



Cambridge IGCSE™

CO-ORDINATED SCIENCES

0654/12

Paper 1 Multiple Choice (Core)

October/November 2021

45 minutes

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.

This document has **20** pages. Any blank pages are indicated.



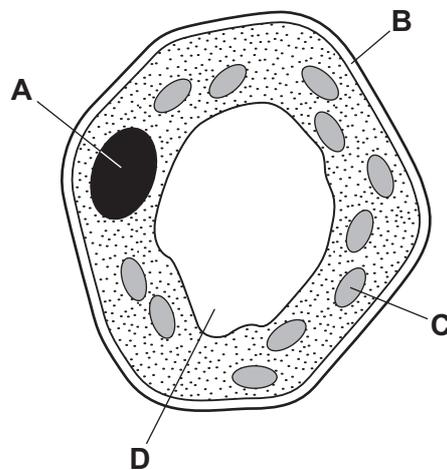
1 All living organisms can break down nutrient molecules to release energy.

What is this process?

- A excretion
- B growth
- C nutrition
- D respiration

2 The diagram shows a plant cell as seen under a light microscope.

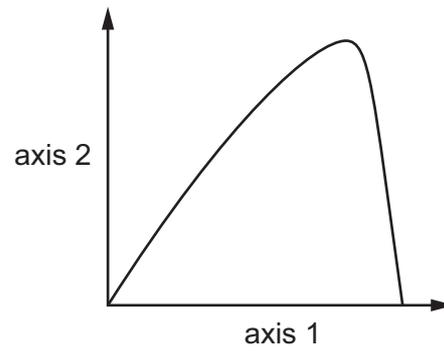
Which structure is also found in animal cells?



3 Which molecule contains carbon?

- A ammonia
- B fat
- C sulfuric acid
- D water

- 4 A student carried out an investigation on the effect of temperature on an enzyme-controlled reaction. The results are shown.

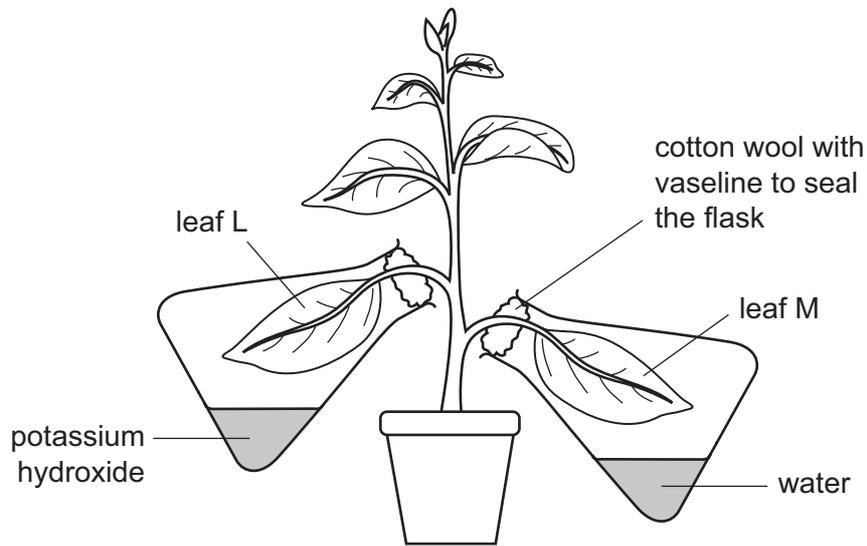


Which labels does the student need to add for the axes labelled axis 1 and axis 2?

| | axis 1 | axis 2 |
|----------|------------------|------------------|
| A | rate of reaction | temperature |
| B | rate of reaction | time |
| C | temperature | rate of reaction |
| D | time | rate of reaction |

- 5 The diagram shows an experiment to investigate photosynthesis. When leaves photosynthesise, they store some carbohydrates as starch.

Potassium hydroxide absorbs carbon dioxide.



