



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?

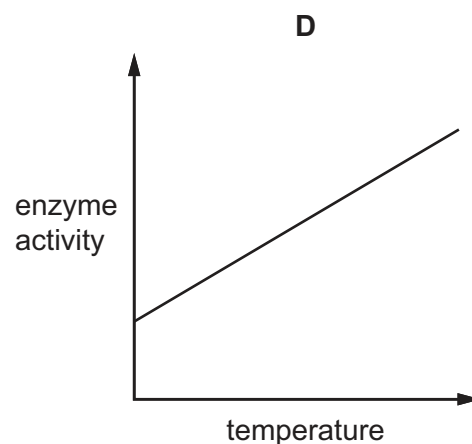
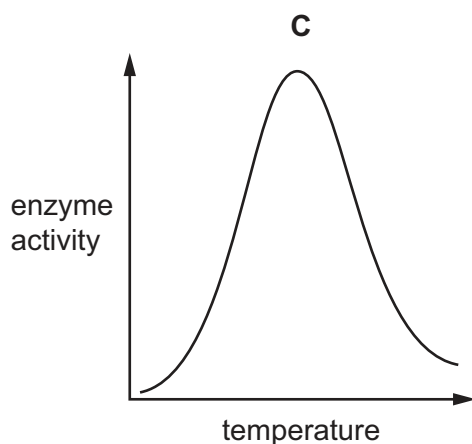
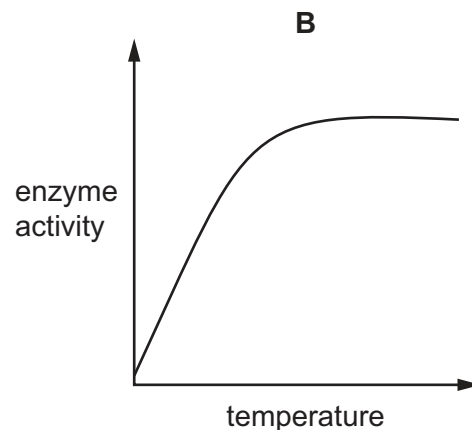
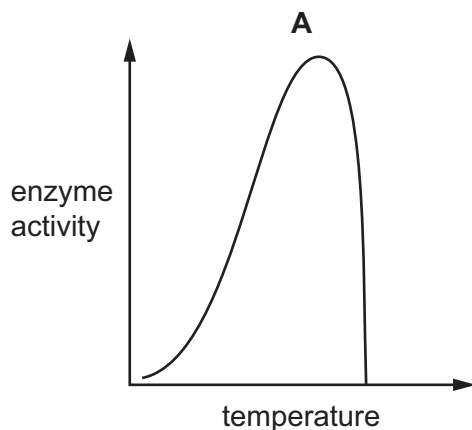
- 1 They contain haemoglobin.
- 2 They have a small surface area to volume ratio.
- 3 They have no nucleus.

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?

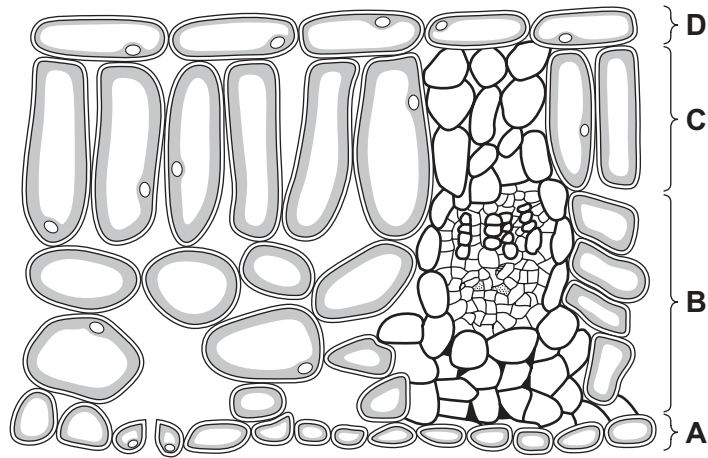
- A** passage of water molecules from a region of their higher concentration to a region of their lower concentration, through a permeable membrane
- B** passage of water molecules from a region of their higher concentration to a region of their lower concentration, through a partially permeable membrane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



