Cambridge Assessment International Education

Cambridge IGCSE™

CO-ORDINATED SCIENCES **0654/23**

Paper 2 Multiple Choice (Extended) **October/November 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.

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1 What is **not** a characteristic of all living organisms?

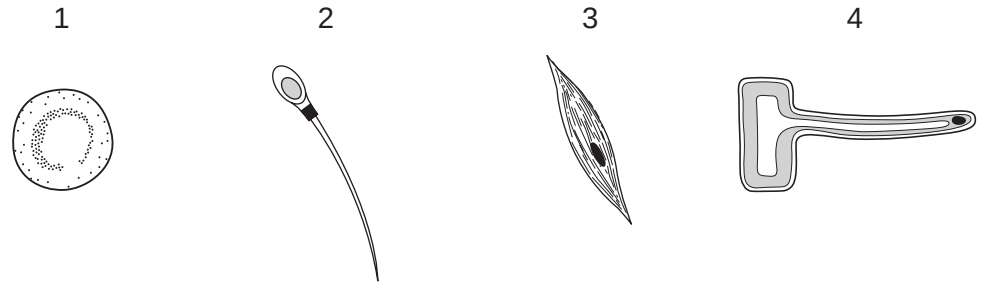
A excretion

B growth

C photosynthesis

D sensitivity

2 The diagrams show four different cells found in living organisms.



Which cell types have a large surface area for diffusion?

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

3 What colour does Benedict's solution change to when heated with a reducing sugar?

A blue

B blue-black

C orange

D purple

4 A mixture of starch and saliva was set up at four different temperatures. Each mixture was tested with iodine solution after 15 minutes and again after 30 minutes.

The results are shown in the table.

temperature / °C	colour with iodine solution	
	15 minutes	30 minutes
0	blue-black	blue-black
15	blue-black	brown
35	brown	brown
95	blue-black	blue-black

What do the results suggest?

A The enzyme in saliva is inactive at 95 °C.

B The enzyme in saliva is slow to work at 35 °C.

C The enzyme in saliva works equally well at 15 °C and 35 °C.

D The enzyme in saliva works faster at higher temperatures.

5 What is the effect of nitrate ion deficiency on plants?

	leaf colour	growth
A	green	good
B	green	poor
C	yellow	good
D	yellow	poor

6 Much of the internal surface of the human small intestine is covered with villi.

What is the function of villi?

A excretion of waste into the intestine

B secretion of enzymes into the intestine

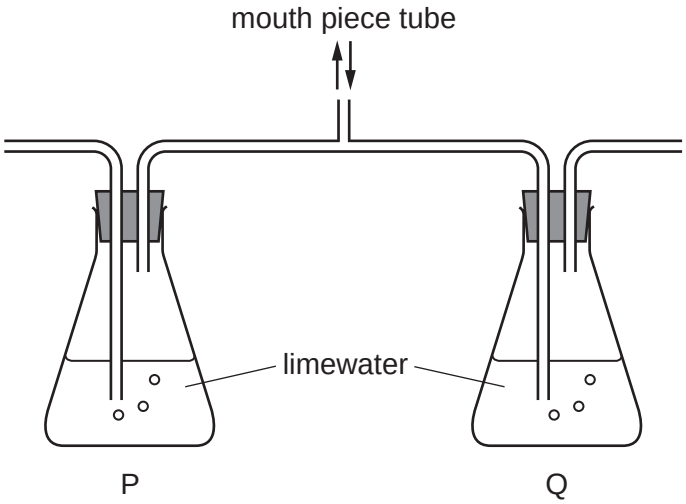
C to improve blood circulation in the intestine walls

D to increase the internal surface area of the intestine

7 Under which conditions will transpiration from a plant be fastest?

	temperature	humidity
A	high	high
B	high	low
C	low	high
D	low	low

8 A student breathed gently in and out of the mouth piece of the apparatus shown.



What were the results after 10 breaths?

