Cambridge Assessment International Education

Cambridge IGCSE™ (9–1)

CO-ORDINATED SCIENCES **0973/22**

Paper 2 Multiple Choice (Extended) **May/June 2020**

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. A mark will not be deducted for a wrong answer.
- Any rough working should be done on this question paper.
- The Periodic Table is printed in the question paper.

This document has **16** pages. Blank pages are indicated.

1 Which characteristic of living things is described as the removal of toxic materials and substances in excess of requirements?

A excretion

B homeostasis

C nutrition

D respiration

2 What is **not** in contact with cytoplasm?

A cellulose cell wall

B cell membrane

C chloroplast

D nucleus

3 A food contains reducing sugar, but no starch.

What colours will be obtained if samples of the food are tested with Benedict's solution and with iodine solution?

	Benedict's test	iodine test
A	blue	blue-black
B	blue	brown
C	red-orange	blue-black
D	red-orange	brown

4 Why do cells contain many different types of enzymes?

A Enzymes are affected by substrate concentration.

B Enzymes are affected by temperature.

C Enzymes have an active site complementary to a specific substrate.

D Enzymes work at different pH values.

5 In photosynthesis, how many molecules of glucose will be produced from twelve molecules of carbon dioxide?

A 2 **B** 6 **C** 12 **D** 24

6 Why is calcium needed in the diet?

A to make carbohydrates

B to make teeth

C to make enzymes

D to make protein

7 Which is **not** a risk factor in coronary heart disease?

A diet high in fat

B low blood pressure

C smoking

D stress

8 Which cells produce mucus in the human breathing system?

A alveoli cells

B capillary cells

C ciliated cells

D goblet cells

9 What happens when the body temperature falls below normal?

A Arterioles supplying the skin constrict.

B Arterioles supplying the skin dilate.

C Capillaries move towards the skin surface.

D Capillaries move away from the skin surface.

10 Which statements about individuals in a large population of birds are correct?

1 All individuals are diploid.

2 Some individuals may have the same allele combination as both of their parents.

3 Some individuals will be better adapted to their environment than others.

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

11 A farmer wants to breed sheep that will produce a high yield of milk.

What is required for breeding these sheep?

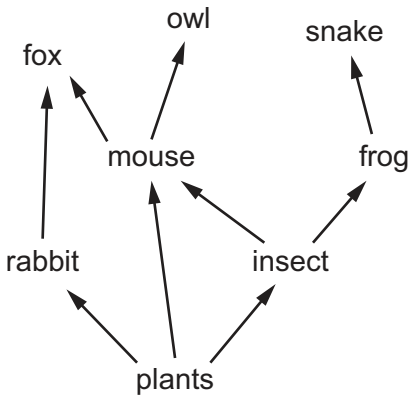
	genetic variation	selective breeding	natural selection
A	✓	✓	✗
B	✓	✗	✓
C	✗	✓	✗
D	✗	✗	✓

key

✓ = yes

✗ = no

12 The diagram shows a food web.



Which statement is correct?

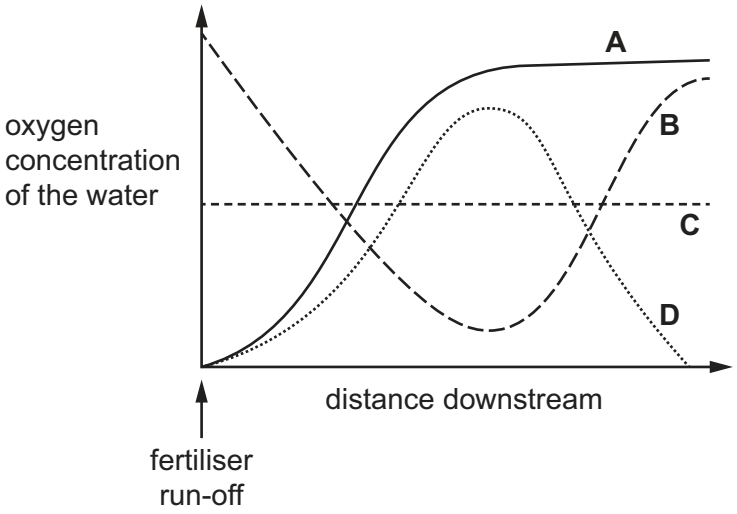
A The fox is a secondary consumer only.