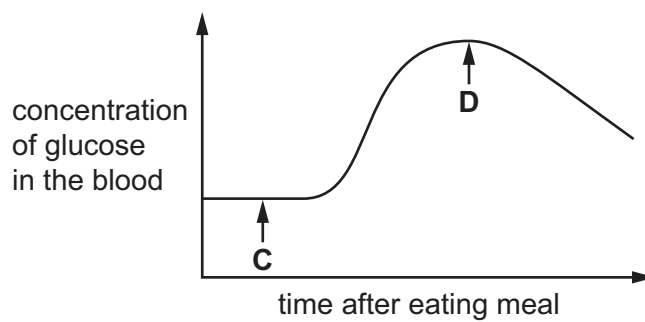
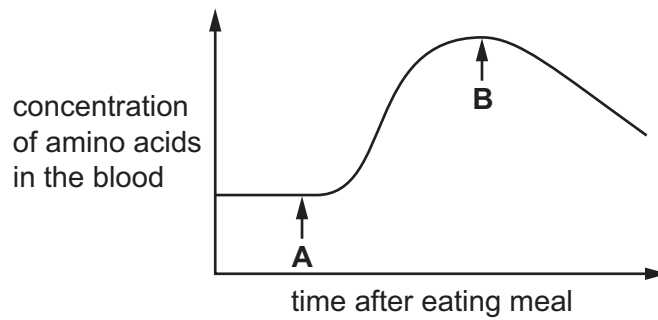
- 4 The diagram shows a section of a leaf.

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?

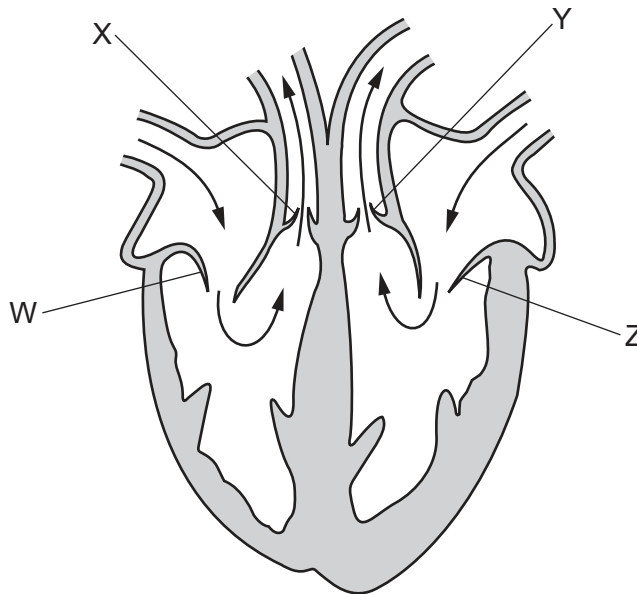


6 Which are the functions of the vascular bundle in a leaf?

	phloem tissue	xylem tissue
A	the movement of water into the leaf	the movement of sugars into the leaf
B	the movement of water out of the leaf	the movement of sugars out of the leaf
C	the movement of sugars into the leaf	the movement of water out of the leaf
D	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.