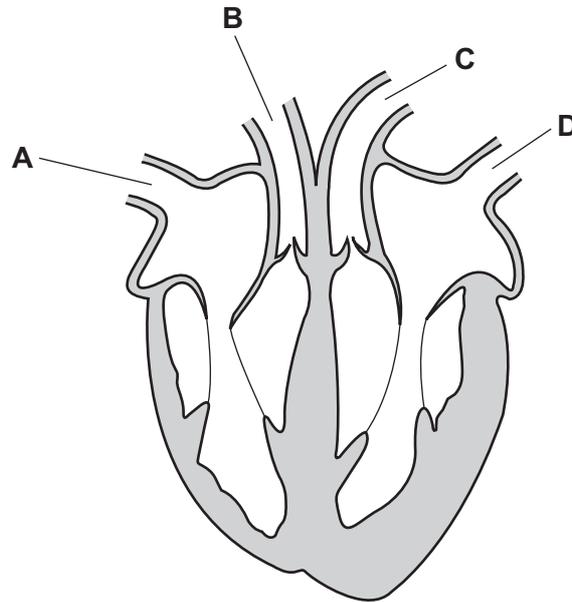
After standing in sunlight for 10 hours, leaf L contained no starch but leaf M contained a lot of starch.

What does this show?

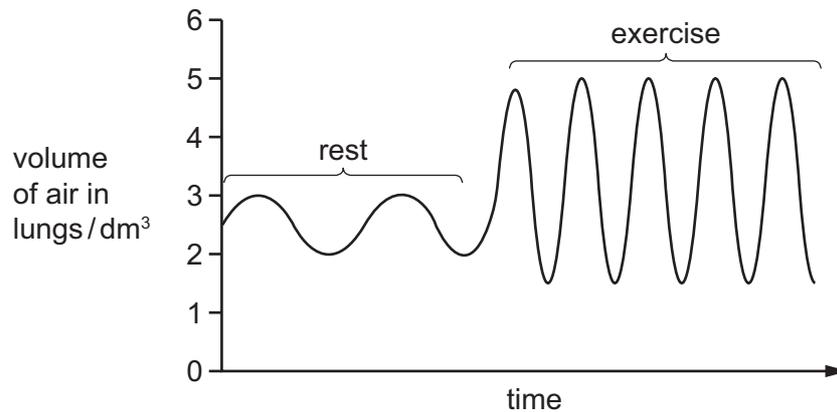
- A A leaf cannot make starch in a sealed flask.
 - B A leaf cannot make starch without carbon dioxide.
 - C A leaf cannot make starch without light.
 - D A leaf cannot make starch without oxygen.
- 6 What is the name of the process which moves soluble food molecules through the wall of the small intestine into the blood?
- A absorption
 - B assimilation
 - C digestion
 - D ingestion

7 The diagram shows a section through a mammalian heart.

Which vessel is the pulmonary vein?



8 The graph shows the changes in volume of air in the lungs at rest and during exercise.



What was the effect of exercise on the rate and depth of breathing?

| | rate of breathing | depth of breathing |
|----------|-------------------|--------------------|
| A | decrease | decrease |
| B | decrease | increase |
| C | increase | decrease |
| D | increase | increase |

- 9 Adrenaline is injected into the blood to treat some medical conditions.

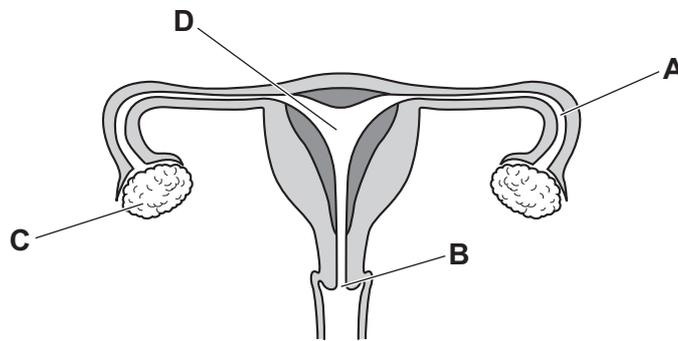
What would happen as a result of injecting adrenaline?

- 1 narrowing of the pupil in the eye
- 2 increased breathing rate
- 3 increased pulse rate

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

- 10 The diagram shows the female reproductive system.

Which labelled part is the cervix?



- 11 In a species of flowering plant, the allele for red flowers is dominant to the allele for white flowers.

A plant breeder crossed a homozygous white-flowered plant with a heterozygous red-flowered plant.

What is the expected phenotypic ratio of the next generation of plants?

