Cambridge Assessment International Education

Cambridge O Level

COMBINED SCIENCE **5129/11**

Paper 1 Multiple Choice **May/June 2023**

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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[Turn over

1 Which part of a plant cell controls the passage of substances into and out of the cell?

A cell membrane

B cell wall

C cytoplasm

D nucleus

2 Why does an enzyme only catalyse a single reaction?

A The enzymes are only active in living organisms.

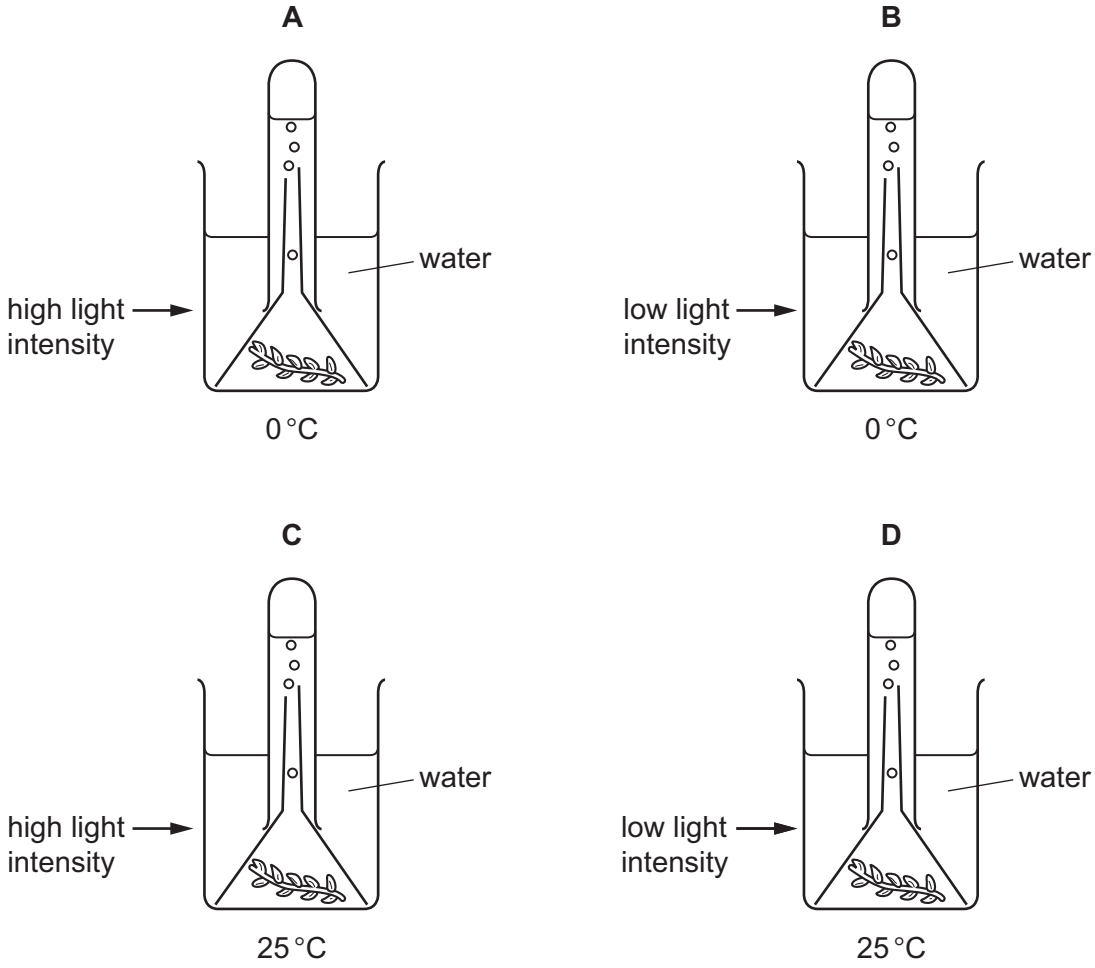
B The enzyme's active site only fits one substrate molecule.

C The enzyme's active site only works at a low pH.

D The enzyme's active site only works at a low temperature.

3 The diagrams show aquatic plants in different light intensities and temperatures.

Which plant will produce the most bubbles in the same time?



4 The body cannot store amino acids.

Which flow chart correctly shows what happens to excess amino acids in the blood?

