



# Cambridge O Level

**COMBINED SCIENCE**

**5129/11**

Paper 1 Multiple Choice

**May/June 2021**

**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.

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



1 Which adaptations allow a red blood cell to carry a larger amount of oxygen?

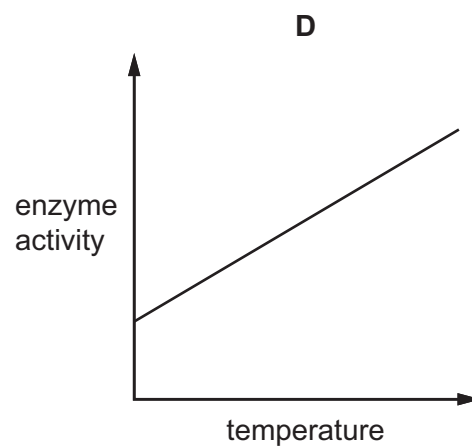
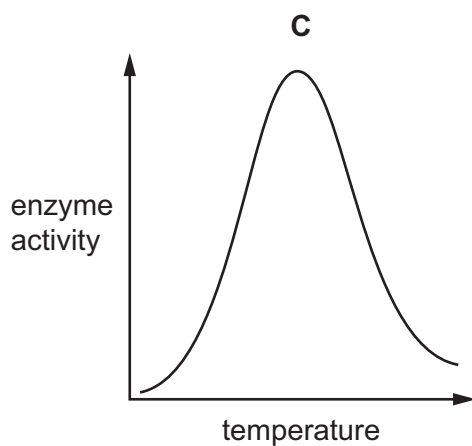
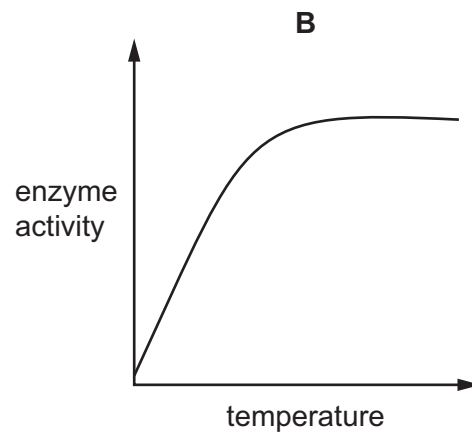
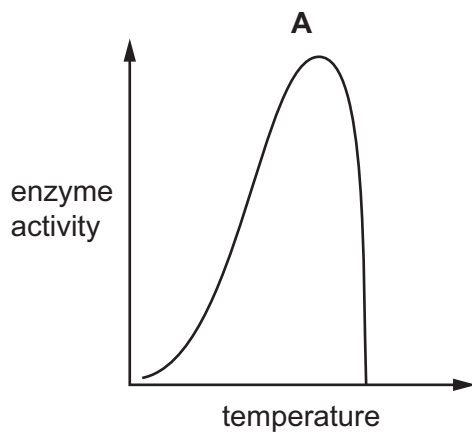
- 1 They contain haemoglobin.
- 2 They have a small surface area to volume ratio.
- 3 They have no nucleus.

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

2 Which is the correct definition of osmosis?

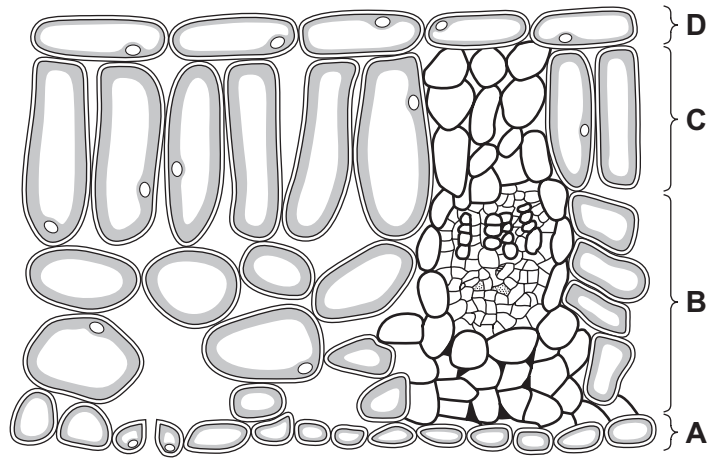
- A** passage of water molecules from a region of their higher concentration to a region of their lower concentration, through a permeable membrane
- B** passage of water molecules from a region of their higher concentration to a region of their lower concentration, through a partially permeable membrane
- C** passage of water molecules from a region of their lower concentration to a region of their higher concentration, through a permeable membrane
- D** passage of water molecules from a region of their lower concentration to a region of their higher concentration, through a partially permeable membrane