B The mouse is a primary consumer only.

C The owl is a tertiary consumer only.

D The snake is a tertiary consumer only.

13 Which line shows how the oxygen concentration of the water changes after excess fertiliser has entered a stream?



14 Which statement about atoms and molecules is correct?

A All molecules are gases at room temperature and pressure.

B An atom is the smallest part of an element.

C Atoms of the same element all have the same mass.

D Molecules always contain atoms of more than one element.

15 What happens to rubidium atoms and to oxygen atoms when they form rubidium oxide, Rb_2O?

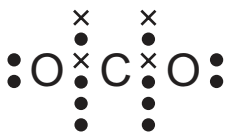
	rubidium atoms	oxygen atoms
A	gain one electron each	lose one electron each
B	gain one electron each	lose two electrons each
C	lose one electron each	gain one electron each
D	lose one electron each	gain two electrons each

16 Which dot-and-cross diagram represents the bonding in a molecule of carbon dioxide?

A

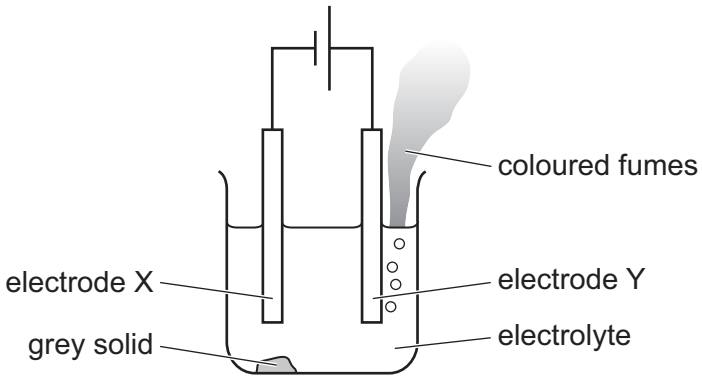
B

C



D

17 The diagram shows the electrolysis of lead(II) bromide using inert electrodes.



Which statement about this experiment is correct?

A Electrode X is positively charged.

B The coloured fumes are produced at the negative electrode.

C The electrolyte is lead(II) bromide.

D The grey solid is lead(II) bromide.

18 The ionic equation for the formation of chromium(III) ions is shown.

$$Cr \rightarrow Cr^{3+} + 3e^{-}$$

Which statement about chromium atoms is correct?

A They are oxidised by gaining electrons.

B They are oxidised by losing electrons.

C They are reduced by gaining electrons.

D They are reduced by losing electrons.

19 Aluminium oxide, Al_2O_3, nitrogen monoxide, NO, and sulfur trioxide, SO_3, are each tested with dilute hydrochloric acid and with aqueous sodium hydroxide.

The results are shown.

oxide	aqueous dilute hydrochloric acid	aqueous sodium hydroxide
Al_2O_3	✓	✓
NO	✗	✗
SO_3	✗	✓

key

✓ = reaction

✗ = no reaction

Which oxides are neutral oxides?

A Al_2O_3 and NO

B Al_2O_3 and SO_3

C NO only

D SO_3 only

20 Zinc oxide is an insoluble base.

It reacts with dilute hydrochloric acid to produce zinc chloride.

Zinc chloride is soluble in water.

Which statement about the preparation of zinc chloride crystals is correct?

A Once the reaction is complete there is no need to filter the reaction mixture.

B The reaction mixture is neutral at the point that no more zinc oxide reacts.

C Zinc chloride crystals are obtained by evaporation to dryness.

D Zinc chloride precipitates when the solution becomes neutral.

21 The properties of the elements in Group VII of the Periodic Table change going down the group.

Which change in properties is correct?

A They become darker in colour.

B They have lower atomic numbers.

C They have lower boiling points.

D They become more reactive.

22 Which metal is mixed with copper to make brass?

A aluminium

B iron

C magnesium

D zinc

23 Which statement is **not** a reason why aluminium is used in aircraft manufacture?

A It forms low density alloys.

