Cambridge Assessment International Education

Cambridge IGCSE™ (9–1)

CO-ORDINATED SCIENCES **0973/21**

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.

1 Which statement is the definition of nutrition?

A break down of nutrient molecules and the release of energy for metabolism

B maintenance of a constant internal environment

C removal of the waste products of metabolism

D taking in of materials for energy, growth and development

2 Which structure in a plant cell makes organic nutrients?

A cell membrane

B cell wall

C chloroplast

D nucleus

3 Nutrient molecules are made up from smaller molecules. Nutrients can be identified by food tests.

Which row is true for a protein?

	smaller molecules	test which gives a positive result
A	amino acids	Benedict's test
B	amino acids	biuret test
C	sugars	Benedict's test
D	sugars	biuret test

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?

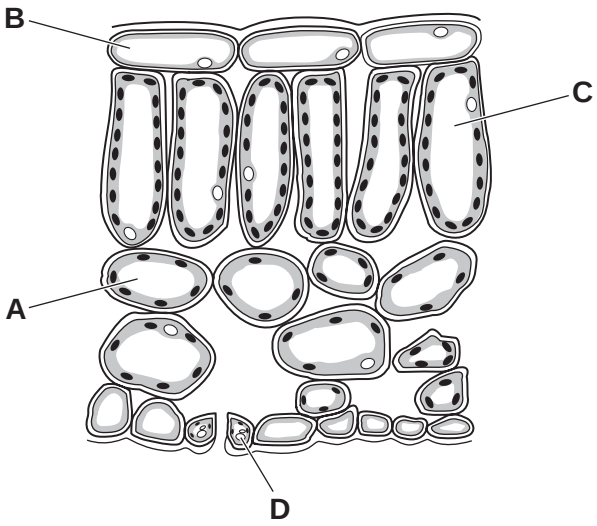
A The enzyme in saliva is inactive at 95 °C.

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 Which cell can control gas exchange?



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 What is the word equation for anaerobic respiration in yeast?

A glucose → alcohol + carbon dioxide

B glucose → carbon dioxide + water

C glucose → lactic acid

D glucose + oxygen → carbon dioxide + water

9 Which row is correct when looking at a near object?

	ciliary muscles	suspensory ligaments	lens
A	contracted	slack	fat
B	contracted	tight	thin
C	relaxed	slack	thin
D	relaxed	tight	fat

10 In human reproduction, which cells are haploid?

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

11 Which term is used to describe an individual with two of the same allele for a characteristic?

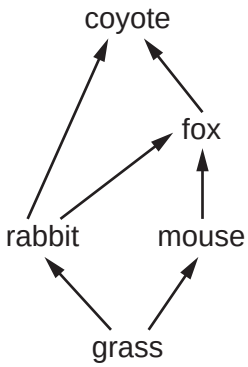
A genotype

B heterozygous

C homozygous

D phenotype

12 Which organism in the food web is a secondary and a tertiary consumer?



A coyote

B fox

C mouse

D rabbit

13 During eutrophication, what reduces the concentration of dissolved oxygen in the water?

A decreased photosynthesis by producers

B decreased respiration by decomposers

C increased photosynthesis by producers

D increased respiration by decomposers

14 A sample of water is contaminated with insoluble chalk and a soluble salt.

Which two processes are used to separate the water from the chalk and salt?

A distillation and chromatography

B distillation and crystallisation

C filtration and chromatography

D filtration and crystallisation

15 Which row describes a covalent compound?

	solubility in water	volatility
A	high	low
B	high	high
C	low	low
D	low	high

16 The equation for the complete combustion of methane is shown.

$$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$$

What is the mass of oxygen that is required for the complete combustion of 16 g of methane?

A 8 g **B** 16 g **C** 32 g **D** 64 g

17 Which statement describes an endothermic reaction?

A The products have less energy than the reactants and the temperature decreases.

B The products have less energy than the reactants and the temperature increases.

C The products have more energy than the reactants and the temperature decreases.

D The products have more energy than the reactants and the temperature increases.

18 Which row describes how the number of effective collisions and the rate of reaction are affected if the activation energy of a reaction is increased?

	number of effective collisions	rate of reaction
A	higher	greater
B	higher	lower
C	lower	greater
D	lower	lower

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 Which chemical test does **not** produce a precipitate?