3 Which graph shows the effect of increasing temperature on the activity of an enzyme?



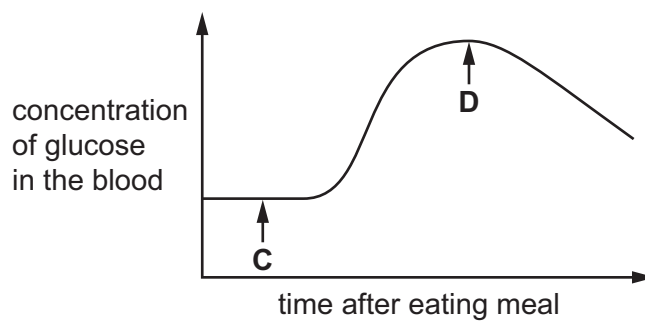
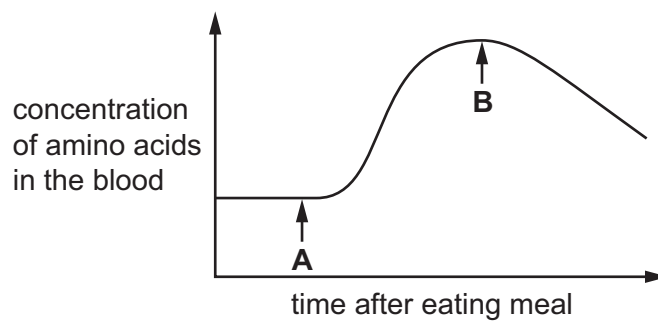
- 4 The diagram shows a section of a leaf.

Which layer contains cells with the most chloroplasts?



- 5 The graphs show how the concentration of amino acids and glucose in the blood change during and after a meal.

Which point shows carbohydrate has been absorbed through the wall of the small intestine?

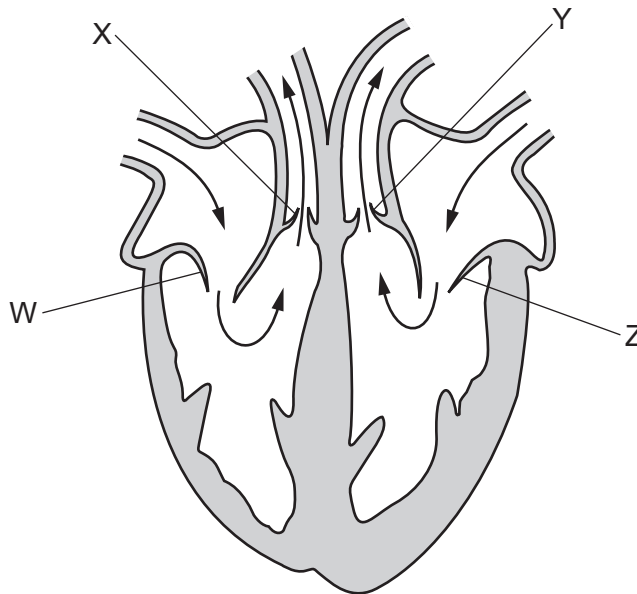


6 Which are the functions of the vascular bundle in a leaf?

	phloem tissue	xylem tissue
<b>A</b>	the movement of water into the leaf	the movement of sugars into the leaf
<b>B</b>	the movement of water out of the leaf	the movement of sugars out of the leaf
<b>C</b>	the movement of sugars into the leaf	the movement of water out of the leaf
<b>D</b>	the movement of sugars out of the leaf	the movement of water into the leaf

7 The diagram shows a human heart.

The four valves in the heart are labelled W, X, Y and Z.



