Cambridge Assessment International Education

Cambridge IGCSE™

PHYSICAL SCIENCE **0652/11**

Paper 1 Multiple Choice (Core) **October/November 2023**

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.

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1 Some statements about particles in solids, liquids and gases are listed.

1 Particles in gases are closer together than particles in solids.

2 Particles in solids are more ordered than particles in liquids.

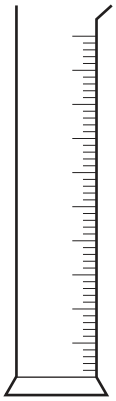
3 Particles in solids diffuse because they are in fixed positions.

4 Particles in liquids move slower than particles in gases.

Which statements are correct?

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

2 The diagram shows a piece of apparatus.



What is measured using this apparatus?

A mass

B temperature

C time

D volume

3 Which process is a chemical change?

A boiling water

B burning methane in air

C melting ice

D separating coloured dyes by chromatography

4 An isotope of sodium is represented as $^{23}_{11}Na$.

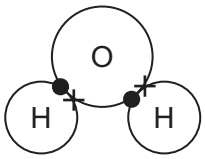
Which row represents a different isotope of sodium?

	electrons	neutrons	protons
A	11	13	11
B	12	12	12
C	13	12	13
D	23	12	23

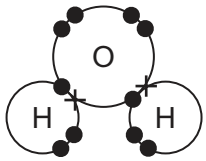
5 Water, H_2O, is a covalent molecule made up of hydrogen and oxygen.

Which dot-and-cross diagram represents a water molecule?

A



B



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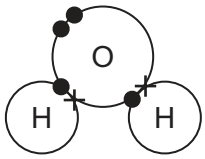

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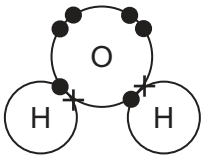


6 Three statements about diamond and graphite are listed.

1 They are different solid forms of the same element.

2 They each conduct electricity.

3 They have atoms that form four equally strong bonds.

Which statements are correct?

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

7 An equation for the reaction of sodium with water is shown.

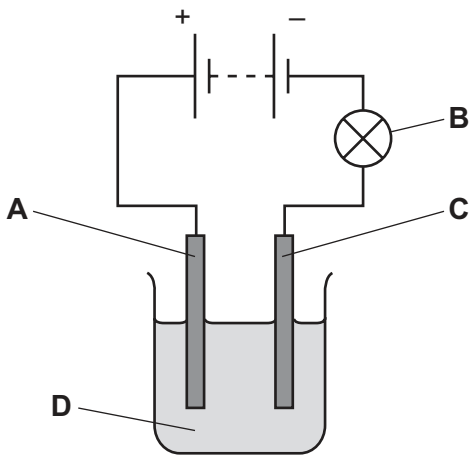
$$xNa + yH_2O \rightarrow zNaOH + H_2$$

Which values of x, y and z balance the equation?

	x	y	z
A	1	2	1
B	2	1	2
C	2	2	2
D	2	3	2

8 The apparatus used for electrolysis is shown.

Which label identifies the electrolyte?



9 The rate of reaction between marble chips and hydrochloric acid is investigated.

The equation is shown.

$$CaCO_3(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + H_2O(l) + CO_2(g)$$

Which conditions give the fastest rate of production of carbon dioxide gas?

	concentration of hydrochloric acid	size of marble chips	hydrochloric acid temperature / °C
A	high	small	30
B	high	medium	25
C	low	large	30
D	low	small	20

10 Lead is extracted from its ore using carbon monoxide.

The equation is shown.

$$PbO + CO \rightarrow Pb + CO_2$$

Which statement explains what happens to the lead atoms and carbon atoms in the reactants?

A Lead and carbon are oxidised.

B Lead and carbon are reduced.

C Lead is oxidised and carbon is reduced.

D Lead is reduced and carbon is oxidised.

11 Sulfuric acid is reacted with magnesium.

Which row identifies the products of this reaction?

	magnesium sulfate	water	hydrogen
A	✓	✓	✓
B	✓	✓	✗
C	✓	✗	✓
D	✗	✓	✓

12 Which oxide is basic?

A Cl_2O_7 **B** P_4O_{10} **C** Rb_2O **D** SO_2

13 A solution containing substance Z is tested.

The results of the tests are shown.

test	result
dilute sodium hydroxide solution added	white precipitate dissolves in excess
acidified barium nitrate solution added	white precipitate

What is Z?

