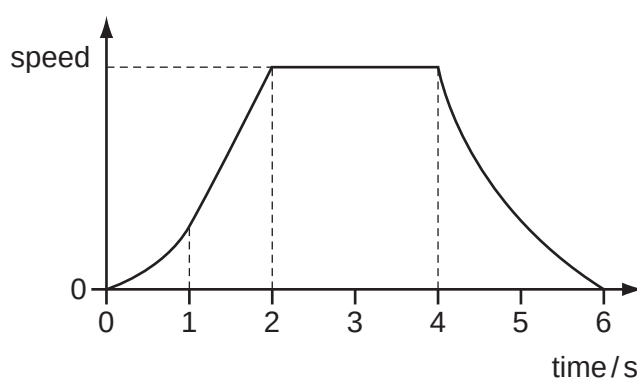
- 27 Petroleum is a source of hydrocarbon fuels.

Other fuels are coal and wood.

Which of these are fossil fuels?

	coal	wood	petroleum
A	yes	yes	no
B	yes	no	yes
C	no	yes	yes
D	yes	yes	yes

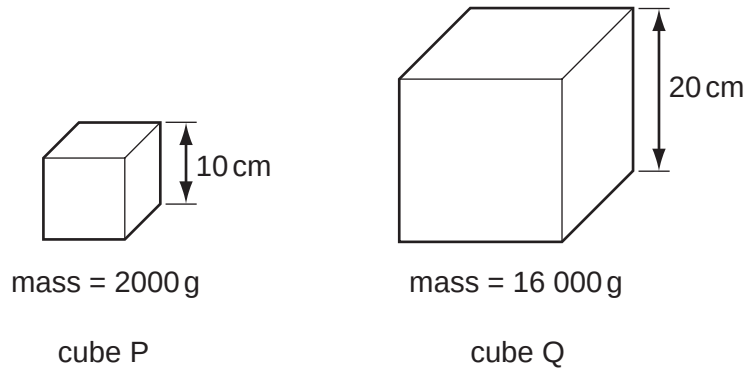
- 28 The graph shows how the speed of an object changes with time.



Which statement about the movement of the object is correct?

- A** It never travels at a constant speed.
- B** It stops for two seconds.
- C** It travels at its maximum speed for four seconds.
- D** It takes the same time to increase its speed as it does to decrease its speed.

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



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

30 What is the unit of work?

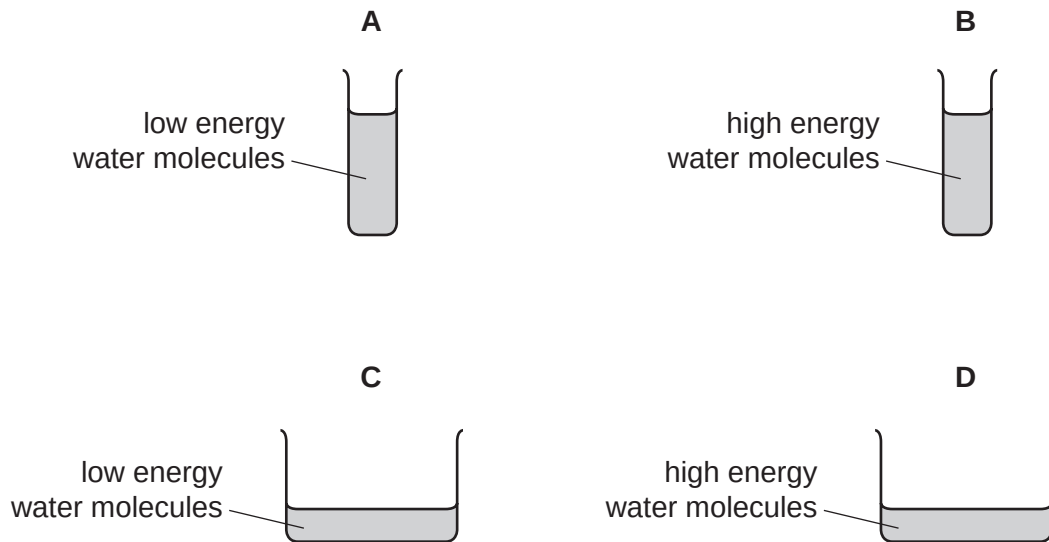
- A joule
- B kilogram
- C newton
- D watt

- 31 The diagram shows two narrow beakers **A** and **B**, and two wide beakers **C** and **D**. All four beakers contain the same mass of water.