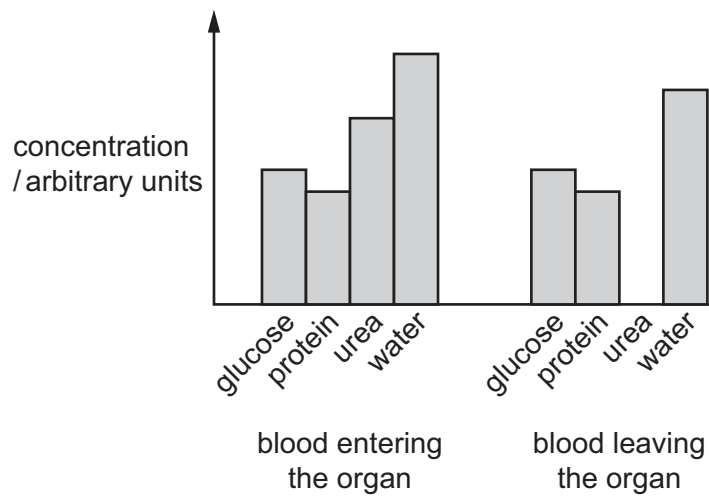
Which valves would be open and which valves would be closed as blood leaves the heart?

	open	closed
<b>A</b>	X and Z	W and Y
<b>B</b>	X and Y	W and Z
<b>C</b>	W and Z	X and Y
<b>D</b>	W and Y	X and Z

8 What helps the uptake of oxygen in humans?

	exchange surface has many small blood vessels	high concentration of oxygen in the blood
<b>A</b>	no	no
<b>B</b>	yes	no
<b>C</b>	no	yes
<b>D</b>	yes	yes

9 Blood is tested for glucose, protein, urea and water before entering and after leaving an organ. The results are shown on the graph.



What is the organ?

- A** intestine
- B** kidney
- C** liver
- D** lungs

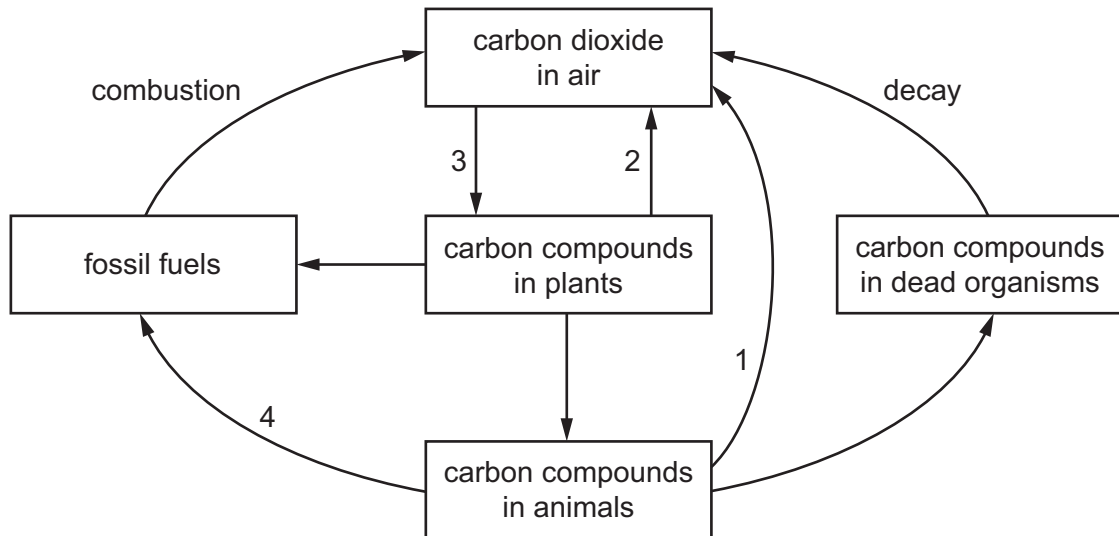
10 Which statement describes the pupil reflex?

- A** a rapid automatic response to a change in light intensity
- B** a rapid voluntary response to a change in light intensity
- C** a slow automatic response to a change in light intensity
- D** a slow voluntary response to a change in light intensity

11 What is true for heroin?

- A It is a nutrient.
- B It is a stimulant.
- C It modifies chemical reactions in the body.
- D It is **not** addictive.