B It is malleable.

C It is more reactive than iron.

D It is resistant to corrosion.

24 Which reaction does **not** take place in a catalytic converter?

A $2CO + O_2 \rightarrow 2CO_2$

B $2NO \rightarrow N_2 + O_2$

C $2NO + 2CO \rightarrow N_2 + 2CO_2$

D $2SO_2 + O_2 \rightarrow 2SO_3$

25 Which statement about calcium carbonate is **not** correct?

A It forms carbon dioxide when it is heated.

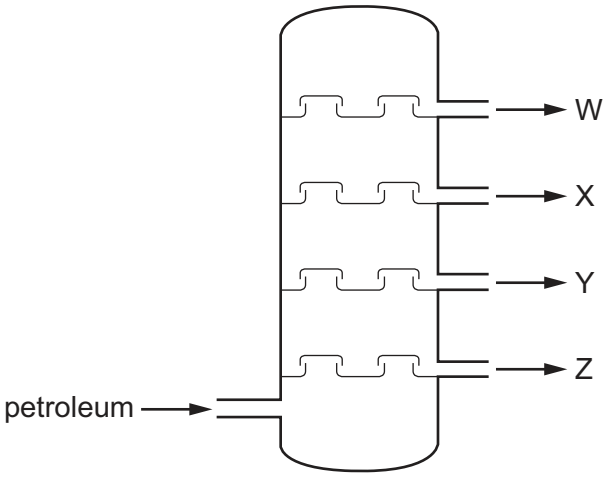
B It forms carbon dioxide when it is mixed with dilute hydrochloric acid.

C It is formed by heating lime.

D It neutralises acids.

26 The diagram represents the fractional distillation of petroleum.

Four fractions, W, X, Y and Z, are produced.



Which statement about fraction Y is correct?

A The forces of attraction between molecules in Y are smaller than those in W.

B The molecules in Y are smaller than the molecules in Z.

C Y has a lower boiling point than X.

D Y vapourises more readily at room temperature than W and X, but less readily than Z.

27 Which row describes properties of alkenes?

	structure of molecules	products of complete combustion
A	contain only carbon and hydrogen	CO_2 and H_2O
B	contain only carbon and hydrogen	CO and H_2O
C	contain only single bonds	CO and H_2O
D	contain only single bonds	CO_2 and H_2O

28 A metal has a density of $20\,g/cm^3$.

A bar made of this metal has a volume of $50\,cm^3$.

What is the mass of the bar?

A 0.40 g **B** 2.5 g **C** 70 g **D** 1000 g

29 An object of mass m moving with speed v has kinetic energy E.

A second object, also of mass m, moves with speed $\frac{v}{2}$.

What is the kinetic energy of the second object?

A $\frac{E}{4}$ **B** $\frac{E}{2}$ **C** E **D** $2E$

30 Which energy resource does **not** have the Sun as its source of energy?

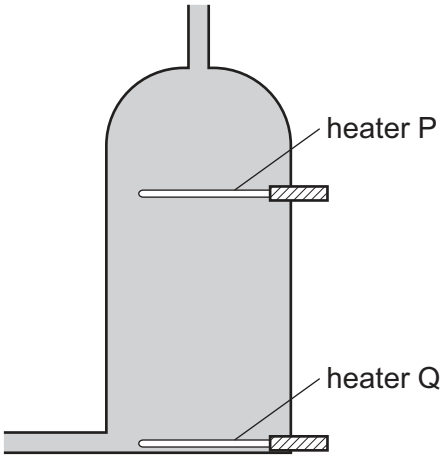
A coal

B geothermal

C hydroelectric

D waves

31 A hot water tank is fitted with two identical heaters P and Q. Heater P is fitted above heater Q as shown. The tank is full of cold water.



When only heater Q is switched on, it takes a long time to heat the tank of water to 60 °C.

What happens to the cold water when only heater P is switched on?

A All the water reaches 60 °C in less time.

B All the water reaches 60 °C in the same time.

C The water below heater P reaches 60 °C in less time.

D The water above heater P reaches 60 °C in less time.

32 ‘The maximum distance a particle on the surface of deep water moves from its rest position when a wave passes it.’