	P	Q
A	clear	clear
B	clear	milky
C	milky	clear
D	milky	milky

9 During an experiment, auxin is applied to one side of a shoot just behind the tip.

What will this stimulate?

A decreased cell elongation in all cells

B decreased cell elongation on the side with extra auxin

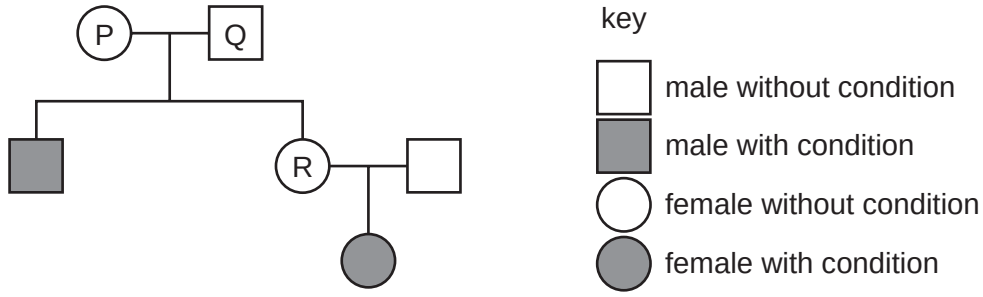
C increased cell elongation in all cells

D increased cell elongation on the side with extra auxin

10 In human reproduction, which cells are haploid?

	gametes	zygotes
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

11 The pedigree diagram shows the inheritance of a recessive condition.



Which statements are correct with reference to this condition?

1 P and Q are both heterozygous for the condition.

2 Q and R have different genotypes.

3 P and R have the same genotype.

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

12 What is the name given to a unit containing all of the organisms and their environment interacting together in a given area?

A ecosystem

B food chain

C food web

D trophic level

13 Which row about some of the stages of eutrophication is correct?

	growth of producers	growth of decomposers	respiration of decomposers	concentration of dissolved oxygen
A	decreases	increases	decreases	increases
B	decreases	decreases	increases	increases
C	increases	decreases	decreases	decreases
D	increases	increases	increases	decreases

14 A mixture of solid sulfur and solid sodium chloride is added to water and stirred.

Sulfur is insoluble in water.

Sodium chloride is soluble in water.

Which processes are used to obtain pure sodium chloride from the mixture?

A distillation then chromatography

B distillation then crystallisation

C filtration then chromatography

D filtration then crystallisation

15 Which sample contains the most molecules?

A 16 dm^3 CH_4

B 28 dm^3 C_2H_4

C 16 g CH_4

D 28 g C_2H_4

16 Which row describes what happens at the electrodes during electrolysis?

	at the anode	at the cathode
A	negative ions gain electrons	positive ions lose electrons
B	negative ions lose electrons	positive ions gain electrons
C	positive ions gain electrons	negative ions lose electrons
D	positive ions lose electrons	negative ions gain electrons

17 Which process is exothermic?

A boiling water

B cracking a long chain alkene

C decomposition of limestone

D identification of hydrogen using a lit splint

18 Magnesium ribbon is reacted with excess dilute hydrochloric acid at 25 °C.

The experiment is repeated at 45 °C, using the same mass of magnesium and the same volume and concentration of dilute hydrochloric acid.

Which statement explains why the reaction is faster at 45 °C?

A Collisions between particles at 45 °C are less frequent and fewer colliding particles possess the activation energy.

B Collisions between particles at 45 °C are less frequent and more colliding particles possess the activation energy.

C Collisions between particles at 45 °C are more frequent and fewer colliding particles possess the activation energy.

D Collisions between particles at 45 °C are more frequent and more colliding particles possess the activation energy.