Beaker **A** and beaker **C** contain low energy water molecules.

Beaker **B** and beaker **D** contain high energy water molecules.

From which beaker does the water evaporate most slowly?

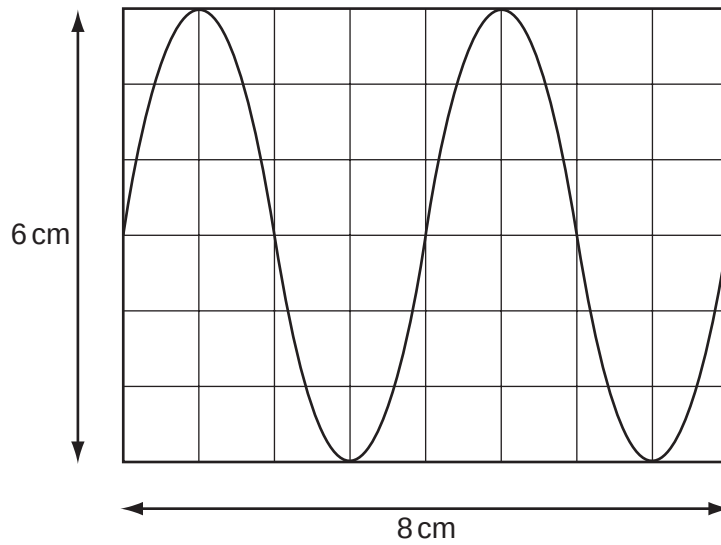


- 32 Heat energy can be lost from a hot object by radiation.

What is the name of this radiation, and is it electromagnetic?

	name of radiation	is it electromagnetic
A	infra-red	no
B	infra-red	yes
C	microwave	no
D	microwave	yes