12 The diagram shows the carbon cycle.



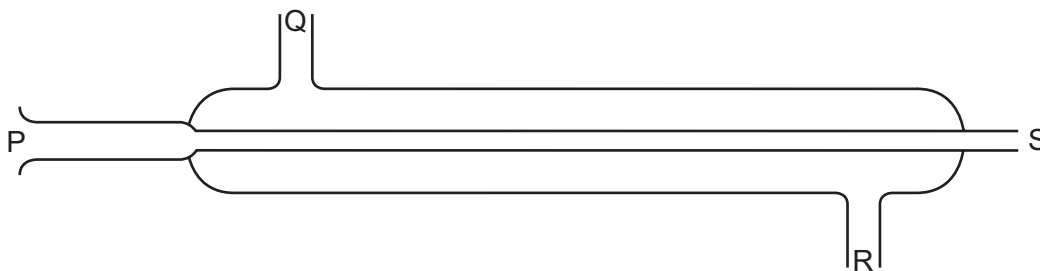
Which arrows represent respiration?

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

13 Which is a correct definition of asexual reproduction?

- A the process resulting in the production of genetically different offspring from one parent
- B the process resulting in the production of genetically different offspring from two parents
- C the process resulting in the production of genetically identical offspring from one parent
- D the process resulting in the production of genetically identical offspring from two parents

14 The diagram shows a condenser.



Where do the hot vapour and the cooling water enter the condenser?

	hot vapour	cooling water
<b>A</b>	P	Q
<b>B</b>	P	R
<b>C</b>	Q	P
<b>D</b>	Q	S

- 15 Which statement describes the changes in kinetic energy, movement and bunching of particles when a solid is heated through  $5^{\circ}\text{C}$  and changes state to become a liquid?
- A** The particles lose kinetic energy, slow down and bunch closer together.
- B** The particles gain kinetic energy, move about rapidly and fill up all the available space.
- C** The particles gain kinetic energy, move around and remain bunched together.
- D** The particles gain kinetic energy, slow down and bunch closer together.
- 16 Which statement describes isotopes of the same element?
- A** They have the same number of electrons and neutrons.
- B** They have the same number of neutrons and a different number of protons.
- C** They have the same number of protons and a different number of neutrons.
- D** They have the same number of protons and neutrons.
- 17 Which statement about the formation of negatively charged ions is correct?
- A** They are formed by elements on the left hand side of the Periodic Table.
- B** They are formed by the metallic elements.
- C** They are formed when atoms lose electrons.
- D** They are formed when halogens become halides.

18 Which statement about covalent bonding is correct?

- A Compounds containing covalent bonds are good electrical conductors.
- B Covalent bonds are formed by sharing outer shell electrons.
- C Covalent bonds are formed between metals and non-metals.
- D Nitrogen forms five covalent bonds with hydrogen.

19 Which formula has the greatest number of atoms?

- A  $\text{Fe}_2(\text{SO}_4)_3$
- B  $\text{Cu}(\text{CH}_3\text{COO})_2$
- C  $\text{Ca}_3(\text{PO}_4)_2$
- D  $(\text{NH}_4)_2\text{CO}_3$

20 Three oxides are listed.

- 1  $\text{K}_2\text{O}$
- 2  $\text{NO}_2$
- 3  $\text{SO}_2$

Excess of each oxide is added to aqueous sodium hydroxide.

Which oxides lower the pH of the solution?

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

21 Fluorine is a Group VII element and is above chlorine in the Periodic Table.

Which statement about fluorine is correct?

- A It has a higher boiling point than chlorine.
- B It is darker in colour than iodine.
- C It is displaced from aqueous potassium fluoride by reaction with bromine.
- D It is more reactive than chlorine.



22 Four metals, W, X, Y and Z, are tested with water, steam and dilute hydrochloric acid.

The results are shown.

W does not react with cold water or steam and only reacts slowly with dilute hydrochloric acid.

Z reacts slowly with cold water, reacts moderately fast with steam and reacts rapidly with dilute hydrochloric acid.

Y reacts vigorously with cold water.

X does not react with cold water, reacts very slowly with steam and reacts moderately fast with dilute hydrochloric acid.