A ammonium chloride

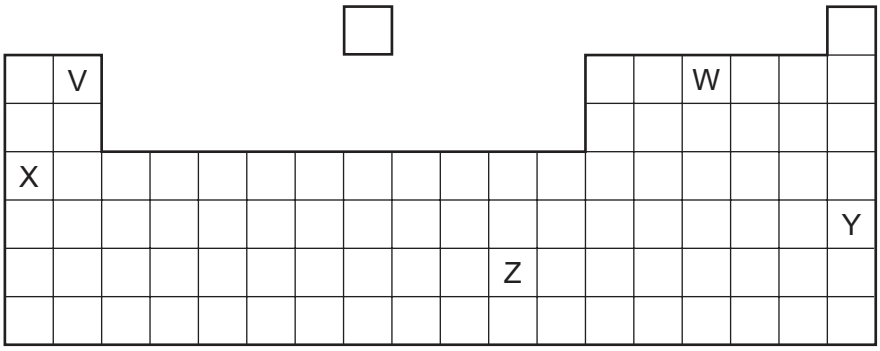
B ammonium sulfate

C zinc chloride

D zinc sulfate

14 Part of the Periodic Table is shown.

The letters are **not** the correct symbols for the elements.



Which elements are non-metals?

A V, X and Z **B** V and X only **C** W, Y and Z **D** W and Y only

15 Which row describes a transition element?

	melting point	often acts as a catalyst	conduction of electricity
A	high	no	good
B	high	yes	good
C	high	yes	poor
D	low	no	poor

16 Magnalium is a substance used to make strong, lightweight ladders. It is made from a mixture of magnesium and aluminium.

Which type of substance is magnalium?

A an alloy

B a compound

C an element

D a pure metal

17 Which row shows a correct order of reactivity of metals?

	least reactive ⟶		most reactive
A	copper	calcium	magnesium
B	copper	magnesium	calcium
C	iron	magnesium	zinc
D	zinc	iron	calcium

18 Gas X is a carbon-containing greenhouse gas which has no effect on limewater.

Which statement about gas X is correct?

A It is a gas formed during respiration.

B It is the main constituent of clean air.

C It is the main constituent of natural gas.

D It relights a glowing splint.

19 What are the products of the complete combustion of methane?

A carbon monoxide and hydrogen

B carbon dioxide, carbon monoxide and water

C carbon dioxide and water only

D carbon monoxide and water only

20 Liquid X has the properties shown.

- It is colourless.
- It is flammable.
- It can be made by the reaction of ethene with steam.
- The complete combustion of X produces carbon dioxide and water.

What is X?

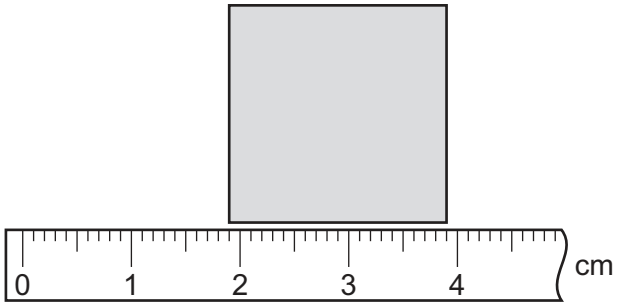
A ethanol

B methane

C petrol

D poly(ethene)

21 The diagram shows a ruler used to measure the length of one side of a square.

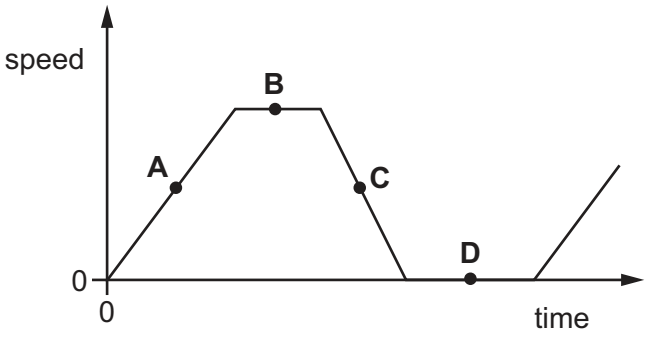


What is the length of the side?