19 Which word equation represents a redox reaction?

A carbon + copper oxide → copper + carbon dioxide

B hydrochloric acid + potassium hydroxide → potassium chloride + water

C magnesium carbonate → magnesium oxide + carbon dioxide

D sodium sulfate + barium nitrate → barium sulfate + sodium nitrate

20 Salts are made by reacting dilute hydrochloric acid with four substances.

1 magnesium

2 magnesium carbonate

3 magnesium hydroxide

4 magnesium oxide

Which substances produce a gas when reacted with dilute hydrochloric acid?

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

21 Which statement about elements in the Periodic Table is correct?

A The density of the elements in Group I increases up the group.

B The metallic character of the elements increases across a period from left to right.

C The number of protons in the atoms of the elements increases across a period from left to right.

D The reactivity of the elements in Group I decreases down the group.

22 Four metals W, X, Y and Z are added to aqueous solutions of their ions.

The results are shown.

metal	Y ions	Z ions	W ions	X ions
W	reaction	reaction	no reaction	reaction
X	reaction	reaction	no reaction	no reaction
Y	no reaction	reaction	no reaction	no reaction
Z	no reaction	no reaction	no reaction	no reaction

What is the order of reactivity?

	least reactive → most reactive			
A	W	X	Y	Z
B	W	Y	X	Z
C	Z	X	Y	W
D	Z	Y	X	W

23 Which process does **not** produce carbon dioxide?

A acid reacting with a metal

B acid reacting with sodium carbonate

C complete combustion of methane

D respiration

24 The Haber process is used to make ammonia.

Which row shows the conditions used in this process?

	catalyst	temperature / °C	pressure / atm
A	Fe	250	450
B	Fe	450	250
C	V_2O_5	250	450
D	V_2O_5	450	250

25 The Contact process is used to manufacture sulfuric acid.

Which statement about the Contact process is **not** correct?

A A nickel catalyst is used.

B Sulfur dioxide reacts with oxygen to form sulfur trioxide.

C Sulfur burns to form sulfur dioxide.

D Sulfur trioxide dissolves in concentrated sulfuric acid to form oleum.

26 What reacts with ethene to make ethanol?

A bromine

B hydrogen

C steam

D yeast

27 Poly(ethene) is made from ethene by the process of addition polymerisation.

Which word describes ethene in this process?

A fuel

B catalyst

C monomer

D solvent

28 A concrete block exerts a pressure on the ground.

Which expression is used to calculate the pressure due to the block?

A (mass of block) × (area of contact with the ground)

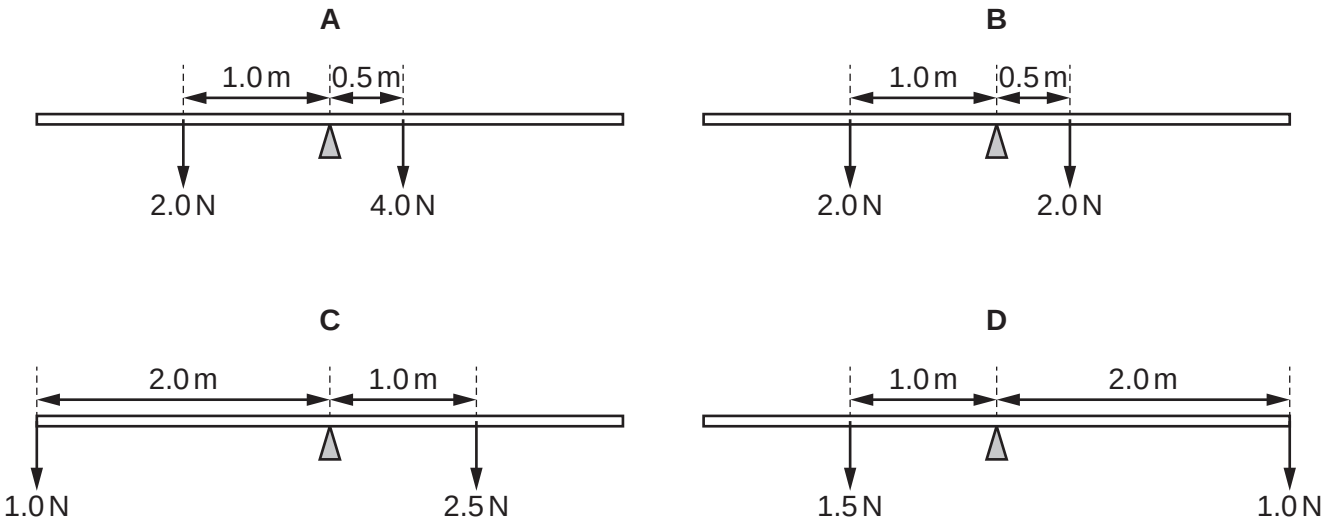
B $\frac{\text{(mass of block)}}{\text{(area of contact with the ground)}}$