33 The diagram represents a wave.

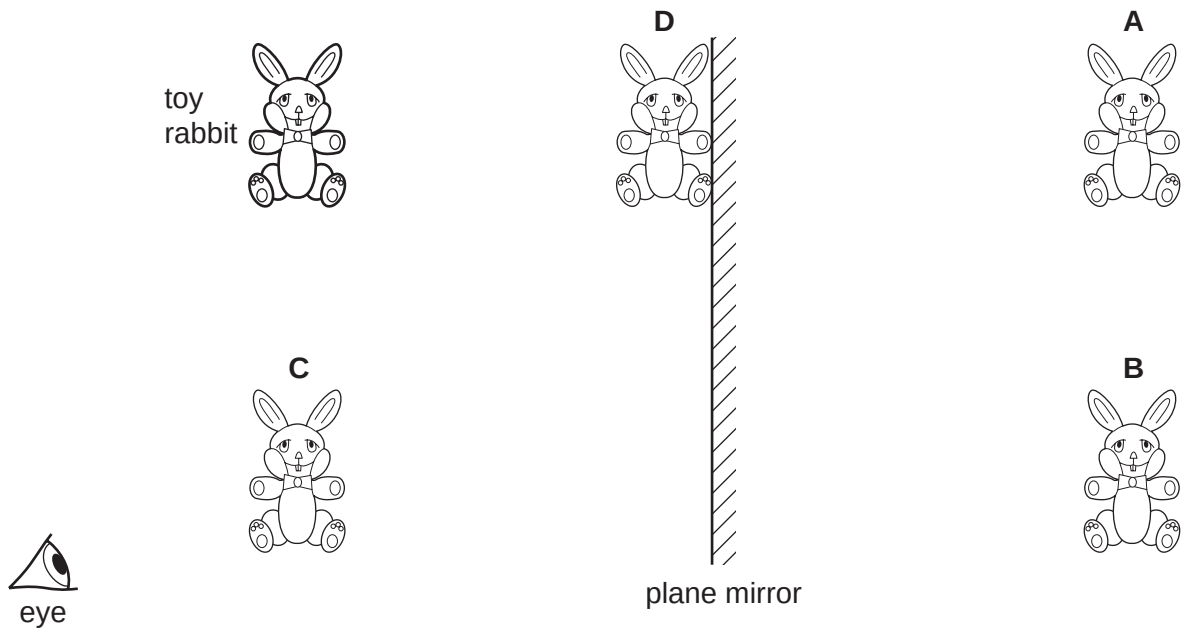


What is the wavelength of the wave?

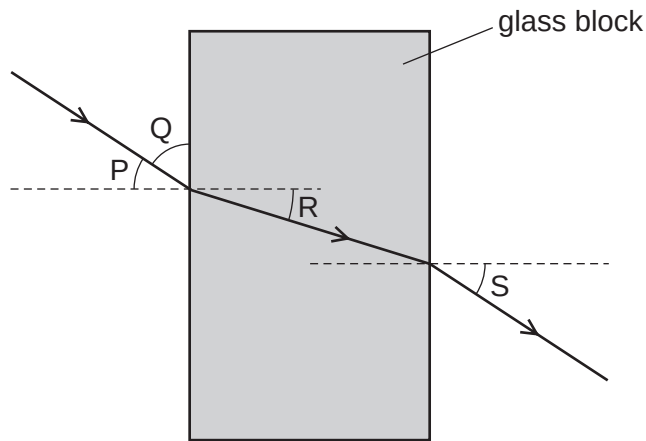
- A** 3 cm **B** 4 cm **C** 6 cm **D** 8 cm

34 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?

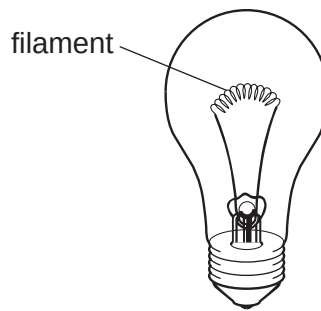


- 35 The diagram shows a ray of light passing through a glass block.



Which two angles are the angle of incidence and the angle of refraction?

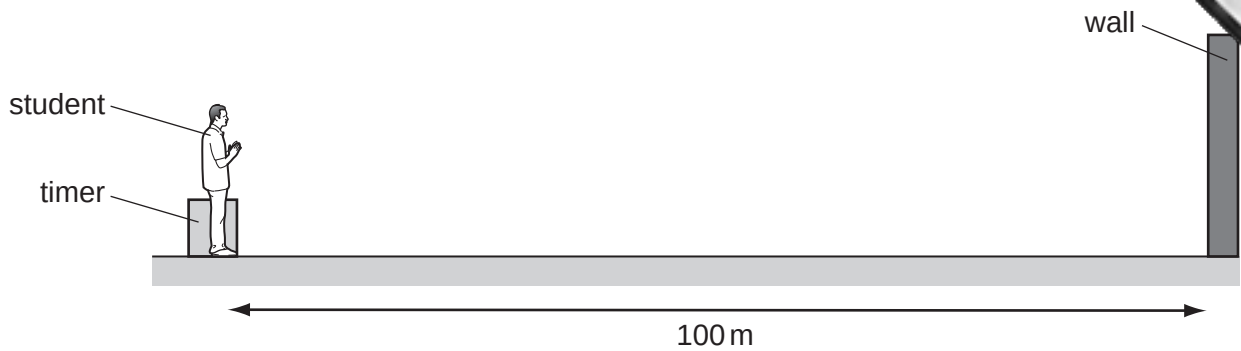
- A** P and R **B** P and S **C** Q and R **D** Q and S
- 36 The diagram shows a filament lamp.