A 1.9 cm **B** 2.0 cm **C** 2.1 cm **D** 3.9 cm

22 The diagram shows a speed–time graph for a bus.

At which labelled point is the bus moving with constant speed?



23 What is meant by the weight of an object?

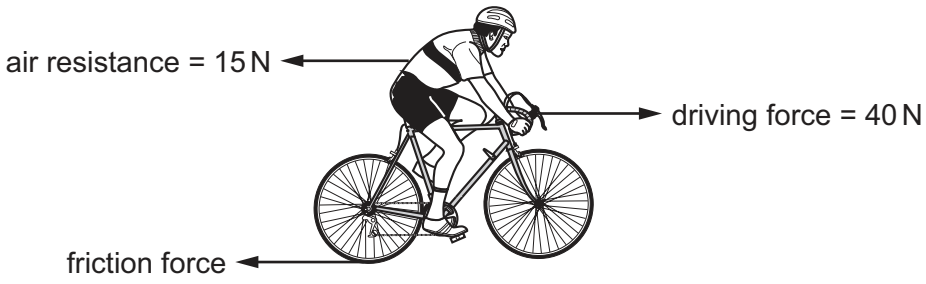
A the amount of matter in the object

B the density of the object

C the gravitational force on the object

D the mass of the object

24 A cyclist travels along a horizontal road at constant speed in a straight line. The diagram shows all the horizontal forces acting.



What is the magnitude of the friction force?

A 15 N **B** 25 N **C** 40 N **D** 55 N

25 Which energy source is a store of gravitational potential energy?

A coal

B geothermal

C hydroelectric

D nuclear

26 A solid, a liquid and a gas all have the same volume. They are all heated through the same temperature increase and they all expand.

Which state of matter expands the least and which state of matter expands the most?

	expands the least	expands the most
A	gas	solid
B	liquid	gas
C	solid	gas
D	solid	liquid

27 How is heat transferred through a vacuum?

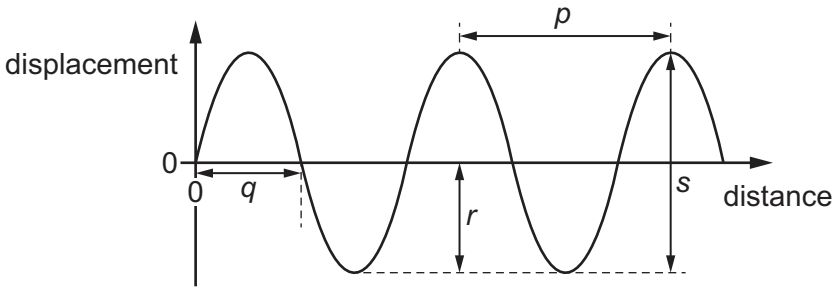
A by conduction only

B by convection only

C by radiation only

D by conduction and radiation

28 The diagram represents a wave.

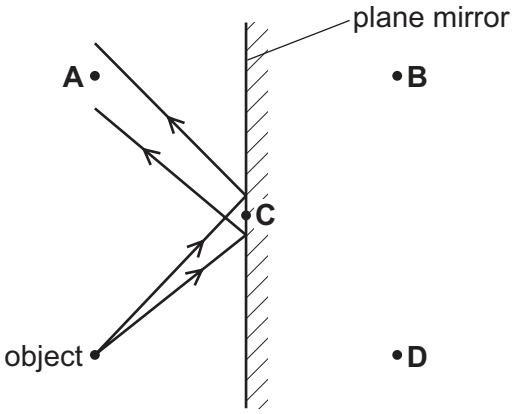


Which arrows represent the amplitude and the wavelength of the wave?