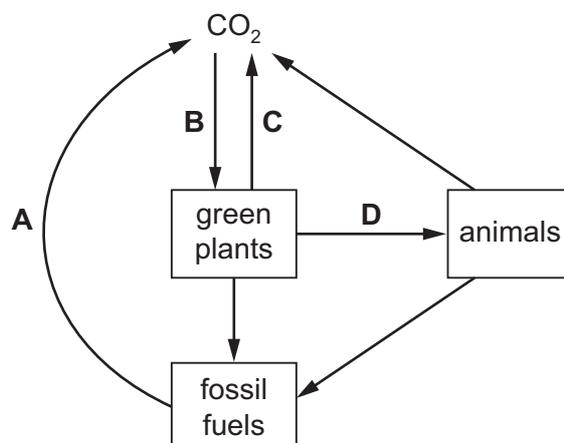
- A** 1 white : 1 red
- B** 3 red : 1 white
- C** 3 white : 1 red
- D** all the plants will be red

- 12 Which organism is a secondary consumer in the food chain shown?

A **B** **C** **D**
 plant → herbivore → carnivore → top carnivore

13 The diagram shows a simplified carbon cycle.

Which labelled arrow represents respiration?



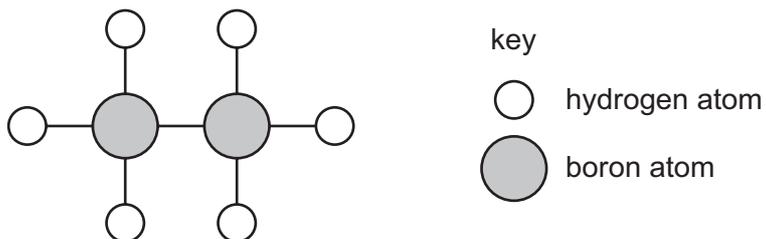
14 Which row correctly identifies the named changes?

| | physical changes | chemical changes |
|----------|--------------------------------|--------------------------------|
| A | condensation and combustion | evaporation and neutralisation |
| B | evaporation and neutralisation | condensation and combustion |
| C | condensation and evaporation | combustion and neutralisation |
| D | combustion and neutralisation | condensation and evaporation |

15 Which row describes the physical properties of the named substances?

| | substance | solubility in water | electrical conductivity as a solid | electrical conductivity as a liquid |
|----------|--------------------|---------------------|------------------------------------|-------------------------------------|
| A | ammonia | low | good | good |
| B | copper chloride | high | poor | good |
| C | iron nitrate | high | good | good |
| D | potassium chloride | low | poor | poor |

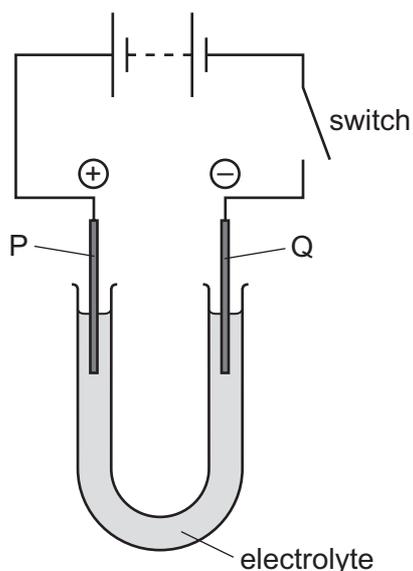
16 A model of a molecule is shown.



Which row shows the formula of this molecule and describes the type of bonding between the atoms?

| | formula | bonding |
|----------|------------------------|----------|
| A | 2BH_3 | covalent |
| B | 2BH_3 | ionic |
| C | B_2H_6 | covalent |
| D | B_2H_6 | ionic |

17 The diagram shows the electrolysis of a compound.



When the switch is closed, the solution around electrode P turns orange because a halogen is formed.

The positive electrode P is called the1....., and the halogen is2..... .

Which words complete gaps 1 and 2?

| | 1 | 2 |
|----------|---------|----------|
| A | anode | bromine |
| B | anode | chlorine |
| C | cathode | bromine |
| D | cathode | chlorine |

18 Magnesium ribbon is added to dilute hydrochloric acid.

Which observation shows that this process is exothermic?

- A** The pH of the solution decreases.
- B** The pH of the solution increases.
- C** The temperature of the solution decreases.
- D** The temperature of the solution increases.