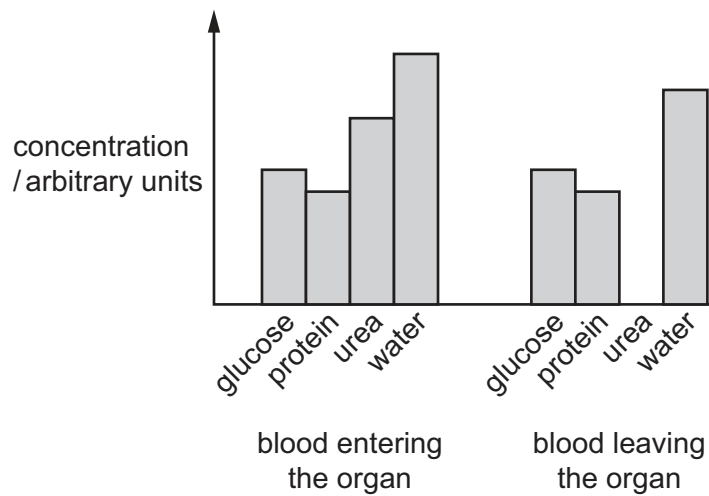
Which valves would be open and which valves would be closed as blood leaves the heart?

	open	closed
A	X and Z	W and Y
B	X and Y	W and Z
C	W and Z	X and Y
D	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
A	no	no
B	yes	no
C	no	yes
D	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

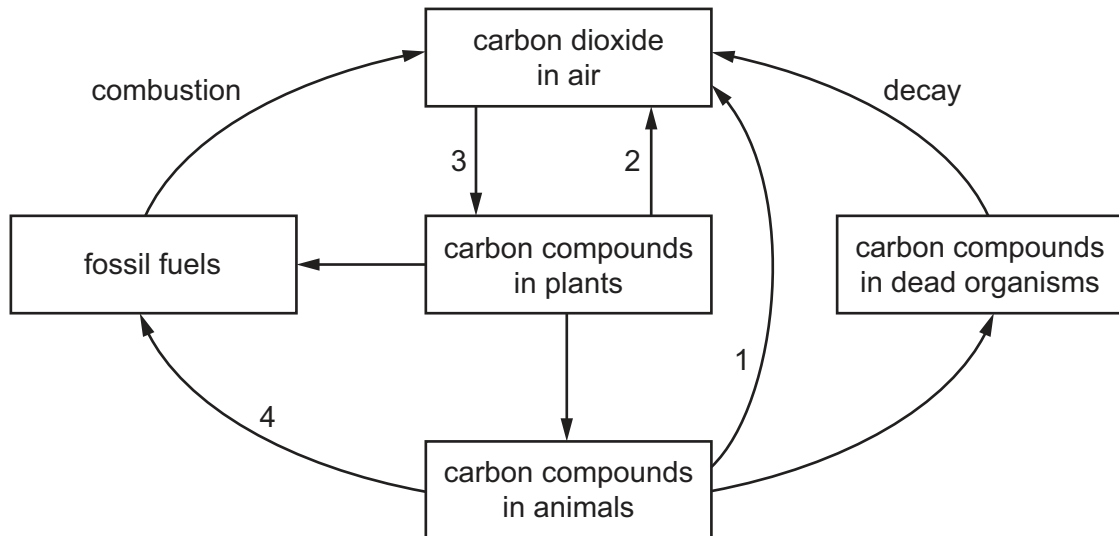
10 Which statement describes the pupil reflex?

- 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.



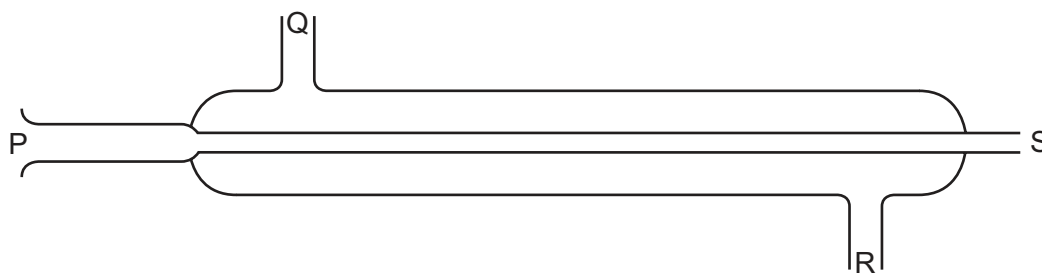
Which arrows represent respiration?

