Cambridge Assessment International Education

Cambridge O Level

COMBINED SCIENCE **5129/12**

Paper 1 Multiple Choice **May/June 2022**

1 hour

You must answer on the multiple choice answer sheet.

You will need: Multiple choice answer sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

INSTRUCTIONS

- 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 multiple choice answer sheet.
- Follow the instructions on the multiple choice answer sheet.
- Write in soft pencil.
- Write your name, centre number and candidate number on the multiple choice answer sheet in the spaces provided unless this has been done for you.
- Do **not** use correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.

INFORMATION

- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.
- The Periodic Table is printed in the question paper.

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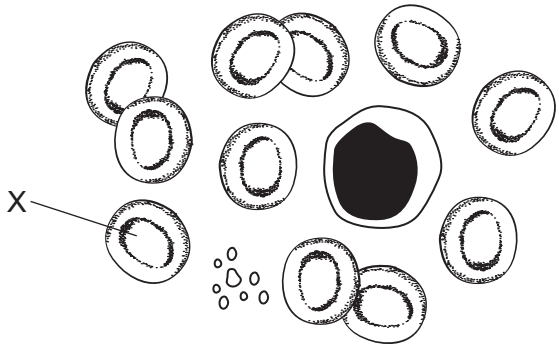
1 The diagram shows a slide of human blood.



Which type of cell is X, and what is its function?

	blood cell type	function
A	red	antibody formation
B	red	transports oxygen
C	white	antibody formation
D	white	transports oxygen

2 Which statement describes osmosis?

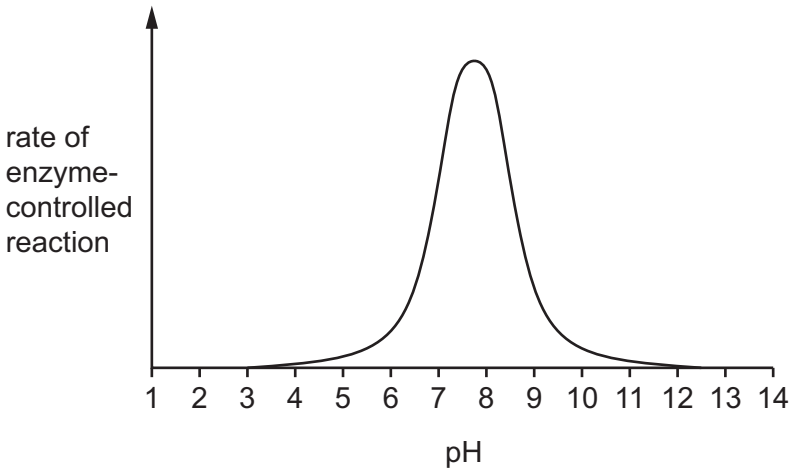
A the passage of water molecules from a region of their higher concentration to a region of their lower concentration through a partially permeable membrane

B the passage of water molecules from a region of their higher concentration to a region of their lower concentration through a permeable membrane

C the passage of water molecules from a region of their lower concentration to a region of their higher concentration through a partially permeable membrane

D the passage of water molecules from a region of their lower concentration to a region of their higher concentration through a permeable membrane

3 The graph shows how the rate of an enzyme-controlled reaction changes with pH.

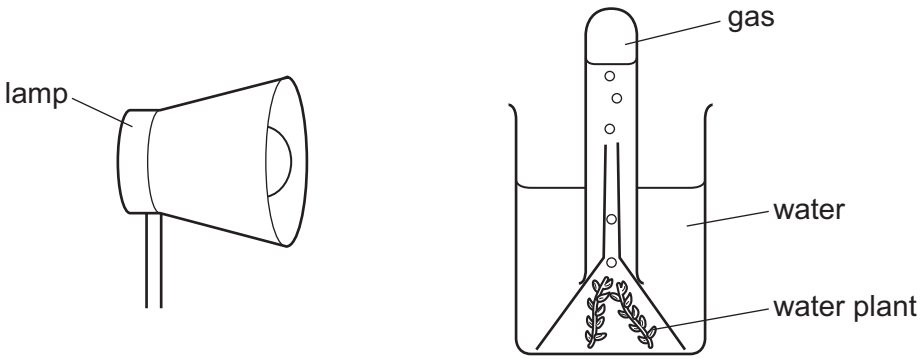


At which pH does the enzyme work best?