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

- 37 A student measures the speed of sound. He claps his hands and the sound reflects off a wall which is 100 m away from him.

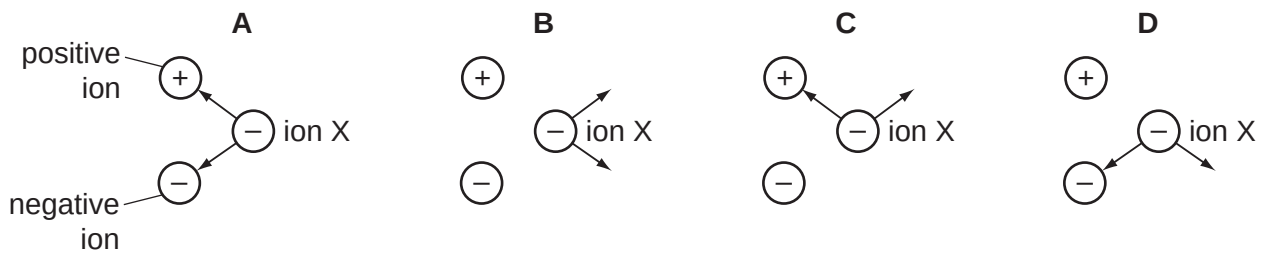


An electronic timer detects the echo of the sound 0.6 s after it is made.

Which calculation should the student use to determine the speed of sound?

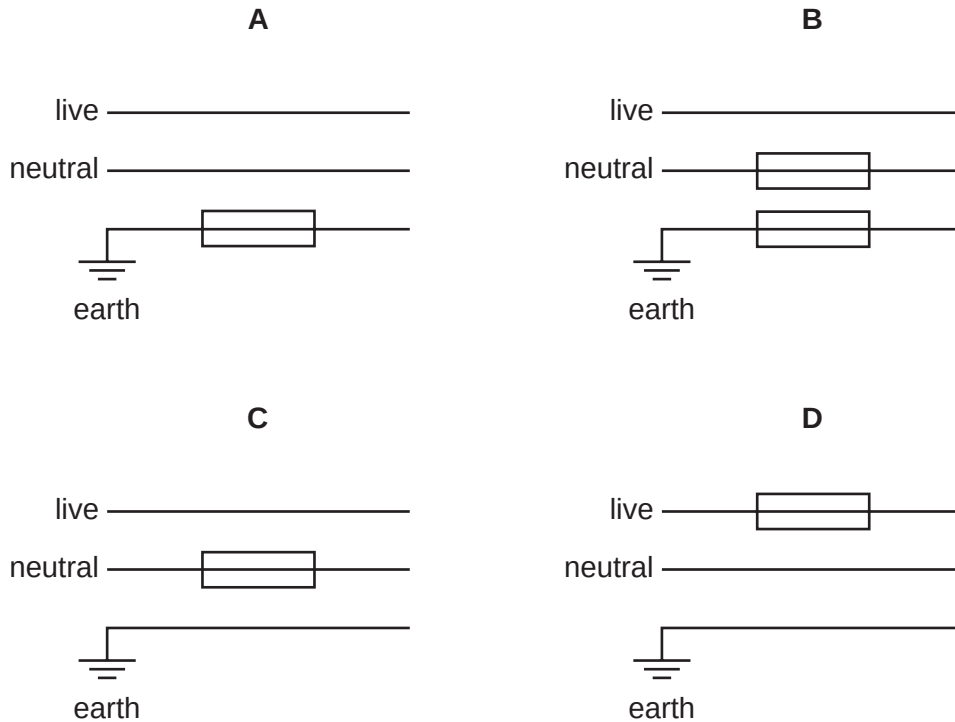
- A** $\frac{100}{0.6}$ m/s **B** $\frac{100}{1.2}$ m/s **C** $\frac{200}{0.3}$ m/s **D** $\frac{200}{0.6}$ m/s
- 38 A negative ion X is close to a positive ion and another negative ion. Electrical forces act on ion X because of the charges in the other two ions.