Which property of a wave does this describe?

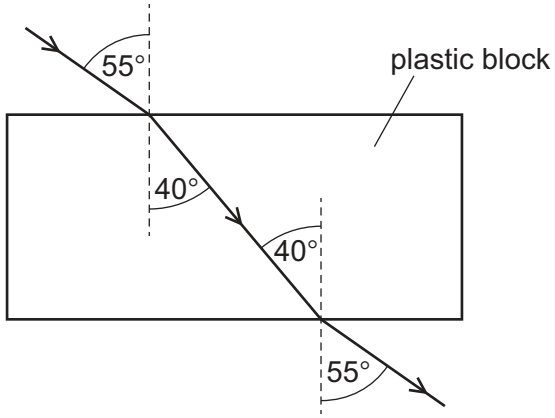
A amplitude

B frequency

C speed

D wavelength

33 The diagram shows light passing through a plastic block.

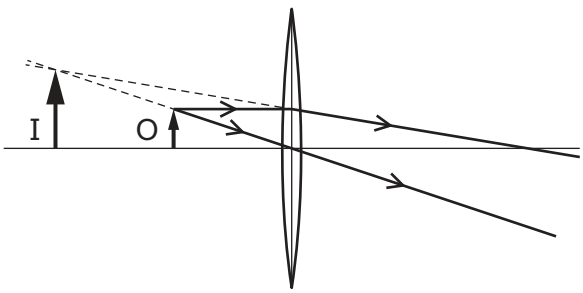


What is the refractive index of the plastic?

A 0.73 **B** 0.78 **C** 1.27 **D** 1.38

34 Which ray diagram represents the formation of a virtual image I of an object O?

A



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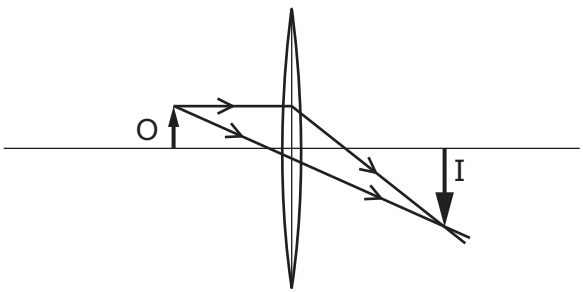

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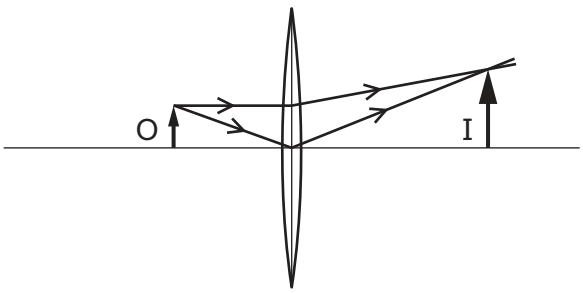

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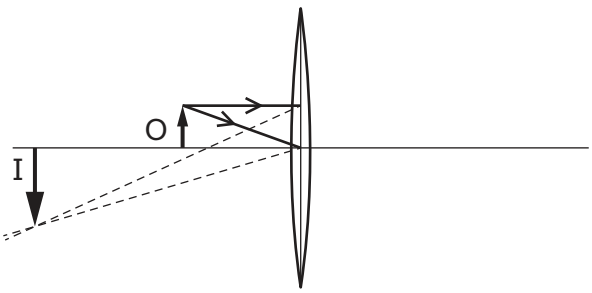
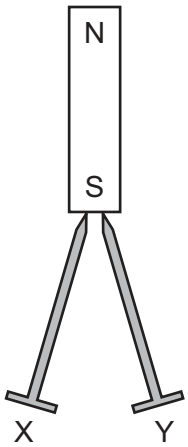


35 Two unmagnetised iron nails are in contact with the S-pole of a permanent magnet. The heads of the nails X and Y repel each other.



Why do X and Y repel?

A X becomes an N-pole and Y becomes an S-pole.