A pH 4 **B** pH 6 **C** pH 8 **D** pH 10

4 The diagram shows an experiment which measures the gas given off by a water plant during photosynthesis.

The distance between the lamp and the water plant is varied and the volume of gas given off in 30 minutes is measured.



At which distance between the lamp and the plant is the most gas collected in 30 minutes?

A 10 cm **B** 25 cm **C** 40 cm **D** 75 cm

5 What is the correct order in which food travels through the alimentary canal after it enters the mouth?

A oesophagus → duodenum → ileum → colon

B oesophagus → stomach → ileum → duodenum

C stomach → duodenum → colon → ileum

D stomach → oesophagus → colon → duodenum

6 Petroleum jelly is waterproof and blocks the movement of water when placed on leaf surfaces.

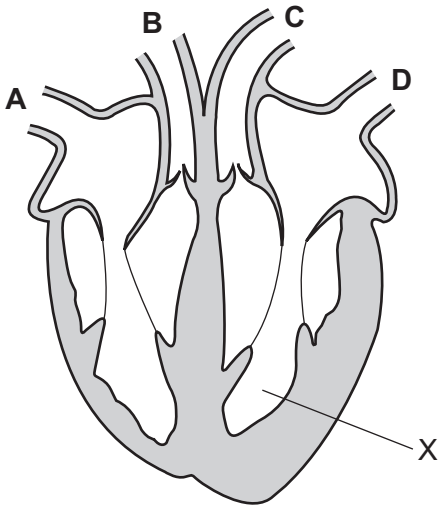
In an investigation, petroleum jelly was spread on either the upper or lower surface of a plant's leaves and the root hairs left on the plant or removed.

Which plant will wilt first?

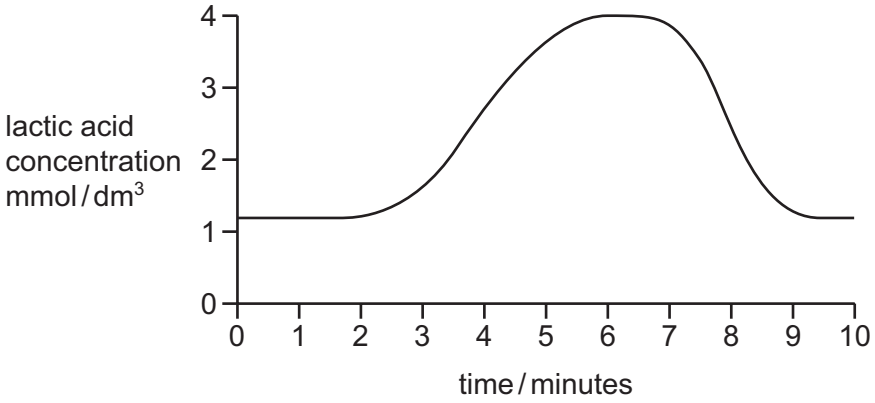
	the surface on which petroleum jelly is spread	root hairs
A	lower	present
B	upper	present
C	lower	removed
D	upper	removed

7 The diagram shows a section through the heart.

Which blood vessel will blood flow through when the chamber marked X contracts?



8 The graph shows changes in the concentration of lactic acid in the muscles of an athlete both during and after a race.



At which time does the athlete finish the race?