A	excess amino acids in blood	→	broken down in kidney	→	urea in urine	→	travel to liver	→	urea in blood
B	excess amino acids in blood	→	broken down in kidney	→	urea in blood	→	travel to liver	→	urea in urine
C	excess amino acids in blood	→	broken down in liver	→	urea in urine	→	travel to kidney	→	urea in blood
D	excess amino acids in blood	→	broken down in liver	→	urea in blood	→	travel to kidney	→	urea in urine

5 The main components of atmospheric air are carbon dioxide, nitrogen, oxygen and water vapour.

Which components are present in greater quantities in expired air compared to inspired air?

A carbon dioxide and nitrogen

B nitrogen and oxygen

C oxygen and water vapour

D water vapour and carbon dioxide

6 Which statements about aerobic respiration are correct?

1 It releases energy from glucose.

2 It releases less energy than anaerobic respiration.

3 It requires the use of oxygen.

4 It produces lactic acid.

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

7 What are the positions of the valves in the heart when the heart pumps blood into the arteries?

	atrioventricular valves	semilunar valves
A	closed	closed
B	closed	open
C	open	closed
D	open	open

8 What is an immediate effect of drinking alcohol on the body?

A It makes the blood absorb more oxygen from the air in the lungs.

B It makes the digestive system work faster.

C It slows down reaction times.

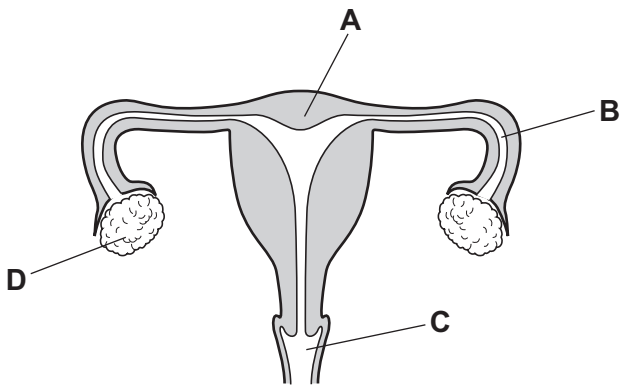
D It reduces the risk of infection by disease.

9 What is the order of the components in a simple reflex arc?

	1st	2nd	3rd	4th	5th
A	effector	motor neurone	sensory neurone	relay neurone	receptor
B	effector	sensory neurone	relay neurone	motor neurone	receptor
C	receptor	motor neurone	sensory neurone	relay neurone	effector
D	receptor	sensory neurone	relay neurone	motor neurone	effector

10 The diagram shows the reproductive system of a human female.

Where does fertilisation take place?



11 To make insulin to treat humans with diabetes, the human gene for insulin is obtained from pancreas cells and inserted into a piece of bacterial DNA.

The bacteria containing the insulin gene are then grown in a large vessel.

The bacteria make insulin which is extracted and purified.

What has been genetically modified?

A the bacteria

B the human gene

C the insulin

D the pancreas

12 Crop plants can be genetically modified.

Which genetic modifications are of benefit to the people growing the crop plants?

1 can produce additional vitamins

2 resistant to herbicides

3 resistant to insect pests

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

13 Which natural process removes carbon dioxide from the air?

A decay

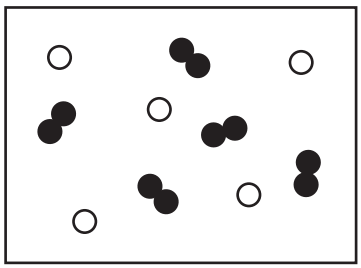
B digestion

C photosynthesis

D respiration

14 Which diagram represents a mixture of compounds?

A



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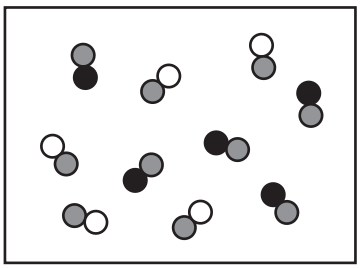

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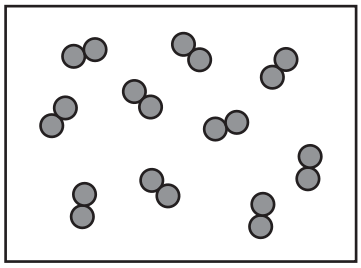