C (weight of block) × (area of contact with the ground)

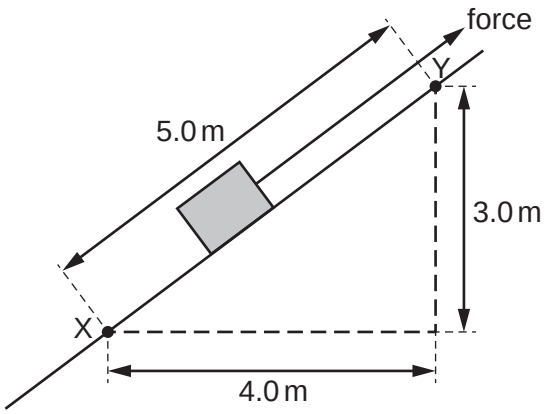
D $\frac{\text{(weight of block)}}{\text{(area of contact with the ground)}}$

29 The diagrams show four uniform beams, each supported by a pivot at its centre.

Which diagram shows a beam that is balanced?



30 The diagram shows a box of weight 600 N being pulled up a frictionless slope by a force.



How much work is done against gravity in moving the box from X to Y?

A 600 J **B** 1800 J **C** 24 000 J **D** 30 000 J

31 Electricity is generated in power stations. Many power stations use steam to drive turbines.

Which type of power station does **not** use steam?

A chemical energy (fuel) power stations

B geothermal energy power stations

C hydroelectric energy power stations

D nuclear energy power stations

32 Which part of the electromagnetic spectrum is often involved in thermal energy transfer by radiation?

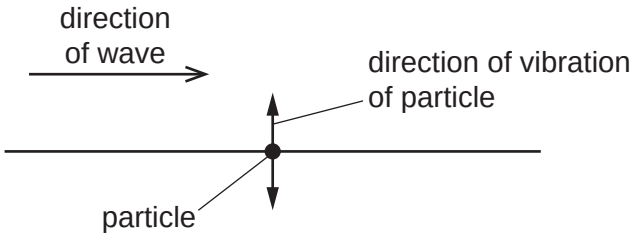
A infrared

B radio

C ultraviolet

D X-rays

33 The diagram shows the direction of a wave that passes a particle. The particle is made to vibrate by the wave. The direction of vibration of the particle is shown.

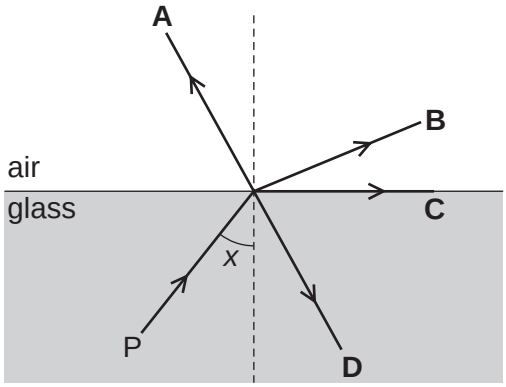


Which row states the type of wave that passes the particle, and gives an example of this type of wave?

	type of wave	example
A	longitudinal	light
B	longitudinal	sound
C	transverse	light
D	transverse	sound

34 The diagram shows a ray of light travelling in glass from point P. Angle *x* is greater than the critical angle.

In which labelled direction does the ray continue?