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

- 15 Which statement describes the changes in kinetic energy, movement and bunching of particles when a solid is heated through 5°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 K_2O
- 2 NO_2
- 3 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	
A	W	X	Z	Y
B	W	Z	X	Y
C	Y	X	Z	W
D	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
A	$ \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	$ \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
C	$ \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
D	$ \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

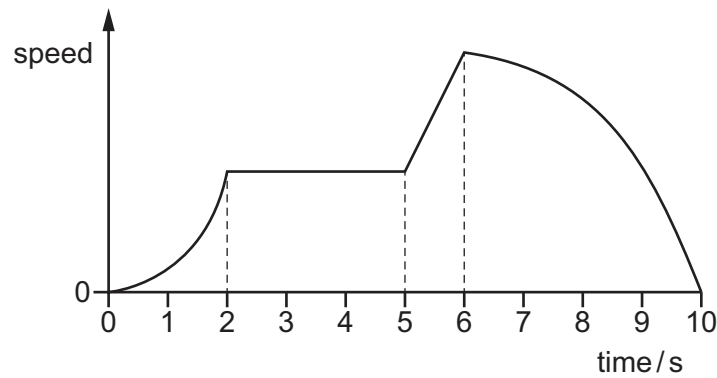
27 A hydrocarbon reacts with element X. In this reaction, X is decolourised.

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
A	butene	bromine	hydrogen
B	ethene	hydrogen	bromine
C	methane	bromine	hydrogen
D	propane	hydrogen	bromine

28 The diagram shows a speed–time graph.



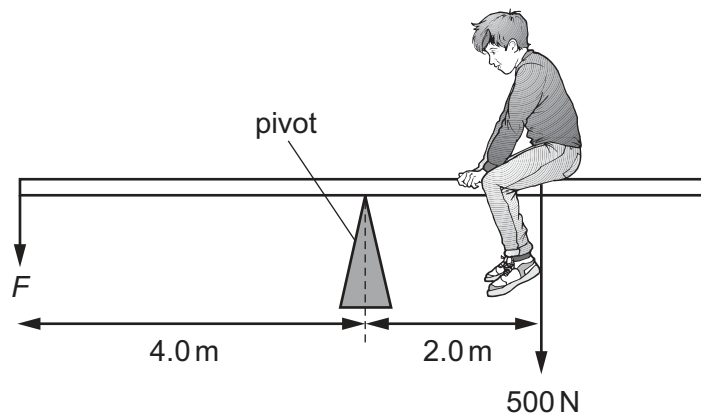
For how many seconds does the body travel with a constant non-zero acceleration?

- 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

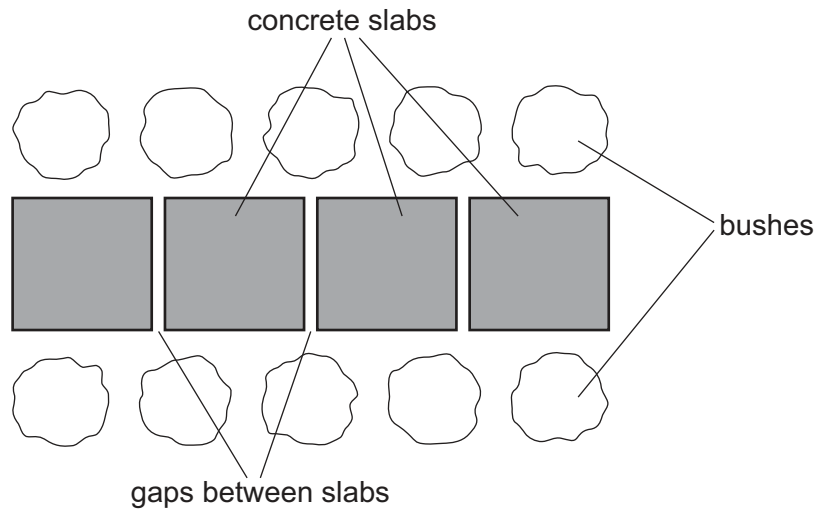
31 In a heated gas, convection occurs. Three processes are involved:

- 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

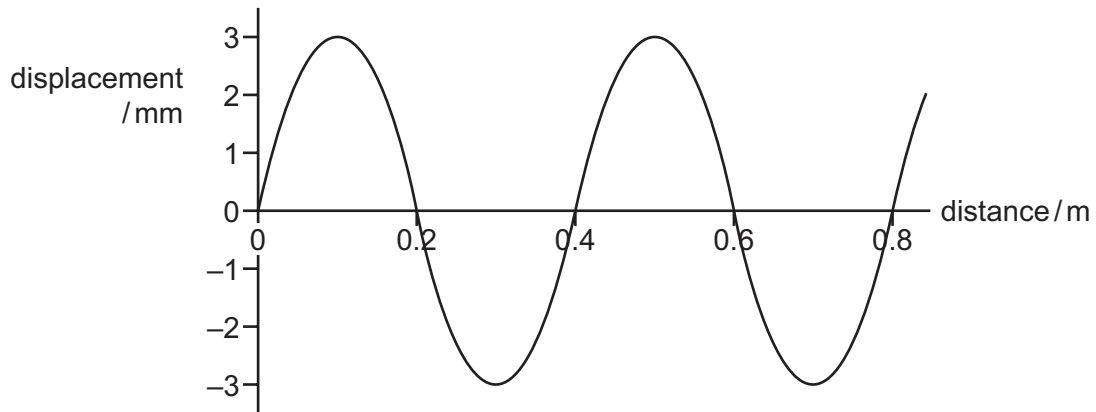
32 A path is made by laying concrete slabs on a cold day. Gaps are left between the slabs.



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.

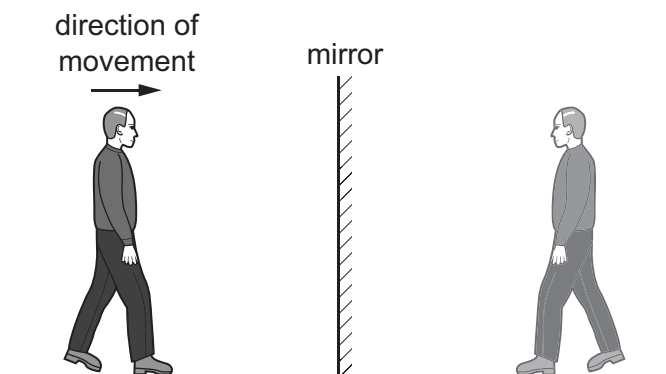
33 The diagram shows a wave at an instant in time.



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

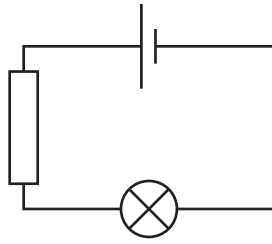


The man walks to the right at 2 m/s.

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.

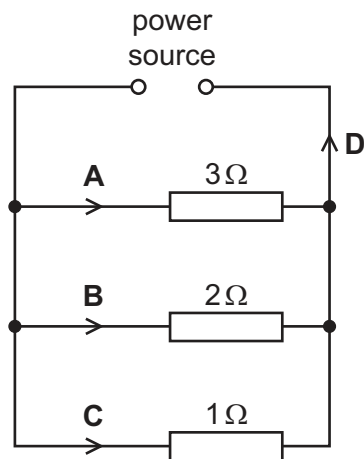


What is the current in the circuit?