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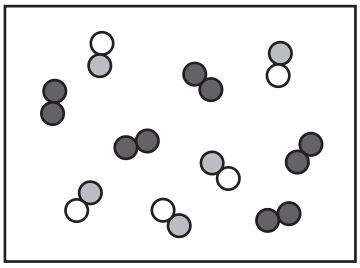


15 What is the definition of nucleon number (mass number)?

A the mass in grams of an atom

B the number of electrons in an atom

C the number of nuclei in a molecule

D the total number of protons and neutrons in an atom

16 Which row describes the properties of an ionic compound?

	melting point / °C	conductivity when solid	conductivity when molten
A	high	poor	good
B	high	good	good
C	low	poor	poor
D	low	good	poor

17 Sulfuric acid has the formula H_2SO_4.

Which statements about a molecule of sulfuric acid are correct?

1 It contains three different chemical elements.

2 It contains a total of seven atoms.

3 It contains twice as many oxygen atoms as hydrogen atoms.

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

18 The equation for the formation of ammonia, NH_3, in the Haber process is shown.

$$N_2 + 3H_2 \rightarrow 2NH_3$$

What is the mass of ammonia made from 14 g of nitrogen?

[A_r: H, 1; N, 14]

A 17 g **B** 28 g **C** 34 g **D** 68 g

19 Which reaction is exothermic?

A production of an alkene by cracking an alkane

B reaction of aqueous sodium hydroxide with hydrochloric acid

C dissolving ammonium nitrate in water

D a reaction that takes energy from the surroundings

20 Four different processes are listed.

1 filtration of impure water

2 fractional distillation of petroleum

3 combustion of methane

4 neutralisation of an acid

Which processes are chemical changes?

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

21 Which row describes the test for oxygen and the positive result?

	test	positive result
A	burning splint	relights
B	burning splint	splint stops burning
C	glowing splint	relights
D	glowing splint	splint stops glowing

22 A sample of rainwater turns universal indicator yellow.

What is the pH of the rainwater?

A 2 **B** 5 **C** 7 **D** 9

23 The properties of the elements in Group VII of the Periodic Table change as the group is descended.

Which statements describe the trends observed as the group is descended?

1 The number of outer shell electrons increases.

2 The number of protons increases.

3 The reactivity of the elements increases.

4 The relative atomic mass increases.

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

24 P, Q, R and S are four metals.

The results of some experiments are shown.

- P reacts slowly with dilute hydrochloric acid to produce hydrogen.
- Q reacts very vigorously with water to produce hydrogen.
- R does not react with dilute hydrochloric acid.
- S reacts violently with water, producing flames.

What are P, Q, R and S?

	P	Q	R	S
A	copper	potassium	magnesium	zinc
B	copper	potassium	zinc	magnesium
C	iron	sodium	copper	potassium
D	iron	sodium	zinc	potassium

25 Which statements about the disadvantages of using the hydrogen-oxygen fuel cell in motor vehicles are correct?

1 It produces no pollutants.

2 It does not need to be electrically recharged.

3 Hydrogen is difficult to store in a motor vehicle.

4 Hydrogen is highly flammable.

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

26 Which statement about bitumen is correct?

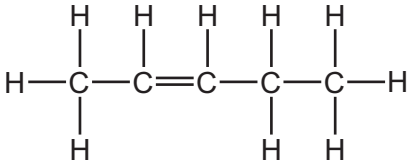
A Bitumen has a lower melting point than lubricating oil.

B Bitumen has smaller molecules than petrol.

C Bitumen is more flammable than diesel.

D Bitumen is more viscous than paraffin.

27 The structure of a hydrocarbon is shown.



The hydrocarbon is tested with aqueous bromine.

Which row describes the type of hydrocarbon and the result of the test with aqueous bromine?

	hydrocarbon	result of test with aqueous bromine
A	saturated	aqueous bromine becomes colourless
B	saturated	aqueous bromine remains orange
C	unsaturated	aqueous bromine becomes colourless
D	unsaturated	aqueous bromine remains orange

28 A small water pump is designed to move 240 cm^3 of water every minute.

A student decides to check and see if this is correct.

Which two measuring instruments should be used?