35 In an experiment to investigate induced magnetism, a magnet is brought close to samples of different unmagnetised materials. A student records the results using diagrams.

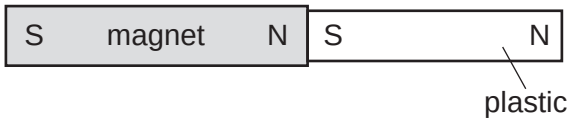
The teacher checks the diagrams and finds that only one result is correctly recorded.

Which result is correctly recorded?

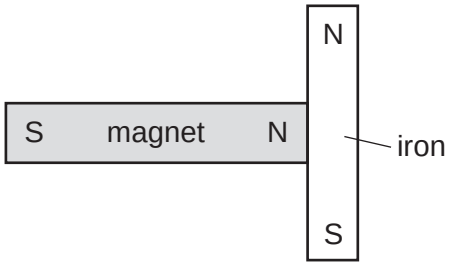
A

B

C



D



36 The current in an ammeter is 1.5 A.

How much charge passes through the ammeter in one minute?

A 0.025 C **B** 1.5 C **C** 40 C **D** 90 C

37 A heating element in an electric kettle has a resistance of 24 Ω.

When the kettle is connected to a 240 V supply, it takes 2.5 minutes to boil some water.

How much energy is used to boil the water?

A 16 J **B** 960 J **C** 6000 J **D** 360 000 J

38 Fuses are used in domestic electric circuits.

Which statement about fuses is correct?

A A fuse is connected in the live wire.

B A fuse is connected in the neutral wire.

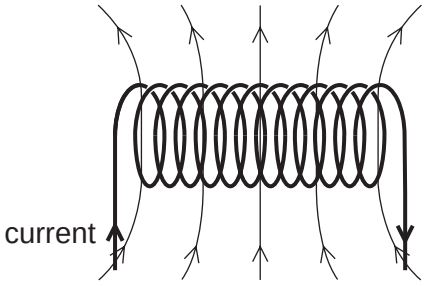
C A 3 A fuse produces a current of exactly 3 A in the circuit.

D A 3 A fuse produces a minimum current of 3 A in the circuit.

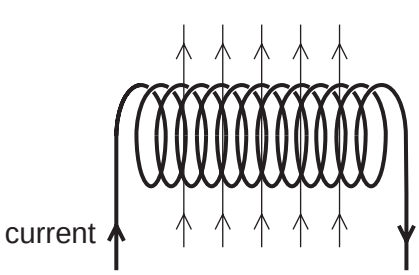
39 A solenoid carrying a current produces a magnetic field.

Which diagram shows the magnetic field pattern?

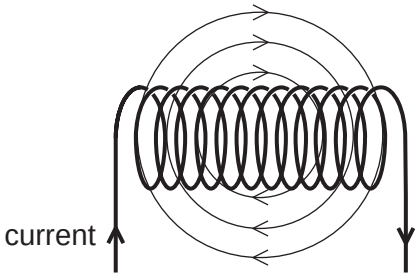
A



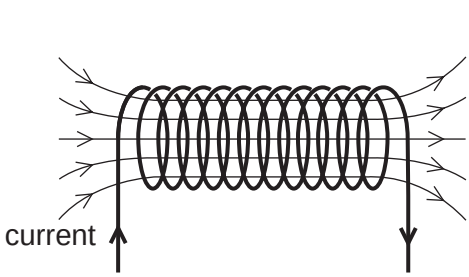
B



C



D



40 Which type of radiation has the greatest ionising effect?

A infrared rays

B α-particles

C β-particles

D γ-rays

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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.).