Which diagram shows the directions of the two forces acting on ion X?

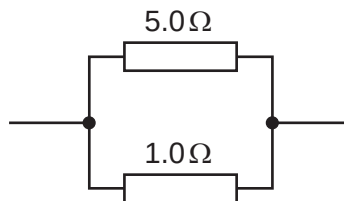


39 Fuses protect mains electrical circuits.

Which diagram shows how the fuse(s) should be connected to provide the maximum safety?



40 A student connects two resistors in parallel.



Which statement about the total resistance of the combination of resistors is correct?

- A** It is less than $1.0\ \Omega$.
- B** It is between $1.0\ \Omega$ and $5.0\ \Omega$.
- C** It is $6.0\ \Omega$.
- D** It is more than $6.0\ \Omega$.

DATA SHEET
The Periodic Table of the Elements

Group																																								
I	II											III	IV	V	VI	VII	0																							
												1 H Hydrogen 1																												
7 Li Lithium 3	9 Be Beryllium 4												11 B Boron 5						12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10																	
23 Na Sodium 11	24 Mg Magnesium 12												27 Al Aluminium 13						28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18																	
39 K Potassium 19	40 Ca Calcium 20		45 Sc Scandium 21		48 Ti Titanium 22		51 V Vanadium 23		52 Cr Chromium 24		55 Mn Manganese 25		56 Fe Iron 26		59 Co Cobalt 27		59 Ni Nickel 28		64 Cu Copper 29		65 Zn Zinc 30		70 Ga Gallium 31		73 Ge Germanium 32		75 As Arsenic 33		79 Se Selenium 34		80 Br Bromine 35		84 Kr Krypton 36							
85 Rb Rubidium 37	88 Sr Strontium 38		89 Y Yttrium 39		91 Zr Zirconium 40		93 Nb Niobium 41		96 Mo Molybdenum 42		96 Tc Technetium 43		101 Ru Ruthenium 44		103 Rh Rhodium 45		106 Pd Palladium 46		108 Ag Silver 47		112 Cd Cadmium 48		115 In Indium 49		119 Sn Tin 50		122 Sb Antimony 51		128 Te Tellurium 52		127 I Iodine 53		131 Xe Xenon 54							
133 Cs Cesium 55	137 Ba Barium 56		139 La Lanthanum 57		178 Hf Hafnium 72		181 Ta Tantalum 73		184 W Tungsten 74		186 Re Rhenium 75		190 Os Osmium 76		192 Ir Iridium 77		195 Pt Platinum 78		197 Au Gold 79		201 Hg Mercury 80		204 Tl Thallium 81		207 Pb Lead 82		209 Bi Bismuth 83		210 Po Polonium 84		210 At Astatine 85		222 Rn Radon 86							
Fr Francium 87		Ra Radium 88		Ac Actinium 89		†																																		
58-71 Lanthanoid series																																								
90-103 Actinoid series																																								
								140 Ce Cerium 58		141 Pr Praseodymium 59		144 Nd Neodymium 60		150 Sm Samarium 62		152 Eu Europium 63		157 Gd Gadolinium 64		159 Tb Terbium 65		162 Dy Dysprosium 66		165 Ho Holmium 67		167 Er Erbium 68		169 Tm Thulium 69		173 Yb Ytterbium 70		175 Lu Lutetium 71								
								232 Th Thorium 90		238 Pa Protactinium 91		238 U Uranium 92		238 Np Neptunium 93		238 Pu Plutonium 94		238 Am Americium 95		238 Cm Curium 96		238 Bk Berkelium 97		238 Cf Californium 98		238 Es Einsteinium 99		238 Fm Fermium 100		238 Md Mendelevium 101		238 No Nobelium 102		238 Lr Lawrencium 103						
Key		X		a		a = relative atomic mass																																		
																										</														

a	X	b
Key		
a = relative atomic mass	X = atomic symbol	b = proton (atomic) number

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).