19 A known mass of solid sodium carbonate is added to excess hydrochloric acid.

Which conditions give the shortest reaction time?

| | solid particle size | acid concentration |
|----------|---------------------|--------------------|
| A | large | high |
| B | large | low |
| C | small | high |
| D | small | low |

20 A white solid X dissolves in dilute hydrochloric acid. A gas is produced which turns limewater milky.

A flame test is carried out on solid X and produces a red coloured flame.

What is X?

- A** lithium carbonate
- B** lithium chloride
- C** potassium carbonate
- D** potassium chloride

21 Some properties of different metals are shown.

| | $\frac{\text{density}}{\text{g/cm}^3}$ | melting point/ $^{\circ}\text{C}$ | colour of compound formed by the metal |
|---|--|-----------------------------------|--|
| 1 | 1.54 | 851 | white |
| 2 | 8.91 | 1455 | green |
| 3 | 5.80 | 1890 | lilac |
| 4 | 11.3 | 328 | white |

Which metals are transition elements?

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

22 Why does the steel used to make a drill contain manganese?

- A** to increase the density of the steel
- B** to increase the hardness of the steel
- C** to increase the malleability of the steel
- D** to increase the melting point of the steel

23 Which colour is observed when water is added to anhydrous copper(II) sulfate?

- A blue
- B green
- C pink
- D white

24 Which process does **not** produce carbon dioxide?

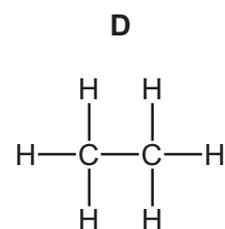
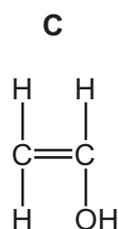
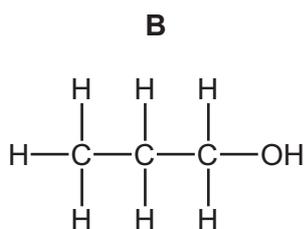
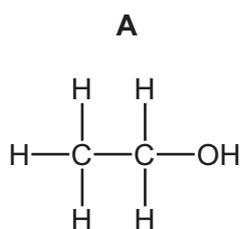
- A complete combustion of fossil fuels
- B reaction of an acid with a carbonate
- C respiration in plants
- D rusting iron

25 Which compound is used to neutralise acidic gases?

- A calcium carbonate
- B calcium chloride
- C calcium phosphate
- D calcium sulfate

26 Four molecules are shown.

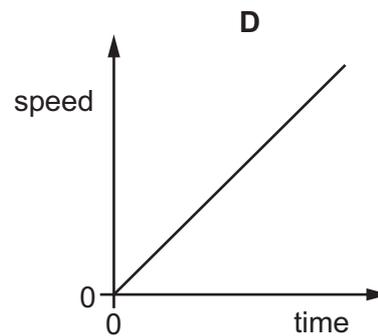
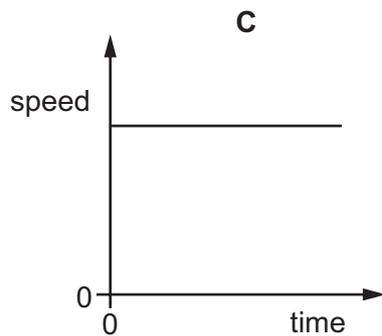
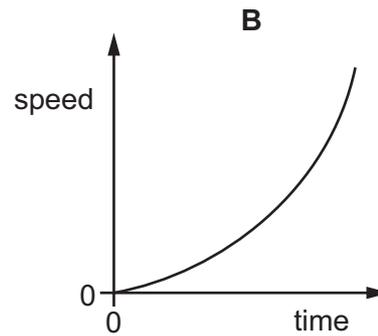
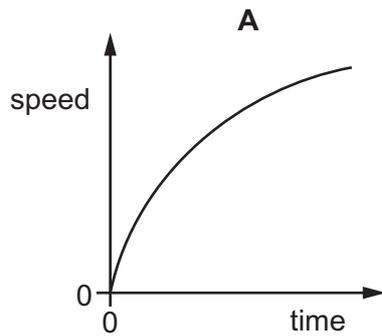
Which structure represents ethanol?