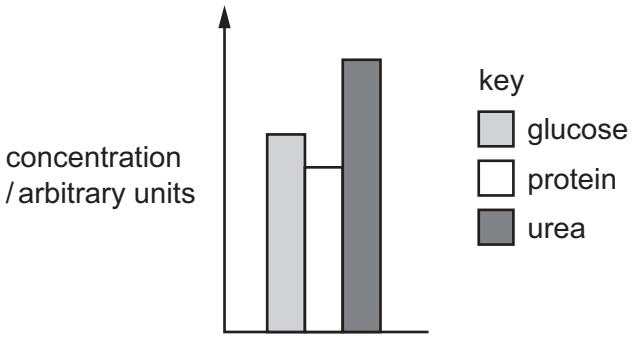
A 1 minute

B 3 minutes

C 7 minutes

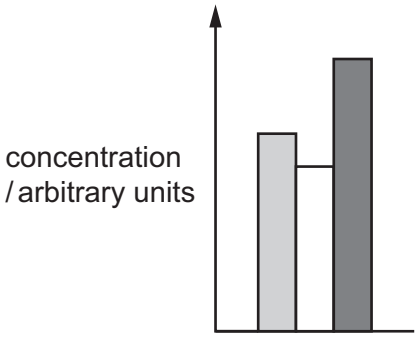
D 10 minutes

9 The graph shows the concentration of glucose, protein and urea in the blood of a healthy person.

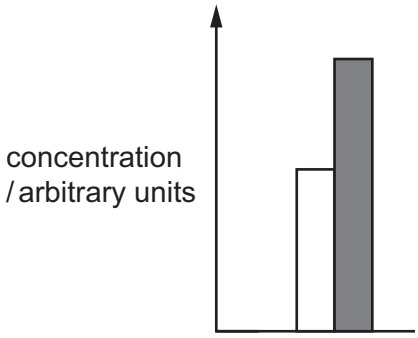


Which graph shows the concentration of these substances in the urine of the same person?

A



B



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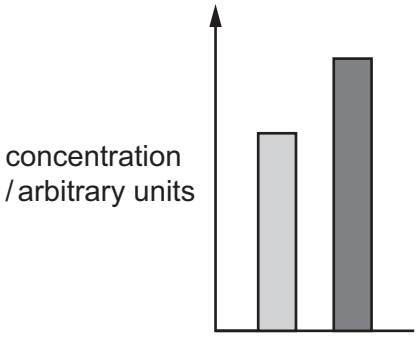
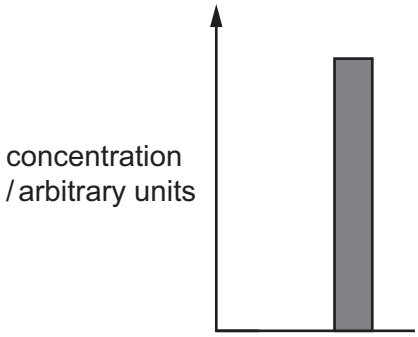


D



10 A hormone is a chemical substance produced by .....1..... , carried by the blood and which alters the activity of one or more specific target .....2..... and is then destroyed by the .....3..... .

Which words should be used in gaps 1, 2 and 3 to give the correct definition of a hormone?

	1	2	3
A	a gland	organs	kidney
B	a gland	organs	liver
C	an organ	glands	kidney
D	an organ	glands	liver

11 Which two substances both act as depressants in the body?

A alcohol and amino acids

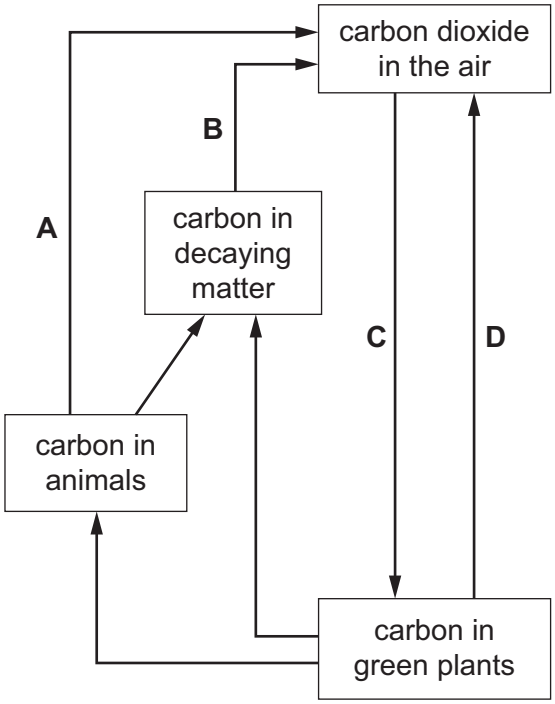
B amino acids and glucose

C glucose and heroin

D heroin and alcohol

12 The diagram shows part of the carbon cycle.

During which stage is oxygen produced?