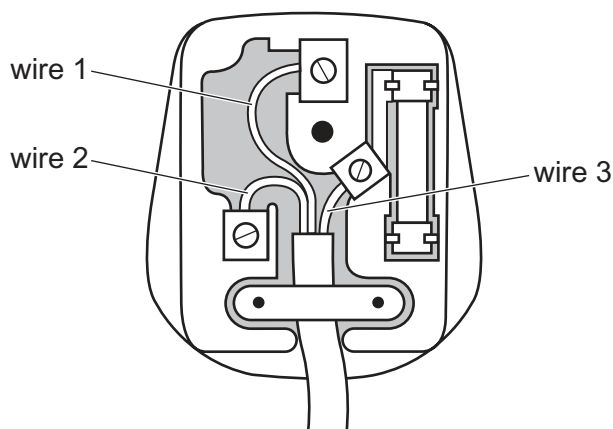
- A 0.33 A B 3.0 A C 4.0 A D 12 A
- 36 A power supply is connected to three resistors.

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

At which point is the current largest?



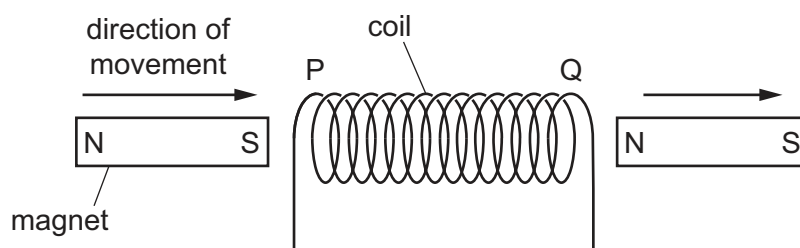
37 The diagram shows the wiring in a mains plug.