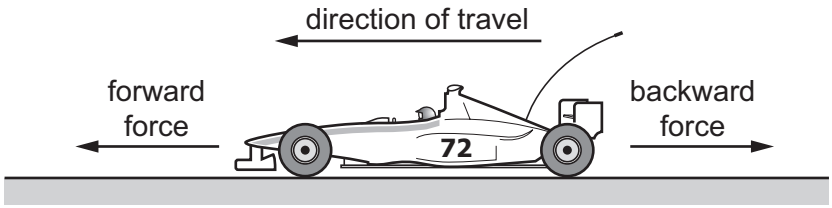
A measuring cylinder and digital balance

B measuring cylinder and digital timer

C ruler and digital balance

D ruler and digital timer

29 A remote control car travels along a horizontal surface at a constant speed. The diagram shows the horizontal forces acting on the car.



The car then slows down. The size of the forward force does not change.

Which statement about the size of the backward force is correct?

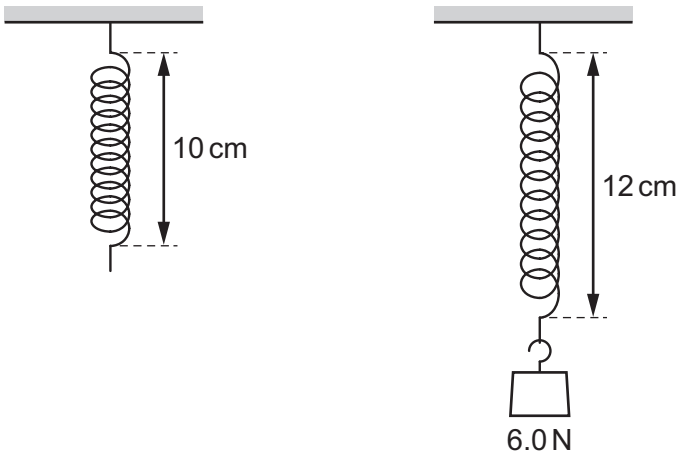
A It has decreased.

B It has increased.

C It is the same size as the forward force.

D It is zero.

30 The two diagrams show the lengths of a spring with no load attached and with a 6.0 N load attached.

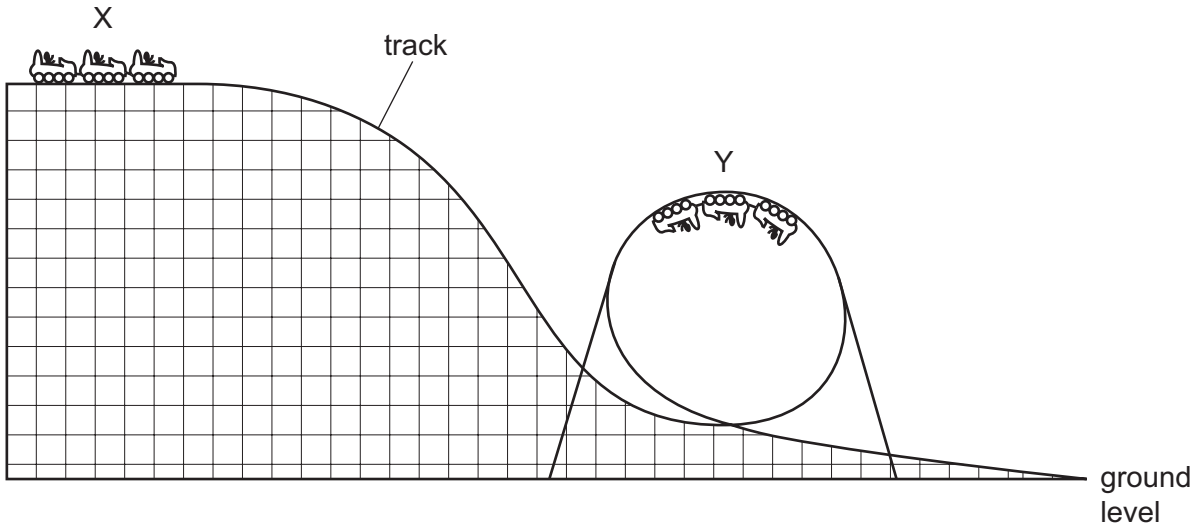


Which weight hanging from the spring causes the length to become 15 cm?