13 Which structure in a flower produces pollen?

A anthers

B carpels

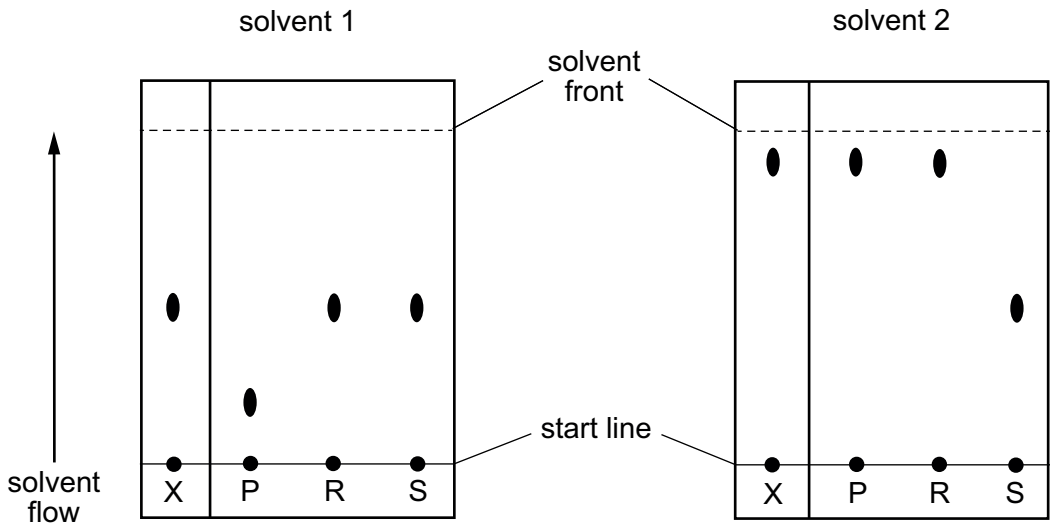
C petals

D sepals

14 Solution X contains one or more of three substances, P, R and S.

Two different solvents are used to produce two chromatograms comparing solution X with the three substances.

The results are shown.



What does X contain?

A P only **B** R only **C** P and R **D** R and S

15 Which statement describes the particles in a liquid?

A They are close together and fill all the available space.

B They are close together and take the shape of the bottom of the container.

C They vibrate and are bunched closely together.

D They move rapidly and fill up all the available space.

16 Which statement describes the nucleon number of an atom?

A It is the number of neutrons in the atom.

B It is the number of protons in the atom.

C It is the number of protons and electrons in the atom.

D It is the number of protons and neutrons in the atom.

17 Which statement describes the arrangement of electrons in a molecule of methane, CH_4?

A Each atom has a noble gas electronic structure.

B Each atom has the same number of outer-shell electrons.

C The atoms are chemically joined by ionic bonds.

D There are eight outer-shell electrons in each atom.

18 25.0 g of hydrated copper(II) sulfate crystals are heated to produce anhydrous copper(II) sulfate and water vapour.

$$CuSO_4 \cdot 5H_2O(s) \rightarrow CuSO_4(s) + 5H_2O(g)$$

What is the mass of anhydrous copper(II) sulfate formed?

A 9.0 g **B** 16.0 g **C** 22.5 g **D** 25.0 g

19 Which gas is produced when magnesium carbonate reacts with dilute hydrochloric acid?

A Cl_2 **B** CO **C** CO_2 **D** H_2

20 Element X exists as a diatomic molecule.

At room temperature X is a coloured gas.

X is in the third period of the Periodic Table.

In which group of the Periodic Table is X placed?

A Group V

B Group VI

C Group VII

D Group VIII

21 A grey solid with a melting point of 1500 °C is a good electrical conductor.

It is easily hammered into shape.

Which type of substance is the grey solid?