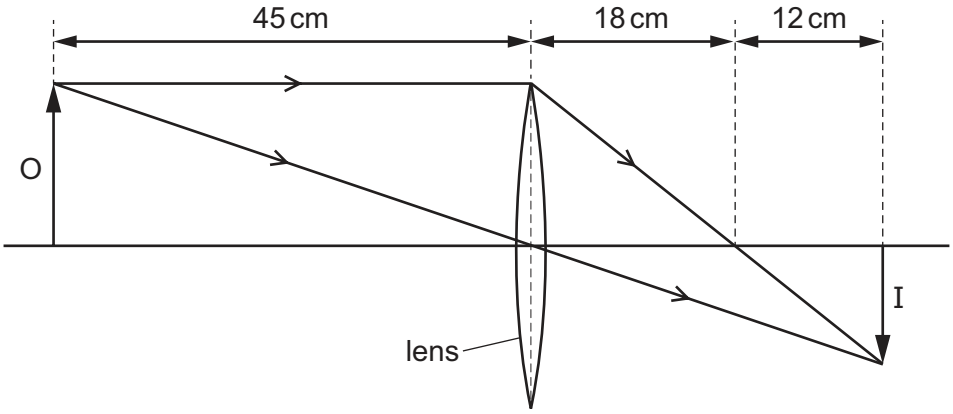
	amplitude	wavelength
A	*r*	*p*
B	*r*	*q*
C	*s*	*p*
D	*s*	*q*

29 Two rays from an object are reflected by a plane mirror, as shown in the diagram.

At which labelled point does the image appear to be formed?



30 The diagram shows light from an object O passing through a converging lens to form an image I.



What is the focal length of the lens?

A 18 cm **B** 30 cm **C** 45 cm **D** 75 cm

31 Radio waves, visible light and X-rays are all travelling in a vacuum.

Which statement about the speeds of these waves is correct?

A Radio waves are the fastest.

B Visible light waves are the fastest.

C X-rays are the fastest.

D They all travel at the same speed.

32 A vibrating object produces waves of different frequencies in air.

Which frequency is that of a sound wave that a human with normal hearing can hear?

A 2.5 Hz **B** 1000 Hz **C** 25 000 Hz **D** 100 000 Hz

33 Which metal is used to make the core of an electromagnet and what is a property of an electromagnet?

	metal used for core	property of electromagnet
A	soft iron	it can be switched on and off
B	soft iron	it is a permanent magnet
C	steel	it can be switched on and off
D	steel	it is a permanent magnet

[Turn over

34 An uncharged plastic rod is rubbed with an uncharged cotton cloth.

What happens to the rod and what happens to the cloth?

A The cloth becomes charged but the rod does not.

B The rod becomes charged but the cloth does not.

C The rod and the cloth become charged with like charges.

D The rod and the cloth become charged with opposite charges.

35 Which quantities can be measured using only a voltmeter?

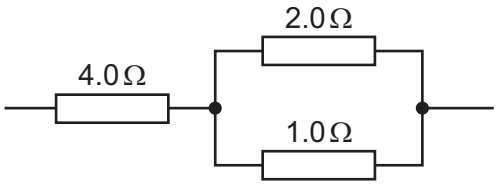
A current and electromotive force (e.m.f.)

B current and resistance

C electromotive force (e.m.f.) and potential difference (p.d.)

D potential difference (p.d.) and resistance

36 The diagram shows an arrangement of three resistors.



What is the combined resistance of the arrangement?

A less than 4.0 Ω

B between 4.0 Ω and 5.0 Ω

C between 5.0 Ω and 6.0 Ω

D greater than 6.0 Ω

37 A lamp is in a circuit that is protected by a 1 A fuse. The lamp is switched on and it lights normally.

The 1 A fuse is now replaced with a 5 A fuse.

What happens when the lamp is switched on?

A The lamp lights normally.

B The fuse blows so the lamp does not light.

C The lamp lights less brightly.

D The lamp lights more brightly.

38 One isotope of iodine can be written as $^{131}_{53}\mathrm{I}$.

Which row describes a different isotope of iodine?

	atomic number	mass number
A	52	131
B	52	132
C	53	131
D	53	132

39 Which row describes the nature of alpha-emission, beta-emission and gamma-emission?

	alpha-emission	beta-emission	gamma-emission
A	electromagnetic wave	electromagnetic wave	helium nucleus
B	electromagnetic wave	electron	electromagnetic wave
C	helium nucleus	electromagnetic wave	helium nucleus
D	helium nucleus	electron	electromagnetic wave

40 A sample contains 240 mg of a radioactive isotope.

Which mass of the isotope remains when three half-lives have passed?

A 30 mg **B** 40 mg **C** 60 mg **D** 80 mg

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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.).