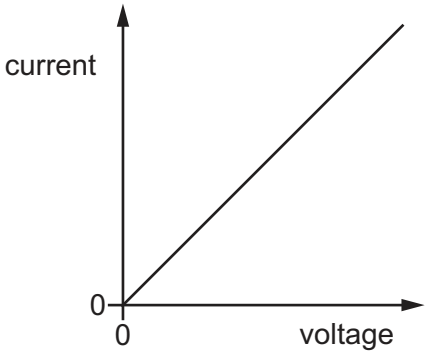
B X becomes an S-pole and Y becomes an N-pole.

C X and Y both become N-poles.

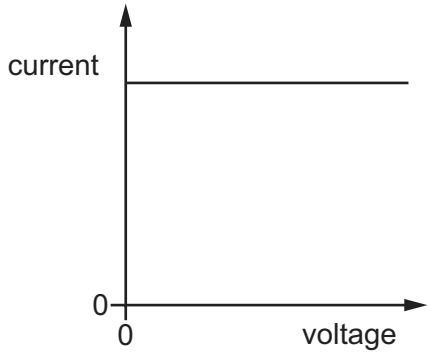
D X and Y both become S-poles.

36 Which graph is the current–voltage characteristic of a filament lamp?

A



B



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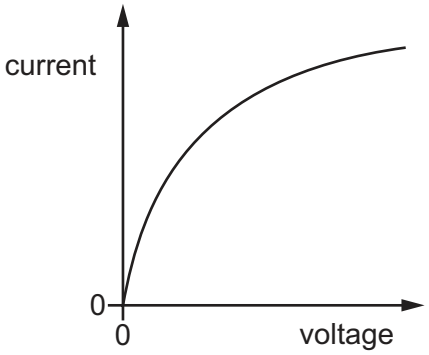

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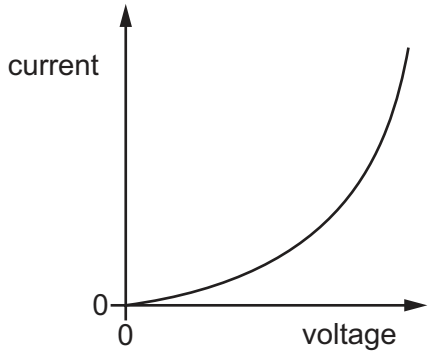


37 There is a current of 100 mA in a circuit.

How much charge flows through the circuit in 1.5 minutes?

A 0.15 C **B** 9.0 C **C** 150 C **D** 9000 C

38 A fuse is a safety device for use in an electrical circuit.

The current in the circuit becomes greater than the rated value for the fuse.

What happens?

A The current decreases to zero.

B The current decreases to the rated value for the fuse.

C The thickness of the insulation around the wires increases.

D The current is sent to the outer case of the appliance.

39 What is the purpose of the slip rings in an alternating current (a.c.) generator?

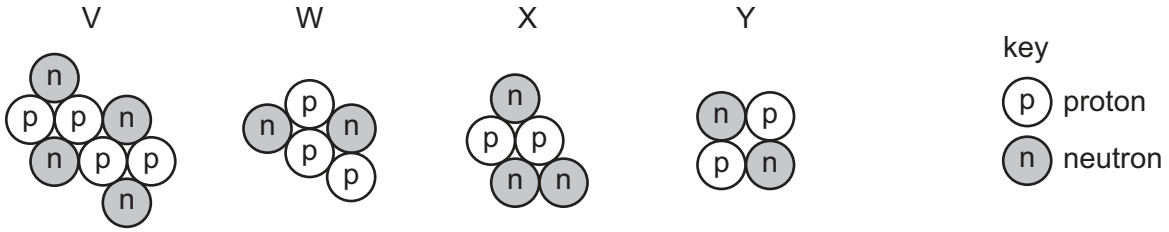
A to allow each end of the coil to contact each carbon brush alternately

B to allow each end of the coil to remain in contact with the same carbon brush at all times

C to maintain a constant voltage in the output circuit while the coil is rotating

D to remain stationary while the coil rotates between them

40 The diagrams represent the nuclei of four different atoms V, W, X and Y.



Which two diagrams represent isotopes of the same element?

A V and Y **B** W and X **C** X and Y **D** Y and W

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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 –		114 Fl flerovium –		116 Lv livermorium –		

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.).