A covalent compound

B ionic compound

C metallic element

D non-metallic element

22 Q, R, S and T are four metals.

T reacts slowly with hydrochloric acid.

Q does not react with acid.

R reacts with steam but not with cold water.

S reacts violently with cold water.

What is the order of reactivity of the four metals, most reactive first?

A Q → T → R → S

B Q → R → T → S

C S → T → R → Q

D S → R → T → Q

23 Which metal is used in the manufacture of aircraft bodies?

A aluminium

B copper

C mild steel

D zinc

24 Gas P is used with acetylene in welding.

Gas Q is produced during the incomplete combustion of methane.

Which row identifies P and Q?

	P	Q
A	hydrogen	carbon dioxide
B	hydrogen	carbon monoxide
C	oxygen	carbon dioxide
D	oxygen	carbon monoxide

25 Some information about element Z is shown.

- It is a diatomic element.
- It is a reactive element.
- Its atoms need one electron to fill their outer shell.
- It reacts with ethene to form ethane.

What is Z?

A bromine

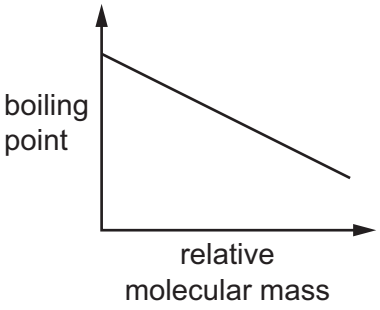
B hydrogen

C iodine

D oxygen

26 Which graph represents the change in boiling point of the alkanes as their relative molecular mass increases?

A



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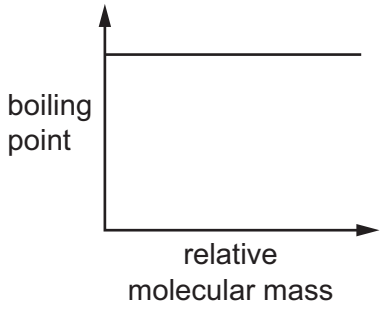
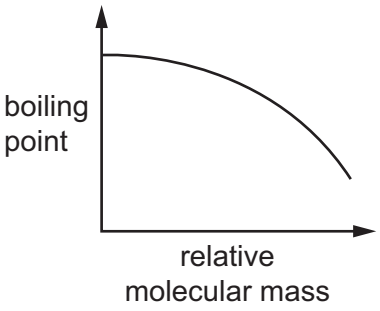
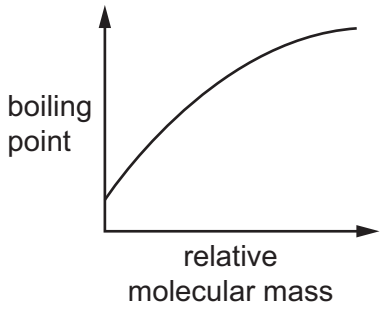


C



D



27 P, Q, R and S are four different organic compounds.

P burns completely in air to give carbon dioxide and water only.

Q is a saturated hydrocarbon.

R has molecular formula C_3H_8.

S decolourises bromine water.

Which compounds could be alkanes?

A P, Q and R **B** P only **C** Q and R only **D** R and S only

28 The velocity of a moving car is constant during part of a journey.

What is the acceleration during this time?

A decreasing all the time

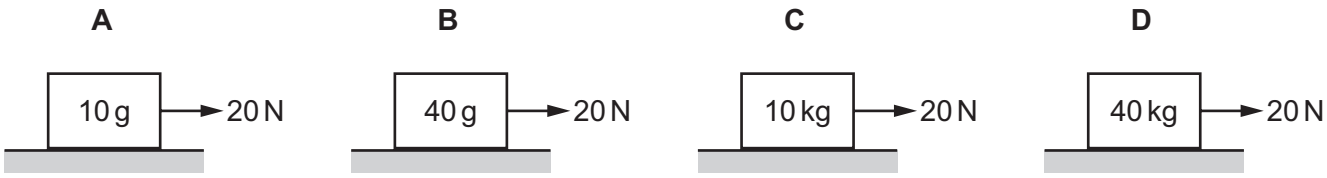
B increasing all the time

C increasing, then decreasing to zero

D zero all the time

29 A 20 N force pulls each of four boxes along a smooth horizontal surface.

Which box accelerates at $2\,m/s^2$?