27 Which process produces alkenes from alkanes?

- A combustion
- B cracking
- C oxidation
- D reduction

28 Which speed–time graph represents the motion of an object in free fall with **no** air resistance?



29 What is meant by the *moment* of a force?

- A** the speed of an object moved by a force
- B** the time taken for a force to move an object
- C** the turning effect of a force
- D** the work done by a force

30 A stone falls from a bench.

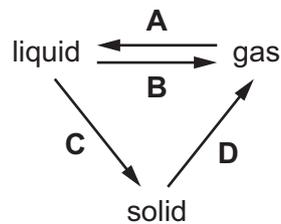
Which row describes how the gravitational potential energy and the kinetic energy of the stone change as it falls?

| | gravitational potential energy | kinetic energy |
|----------|--------------------------------|----------------|
| A | decreases | increases |
| B | decreases | stays the same |
| C | increases | decreases |
| D | increases | stays the same |

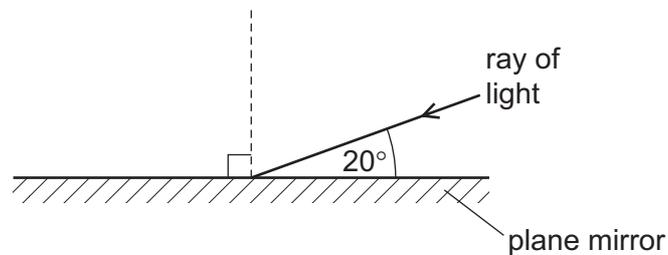
- 31 Four different kettles contain different masses of water.
They are used to heat the water from 20°C to 100°C .
Each kettle takes a different amount of time to do this.
Which kettle has the lowest useful power output?

| | mass of water / g | time to heat water to 100°C / minute |
|----------|-------------------|--|
| A | 1000 | 3.0 |
| B | 1000 | 5.0 |
| C | 2500 | 3.0 |
| D | 2500 | 5.0 |

- 32 Which labelled arrow on the diagram represents condensation?



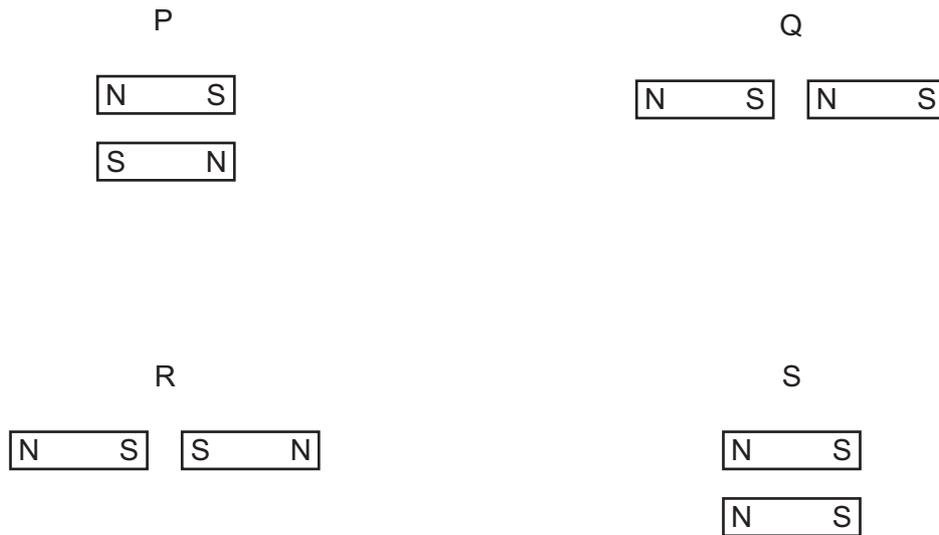
- 33 The diagram shows a ray of light striking a plane mirror.



What is the angle of reflection?