What is the order of reactivity of the metals?

	most reactive		→	least reactive	
<b>A</b>	W	X		Z	Y
<b>B</b>	W	Z		X	Y
<b>C</b>	Y	X		Z	W
<b>D</b>	Y	Z		X	W

23 Which property of aluminium makes it suitable for making food containers?

- A** good heat conductivity
- B** good resistance to corrosion
- C** high density
- D** low melting point

24 The global atmospheric concentration of carbon dioxide has increased in the last 200 years.

Which processes are causing this increase?

- 1 emissions from motor vehicles
- 2 photosynthesis
- 3 power stations using coal and oil

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

25 Ammonium sulfate is a common fertiliser.

Which element needed by plant life is provided by this fertiliser?

- A nitrogen
- B oxygen
- C phosphorus
- D potassium

26 Which row identifies the structure and name of the compound?

	structure	name
<b>A</b>	$  \begin{array}{c}  \text{H} \quad \text{H} \\  \diagdown \quad / \\  \text{C} = \text{C} \\  / \quad \diagdown \\  \text{H} \quad \text{H}  \end{array}  $	ethane
<b>B</b>	$  \begin{array}{c}  \text{H} \quad \text{H} \\    \quad   \\  \text{H}-\text{C}-\text{C}-\text{O}-\text{H} \\    \quad   \\  \text{H} \quad \text{H}  \end{array}  $	ethanol
<b>C</b>	$  \begin{array}{c}  \text{H} \quad \text{H} \\    \quad   \\  \text{H}-\text{C}-\text{C}-\text{H} \\    \quad   \\  \text{H} \quad \text{H}  \end{array}  $	ethene
<b>D</b>	$  \left[ \begin{array}{c}  \text{H} \quad \text{H} \\    \quad   \\  -\text{C} = \text{C}- \\    \quad   \\  \text{H} \quad \text{H}  \end{array} \right]_n  $	(poly)ethene

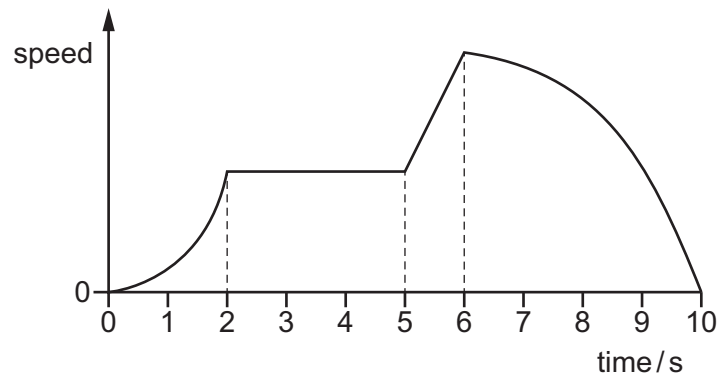
27 A hydrocarbon reacts with element X. In this reaction, X is decolourised.

The same hydrocarbon reacts with another element Y. In this reaction there is no colour change.

Which row identifies the hydrocarbon and elements X and Y?

	hydrocarbon	X	Y
<b>A</b>	butene	bromine	hydrogen
<b>B</b>	ethene	hydrogen	bromine
<b>C</b>	methane	bromine	hydrogen
<b>D</b>	propane	hydrogen	bromine

28 The diagram shows a speed–time graph.



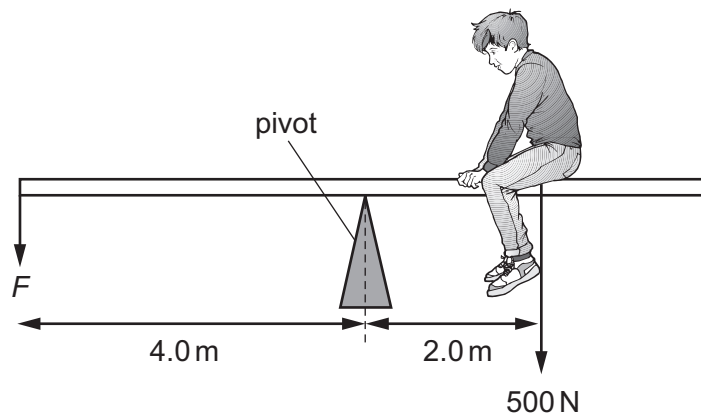
For how many seconds does the body travel with a constant non-zero acceleration?