30 A student stretches a spring to collect data to plot an extension–load graph.

Which apparatus is **not** needed?

A mass hanger and masses

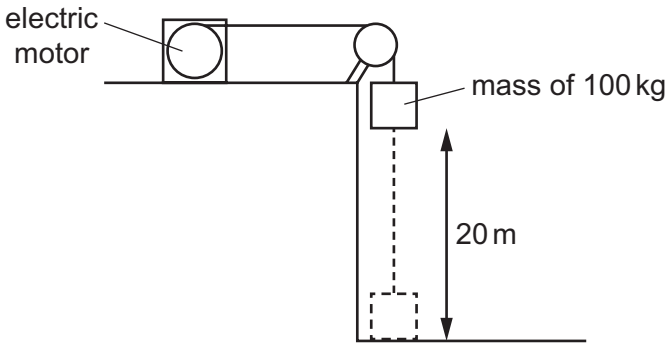
B metre rule

C resistor

D retort stand, boss and clamp

31 An electric motor lifts a mass of 100 kg through a vertical distance of 20 m.

Gravitational field strength is 10 N / kg.



How much work is done by the motor to lift the mass?

A 5 J **B** 50 J **C** 2000 J **D** 20 000 J

32 The following descriptions are related to temperature measurement.

1 a substance with a physical property that changes with temperature

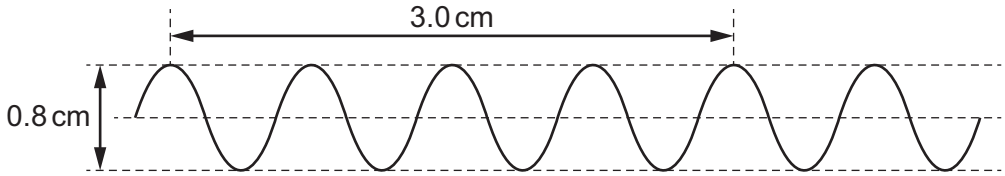
2 a scale that can be divided into equal parts

3 temperatures to define upper and lower fixed points

Which of these are necessary to make a thermometer?

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

33 The diagram shows a wave.



The wave has a frequency of 10 Hz.

What is the speed of this wave?

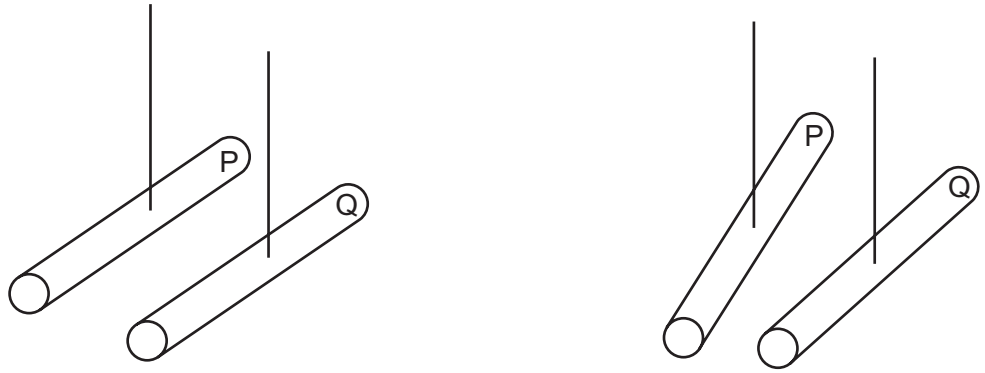
A 6.0 cm / s **B** 7.5 cm / s **C** 8.0 cm / s **D** 30 cm / s

34 Radio waves, visible light and X-rays are all components of the electromagnetic spectrum.

What is the order of increasing wavelength?

	shortest wavelength →		longest wavelength
A	visible light	radio waves	X-rays
B	visible light	X-rays	radio waves
C	X-rays	radio waves	visible light
D	X-rays	visible light	radio waves