A 7.5 N **B** 15 N **C** 30 N **D** 45 N

31 In a theme park ride, passengers in a car are initially at rest at the top of the track.

The car then travels down and round a circular loop in the track before reaching ground level.



How is the energy of the car and passengers stored at point X and at point Y?

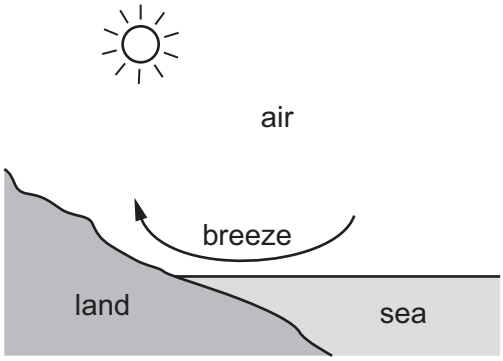
	at point X	at point Y
A	KE only	PE only
B	PE only	KE only
C	KE only	KE and PE
D	PE only	KE and PE

key

KE = kinetic energy

PE = gravitational potential energy

32 On a sunny day, air over the sea is drawn towards the land, causing a cool breeze.



How does the air above the land change to cause the cool breeze?

A It contracts and decreases in density.

B It contracts and increases in density.

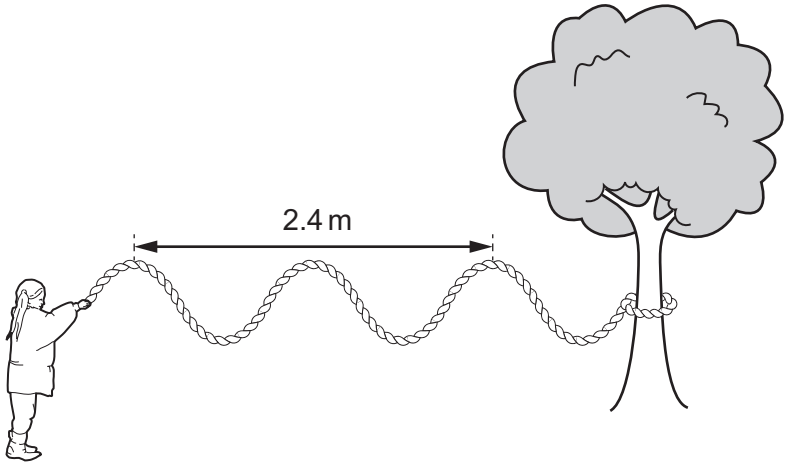
C It expands and decreases in density.

D It expands and increases in density.

33 A student ties one end of a long rope to a tree.

She shakes the rope to produce a wave with a constant frequency of 4.0 Hz.

The diagram shows the waves produced.

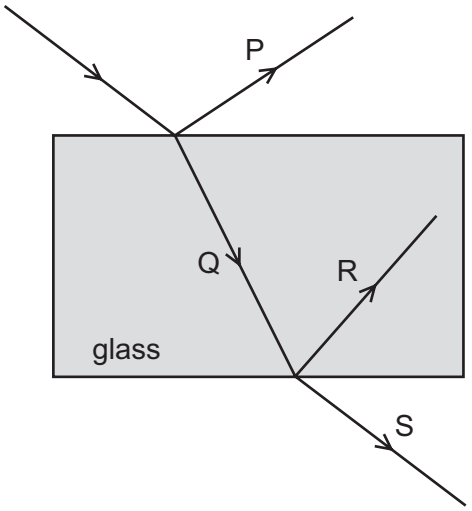


What is the speed of the wave along the rope?

A 1.7 m/s **B** 3.3 m/s **C** 4.8 m/s **D** 9.6 m/s

34 The diagram shows light incident on a glass block.

Some of the light is reflected and some is refracted.



Which two rays are refracted?

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

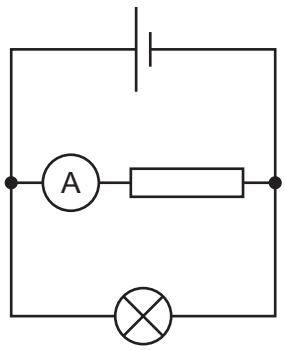
35 There is a current of 2.0 A in a lamp when it has 12 V across it.

What is the resistance of the lamp?