- A** 1.0s      **B** 2.0s      **C** 3.0s      **D** 4.0s

29 Which two variables affect the density of material?

- A** charge and volume  
**B** height above the ground and charge  
**C** mass and height above the ground  
**D** mass and volume

30 The diagram shows a boy of weight 500 N sitting on a see-saw. He sits 2.0 m from the pivot.



What force  $F$  is applied 4.0 m from the pivot to balance the see-saw?

- A** 250 N      **B** 750 N      **C** 1000 N      **D** 3000 N

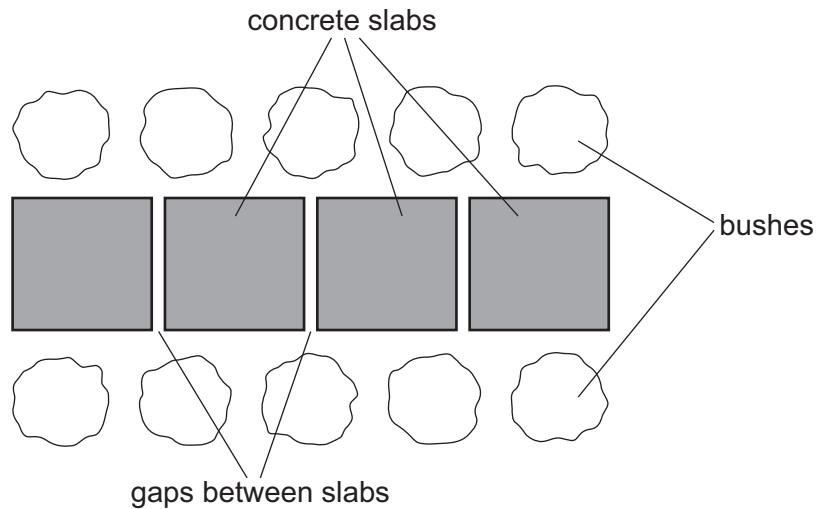
31 In a heated gas, convection occurs. Three processes are involved:

- 1 Separation of the particles of the gas increases.
- 2 The heated gas rises.
- 3 The thermal energy of the gas particles increases.

In which order do these processes happen?

- A** 1 → 2 → 3    **B** 2 → 1 → 3    **C** 3 → 1 → 2    **D** 3 → 2 → 1

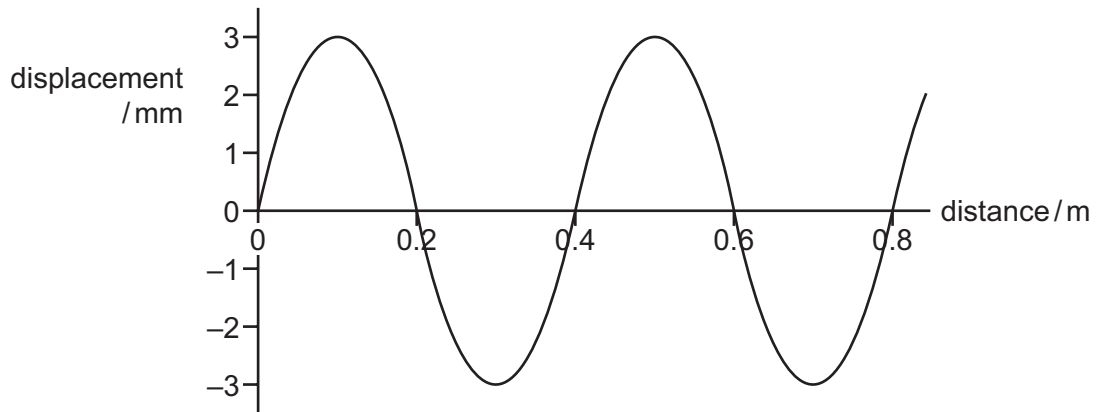
32 A path is made by laying concrete slabs on a cold day. Gaps are left between the slabs.



On a hot day how does the size of each slab and the gaps between the slabs change?

- A** The slabs and the gaps both become larger.  
**B** The slabs and the gaps both become smaller.  
**C** The slabs become larger and the gaps become smaller.  
**D** The slabs become smaller and the gaps become larger.