35 Two plastic rods are charged by rubbing the ends labelled P and Q with a cloth.



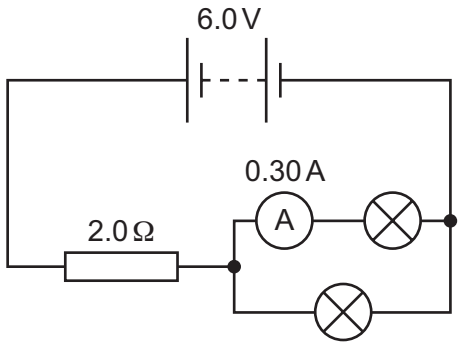
before charging

after charging

How do the charges at end P and end Q compare, and what is the type of force acting between P and Q?

	comparison of charges	type of force
A	like	attract
B	like	repel
C	unlike	attract
D	unlike	repel

36 Two identical lamps, a resistor, an ammeter and a battery are connected, as shown.



There is a current of 0.30 A through each lamp. The resistor has a resistance of 2.0 Ω and the battery supplies 6.0 V.

What is the potential difference (p.d.) across the resistor?

A 0.60 V **B** 1.2 V **C** 3.0 V **D** 6.0 V

37 An electric iron is connected by a cable to a mains plug.

The current in the iron when it works correctly is 5.0 A.

The metal in the cable melts if the current is larger than 15 A.

What is the best fuse to fit in the plug?

A 3 A **B** 5 A **C** 7 A **D** 20 A

38 What is an example of induced magnetism?

A a magnetised compass needle pointing north

B a north pole attracting iron filings

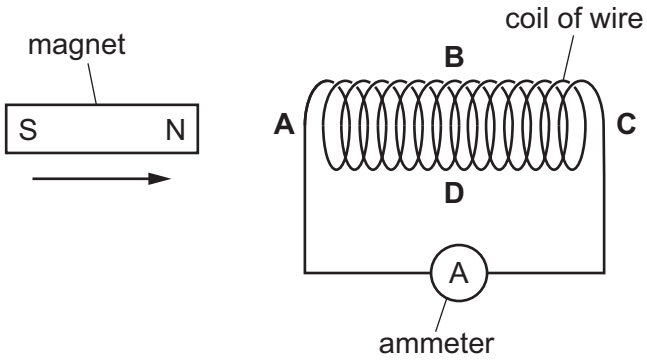
C a north pole repelling a north pole

D a negatively charged balloon attracting small pieces of paper

39 A magnet is moved towards a coil of wire.

The induced electromotive force (e.m.f.) and resulting current in the coil create magnetic poles.

In which position is a north pole created?



40 A detector held in front of a radioactive source measures 1500 counts / minute due to the source.

When a thin piece of paper is placed between the source and detector, the measurement due to the source drops to 500 counts / minute.

There is no further change in the measurement when a thin piece of metal is added to this sheet of paper.

Which types of emission are given out by the radioactive source?

A alpha-particles and gamma-rays

B alpha-particles only

C beta-particles and gamma-rays

D beta-particles only

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The Periodic Table of Elements

Group																	
I	II											III	IV	V	VI	VII	VIII
							1 H hydrogen 1										2 He helium 4
3 Li lithium 7	4 Be beryllium 9											5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20
11 Na sodium 23	12 Mg magnesium 24											13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium –	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131
55 Cs caesium 133	56 Ba barium 137	57–71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium –	85 At astatine –	86 Rn radon –
87 Fr francium –	88 Ra radium –	89–103 actinoids	104 Rf rutherfordium –	105 Db dubnium –	106 Sg seaborgium –	107 Bh bohrium –	108 Hs hassium –	109 Mt meitnerium –	110 Ds darmstadtium –	111 Rg roentgenium –	112 Cn copernicium –		114 Fl flerovium –		116 Lv livermorium –		

Key

atomic number
atomic symbol
name
relative atomic mass

lanthanoids	57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium –	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
actinoids	89 Ac actinium –	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	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.).