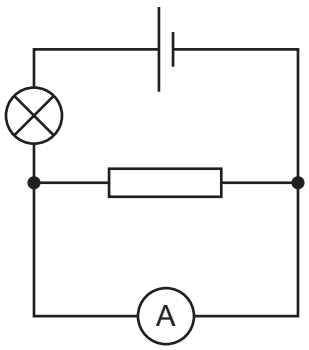
A 6.0 Ω **B** 10 Ω **C** 14 Ω **D** 24 Ω

36 In which circuit is the current in the resistor measured?

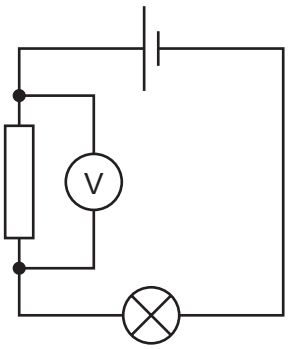
A



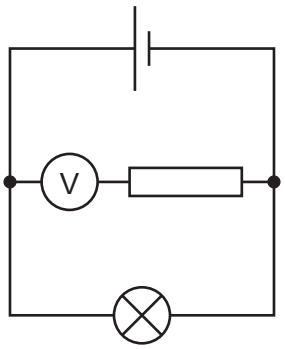
B



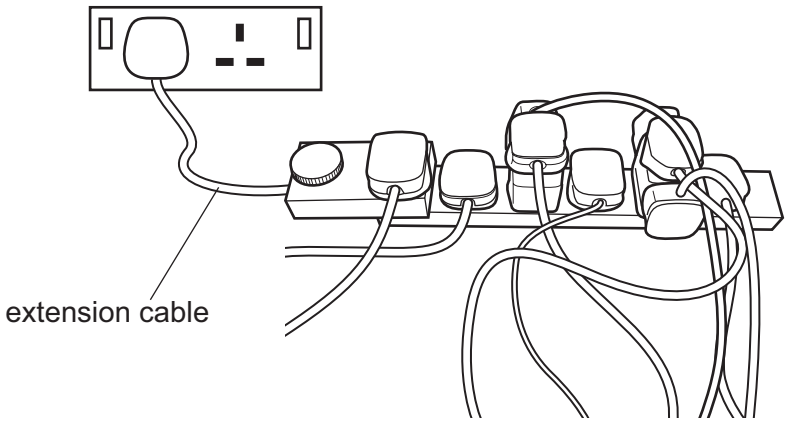
C



D



37 The diagram shows an unsafe use of an extension cable.



What is the electrical hazard?

A the danger of burning out the appliances

B the danger of melting the fuse in the extension cable

C the danger of overheating the extension cable

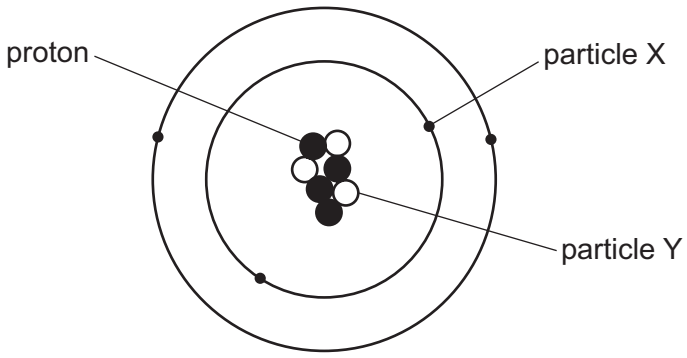
D the danger of the appliances not being earthed

38 A fully charged 12 V battery supplies a current of 3.0 A for 30 hours.

What is the total energy that the battery supplies?

A 360 J **B** 1080 J **C** 64 800 J **D** 3 890 000 J

39 The diagram represents a neutral atom of an isotope of beryllium.



What are the names of particle X and particle Y?

	particle X	particle Y
A	electron	neutron
B	electron	nucleus
C	neutron	electron
D	neutron	nucleus

40 What is **not** given out from an unstable nucleus during radioactive decay?

A α-particle

B β-particle

C gamma radiation

D ultraviolet radiation

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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 –	113 Nh nihonium –	114 Fl flerovium –	115 Mc moscovium –	116 Lv livermorium –	117 Ts tennessine –	118 Og oganesson –

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.).