- A** 20° **B** 40° **C** 70° **D** 90°

34 The diagrams P, Q, R and S show four pairs of bar magnets.

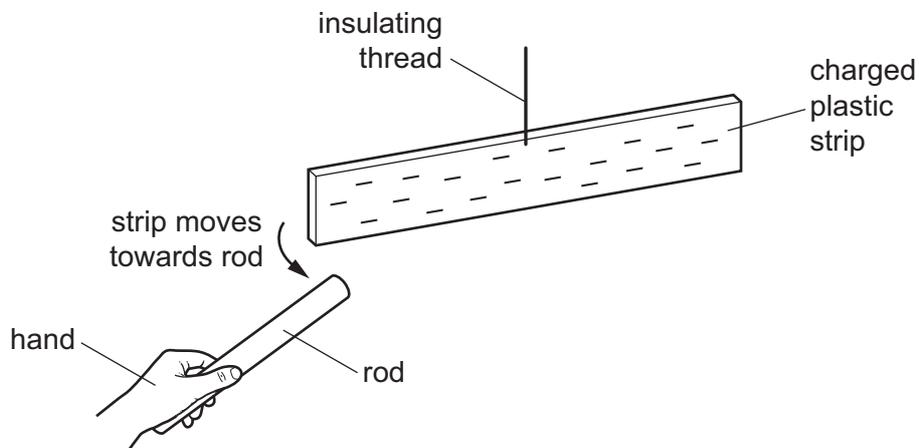


For which two pairs of magnets is there a force of attraction between the magnets?

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

35 A rod is rubbed with a dry piece of cloth. A scientist holds the rod in her hand and brings it close to a negatively charged plastic strip. The strip is suspended by an insulating thread.

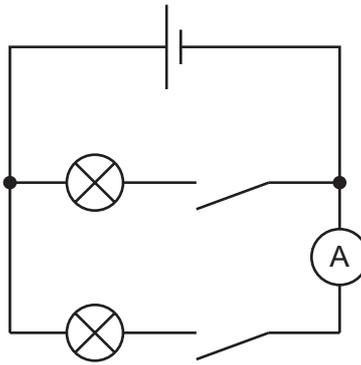
As the rod approaches the plastic strip, the strip moves towards the rod.



Which statement is correct?

- A** The rod is a negatively charged electrical conductor.
B The rod is a negatively charged electrical insulator.
C The rod is a positively charged electrical conductor.
D The rod is a positively charged electrical insulator.

36 Two lamps are connected in the circuit shown.

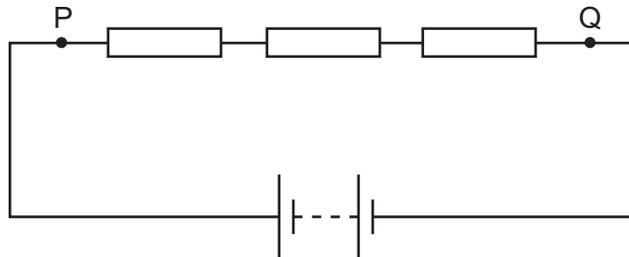


Which of these two statements about the circuit are correct?

- 1 There is a separate switch to control each lamp.
- 2 The ammeter measures the current in both lamps.

- A** neither 1 nor 2
B 1 only
C 2 only
D 1 and 2

37 Three resistors are connected in series with a battery, as shown.

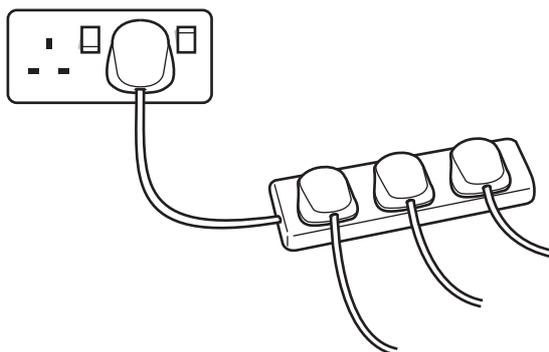


The current at point P is 6.0 A.

What is the current at point Q?

- A** 0 A **B** 2.0 A **C** 3.0 A **D** 6.0 A

- 38 An electric kettle, washing machine and cooker are all switched on and connected through an extension cable into a single mains socket.



What is the electrical hazard of this arrangement?

- A The cooker overheats.
 B The extension cable overheats.
 C The kettle overheats.
 D The washing machine overheats.
- 39 There is a current in a coil of wire. The coil rotates between the poles of a magnet.

Which change does **not** increase the turning effect on the coil?

- A increasing the current in the coil
 B reversing the current
 C using a stronger magnet
 D using more turns in the coil
- 40 The table gives information about four nuclides P, Q, R and S.

| nuclide | number of protons | number of neutrons |
|---------|-------------------|--------------------|
| P | 81 | 123 |
| Q | 82 | 122 |
| R | 82 | 123 |
| S | 83 | 121 |

Which nuclides are isotopes of the same element?

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

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