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

	earth	live	neutral
A	wire 1	wire 2	wire 3
B	wire 1	wire 3	wire 2
C	wire 2	wire 1	wire 3
D	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
A	N-pole	N-pole
B	N-pole	S-pole
C	S-pole	N-pole
D	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																																																																																																																																																																																													
3 Li lithium 7	4 Be beryllium 9	11 Na sodium 23	12 Mg magnesium 24	19 K potassium 39	20 Ca calcium 40	37 Rb rubidium 85	55 Cs caesium 133	87 Fr francium —	1 H hydrogen 1	2 He helium 4	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	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 —	118 Og oganeson —	119 Uu unbinilium —	120 Uub unbinilium —	121 Uut ununilium —	122 Uuq ununilium —	123 Uuq ununilium —	124 Uuq ununilium —	125 Uuq ununilium —	126 Uuq ununilium —	127 Uuq ununilium —	128 Uuq ununilium —	129 Uuq ununilium —	130 Uuq ununilium —	131 Uuq ununilium —	132 Uuq ununilium —	133 Uuq ununilium —	134 Uuq ununilium —	135 Uuq ununilium —	136 Uuq ununilium —	137 Uuq ununilium —	138 Uuq ununilium —	139 Uuq ununilium —	140 Uuq ununilium —	141 Uuq ununilium —	142 Uuq ununilium —	143 Uuq ununilium —	144 Uuq ununilium —	145 Uuq ununilium —	146 Uuq ununilium —	147 Uuq ununilium —	148 Uuq ununilium —	149 Uuq ununilium —	150 Uuq ununilium —	151 Uuq ununilium —	152 Uuq ununilium —	153 Uuq ununilium —	154 Uuq ununilium —	155 Uuq ununilium —	156 Uuq ununilium —	157 Uuq ununilium —	158 Uuq ununilium —	159 Uuq ununilium —	160 Uuq ununilium —	161 Uuq ununilium —	162 Uuq ununilium —	163 Uuq ununilium —	164 Uuq ununilium —	165 Uuq ununilium —	166 Uuq ununilium —	167 Uuq ununilium —	168 Uuq ununilium —	169 Uuq ununilium —	170 Uuq ununilium —	171 Uuq ununilium —	172 Uuq ununilium —	173 Uuq ununilium —	174 Uuq ununilium —	175 Uuq ununilium —	176 Uuq ununilium —	177 Uuq ununilium —	178 Uuq ununilium —	179 Uuq ununilium —	180 Uuq ununilium —	181 Uuq ununilium —	182 Uuq ununilium —	183 Uuq ununilium —	184 Uuq ununilium —	185 Uuq ununilium —	186 Uuq ununilium —	187 Uuq ununilium —	188 Uuq ununilium —	189 Uuq ununilium —	190 Uuq ununilium —	191 Uuq ununilium —	192 Uuq ununilium —	193 Uuq ununilium —	194 Uuq ununilium —	195 Uuq ununilium —	196 Uuq ununilium —	197 Uuq ununilium —	198 Uuq ununilium —	199 Uuq ununilium —	200 Uuq ununilium —	201 Uuq ununilium —	202 Uuq ununilium —	203 Uuq ununilium —	204 Uuq ununilium —	205 Uuq ununilium —	206 Uuq ununilium —	207 Uuq ununilium —	208 Uuq ununilium —	209 Uuq ununilium —	210 Uuq ununilium —	211 Uuq ununilium —	212 Uuq ununilium —	213 Uuq ununilium —	214 Uuq ununilium —	215 Uuq ununilium —	216 Uuq ununilium —	217 Uuq ununilium —	218 Uuq ununilium —	219 Uuq ununilium —	220 Uuq ununilium —	221 Uuq ununilium —	222 Uuq ununilium —	223 Uuq ununilium —	224 Uuq ununilium —	225 Uuq ununilium —	226 Uuq ununilium —	227 Uuq ununilium —	228 Uuq ununilium —	229 Uuq ununilium —	230 Uuq ununilium —	231 Uuq ununilium —	232 Uuq ununilium —	233 Uuq ununilium —	234 Uuq ununilium —	235 Uuq ununilium —	236 Uuq ununilium —	237 Uuq ununilium —	238 Uuq ununilium —	239 Uuq ununilium —	240 Uuq ununilium —	241 Uuq ununilium —	242 Uuq ununilium —	243 Uuq ununilium —	244 Uuq ununilium —	245 Uuq ununilium —	246 Uuq ununilium —	247 Uuq ununilium —	248 Uuq ununilium —	249 Uuq ununilium —	250 Uuq ununilium —	251 Uuq ununilium —	252 Uuq ununilium —	253 Uuq ununilium —	254 Uuq ununilium —	255 Uuq ununilium —	256 Uuq ununilium —	257 Uuq ununilium —	258 Uuq ununilium —	259 Uuq ununilium —	260 Uuq ununilium —	261 Uuq ununilium —	262 Uuq ununilium —	263 Uuq ununilium —	264 Uuq ununilium —	265 Uuq ununilium —	266 Uuq ununilium —	267 Uuq ununilium —	268 Uuq ununilium —	269 Uuq ununilium —	270 Uuq ununilium —	271 Uuq ununilium —	272 Uuq ununilium —	273 Uuq ununilium —	274 Uuq ununilium —	275 Uuq ununilium —	276 Uuq ununilium —	277 Uuq ununilium —	278 Uuq ununilium —	279 Uuq ununilium —	280 Uuq ununilium —	281 Uuq ununilium —	282 Uuq ununilium —	283 Uuq ununilium —	284 Uuq ununilium —	285 Uuq ununilium —	286 Uuq ununilium —	287 Uuq ununilium —	288 Uuq ununilium —	289 Uuq ununilium —	290 Uuq ununilium —	291 Uuq ununilium —	292 Uuq ununilium —	293 Uuq ununilium —	294 Uuq ununilium —	295 Uuq ununilium —	296 Uuq ununilium —	297 Uuq ununilium —	298 Uuq ununilium —	299 Uuq ununilium —	300 Uuq ununilium —

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 dm³ at room temperature and pressure (r.t.p.).