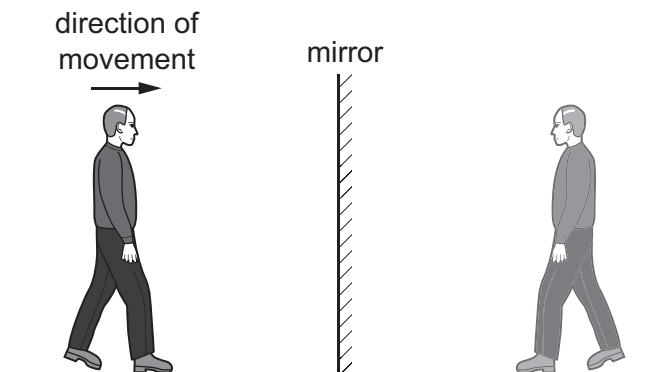
33 The diagram shows a wave at an instant in time.



Which statement about the wave is correct?

- A The amplitude is 3 mm.
- B The amplitude is 6 mm.
- C The wavelength is 0.2 m.
- D The wavelength is 0.8 m.

34 The diagram shows a man walking towards a plane mirror

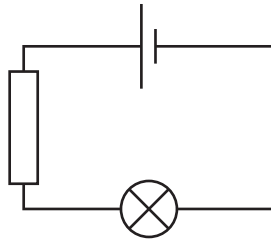


The man walks to the right at 2 m/s.

Which statement about the image is correct?

- A It does not move.
- B It moves to the left at 2 m/s.
- C It moves to the right at 2 m/s.
- D It increases in size.

- 35 In the circuit shown, 2.0 C of charge move through the lamp in a time of 6.0 s.

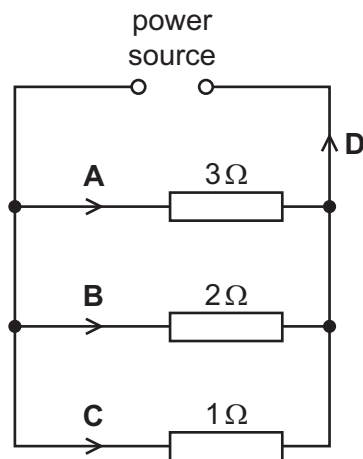


What is the current in the circuit?

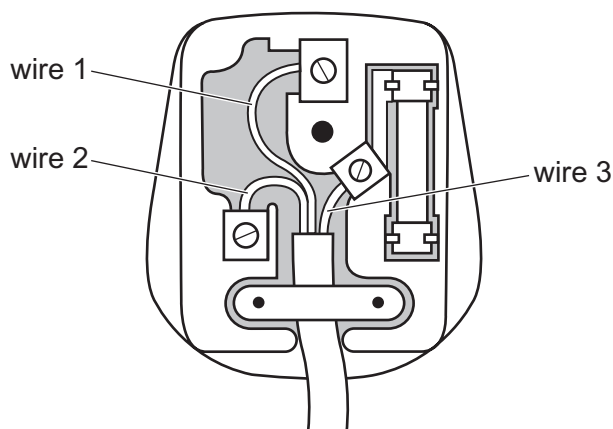
- A 0.33 A      B 3.0 A      C 4.0 A      D 12 A
- 36 A power supply is connected to three resistors.

Four points in the circuit are labelled **A**, **B**, **C** and **D**.

At which point is the current largest?



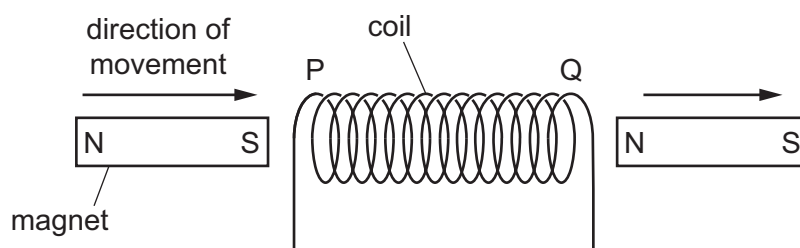
37 The diagram shows the wiring in a mains plug.



Which wires are connected to the earth, live and neutral pins?

	earth	live	neutral
<b>A</b>	wire 1	wire 2	wire 3
<b>B</b>	wire 1	wire 3	wire 2
<b>C</b>	wire 2	wire 1	wire 3
<b>D</b>	wire 2	wire 3	wire 1

38 A magnet moves through a coil of wire, entering the coil at P and leaving at Q.



The induced current creates magnetic poles in the coil at P and Q.

Which poles are created as the magnet first enters the coil and then as the magnet completely leaves the coil?

	pole at P as south pole enters the coil	pole at Q as north pole leaves the coil
<b>A</b>	N-pole	N-pole
<b>B</b>	N-pole	S-pole
<b>C</b>	S-pole	N-pole
<b>D</b>	S-pole	S-pole

39 Which table correctly identifies the locations of electrons, neutrons and protons in an atom?

**A**

	inside nucleus	outside nucleus
electrons	✓	
neutrons	✓	
protons		✓

**B**

	inside nucleus	outside nucleus
electrons		✓
neutrons		✓
protons	✓	

**C**

	inside nucleus	outside nucleus
electrons		✓
neutrons	✓	
protons	✓	

**D**

	inside nucleus	outside nucleus
electrons	✓	
neutrons		✓
protons		✓

40 Which type of radioactive substance causes the most ionisation damage when inside the body?

- A a beta-particle emitter
- B a gamma-ray emitter
- C an alpha-particle emitter
- D all three types of emitter are equally dangerous







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## The Periodic Table of Elements

Group									
I	II	III	IV	V	VI	VII	VIII		
		1 H hydrogen 1							
3 Li lithium 7	4 Be beryllium 9	<b>Key</b> atomic number atomic symbol name relative atomic mass						2 He helium 4	
11 Na sodium 23	12 Mg magnesium 24	5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20		
19 K potassium 39	20 Ca calcium 40	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		
37 Rb rubidium 85	38 Sr strontium 88	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84		
55 Cs caesium 133	56 Ba barium 137	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131		
87 Fr francium —	88 Ra radium —	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium —	85 At astatine —	86 Rn radon —		
57 La lanthanum 139	58 Ce cerium 140	29 Cu copper 64	28 Ni nickel 59	27 Co cobalt 59	26 Fe iron 56	25 Mn manganese 55	24 Cr chromium 52		
89 Ac actinium —	90 Th thorium 232	30 Zn zinc 65	29 Cu copper 64	27 Co cobalt 59	26 Fe iron 56	25 Mn manganese 55	24 Cr chromium 52		
		30 Zn zinc 65	29 Cu copper 64	27 Co cobalt 59	26 Fe iron 56	25 Mn manganese 55	24 Cr chromium 52		
		48 Cd cadmium 112	47 Ag silver 108	45 Rh rhodium 103	44 Ru ruthenium 101	43 Tc technetium —	42 Mo molybdenum 96		
		80 Hg mercury 201	79 Au gold 197	77 Ir iridium 192	76 Os osmium 190	75 Re rhenium 186	74 W tungsten 184		
		114 Fl flerovium —	111 Rg roentgenium —	109 Mt meitnerium —	108 Hs hassium —	107 Bh bohrium —	106 Sg seaborgium —		
		67 Ho holmium 165	66 Dy dysprosium 163	65 Tb terbium 159	64 Gd gadolinium 157	63 Eu europium 152	62 Sm samarium 150		
		69 Tm thulium 169	68 Er erbium 167	65 Tb terbium 159	64 Gd gadolinium 157	63 Eu europium 152	62 Sm samarium 150		
		101 Md mendelevium —	100 Fm fermium —	97 Bk berkelium —	96 Cm curium —	95 Am americium —	94 Pu plutonium —		
		103 No nobelium —	102 Lr lawrencium —	101 Md mendelevium —	100 Fm fermium —	99 Es einsteinium —	98 Cf californium —		
		71 Lu lutetium 175	70 Yb ytterbium 173	69 Tm thulium 169	68 Er erbium 167	66 Dy dysprosium 163	65 Tb terbium 159		
		103 No nobelium —	102 Lr lawrencium —	101 Md mendelevium —	100 Fm fermium —	98 Cf californium —	97 Bk berkelium —		
		103 No nobelium —	102 Lr lawrencium —	101 Md mendelevium —	100 Fm fermium —	98 Cf californium —	97 Bk berkelium —		

lanthanoids

actinoids

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