A carbon dioxide and limewater

B carbonate ions and dilute hydrochloric acid

C chloride ions and aqueous silver nitrate

D copper(II) ions and aqueous sodium hydroxide

21 Which electronic structure is for a non-metallic element?

A 2 **B** 2,2 **C** 2,8,2 **D** 2,8,8,2

22 The equations for four reactions are shown.

$$Mn + Ni(NO_3)_2 \rightarrow Mn(NO_3)_2 + Ni$$

$$Ni + PbO \rightarrow NiO + Pb$$

$$PbO + Sn \rightarrow SnO + Pb$$

$$Sn(NO_3)_2 + Ni \rightarrow Ni(NO_3)_2 + Sn$$

What is the order of reactivity of the metals?

	most reactive →			least reactive
A	lead	tin	nickel	manganese
B	manganese	nickel	tin	lead
C	manganese	tin	nickel	lead
D	lead	nickel	tin	manganese

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 Which row shows the conditions used in the Haber process?

	temperature / °C	pressure / atm	catalyst
A	150	200	iron
B	150	400	vanadium oxide
C	450	200	iron
D	450	400	vanadium oxide

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 form ethanol?

A bromine

B hydrogen

C oxygen

D steam

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

Which word describes ethene in this process?

A fuel

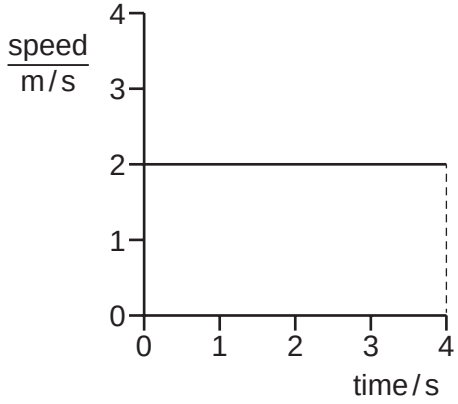
B catalyst

C monomer

D solvent

28 Which speed–time graph represents an object moving with an acceleration of $2.0\,m/s^2$?

A



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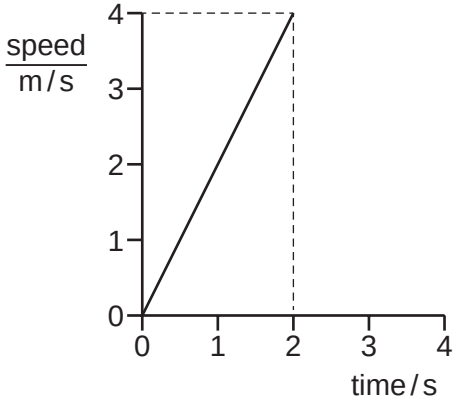

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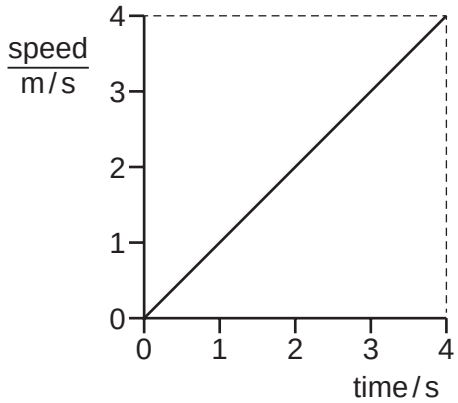

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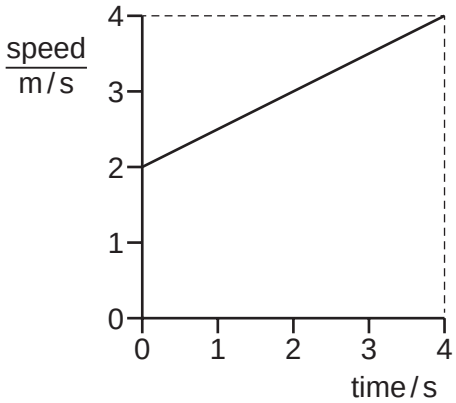
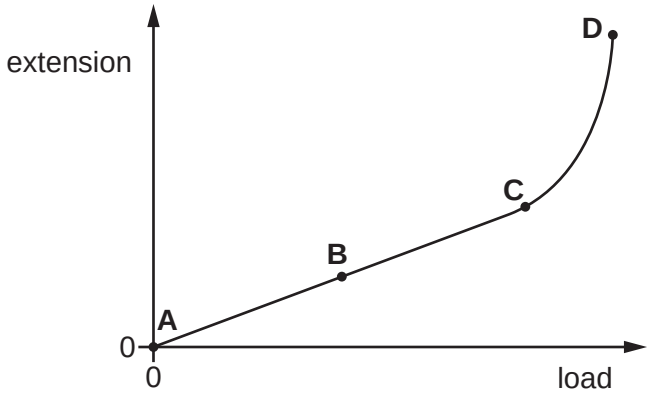


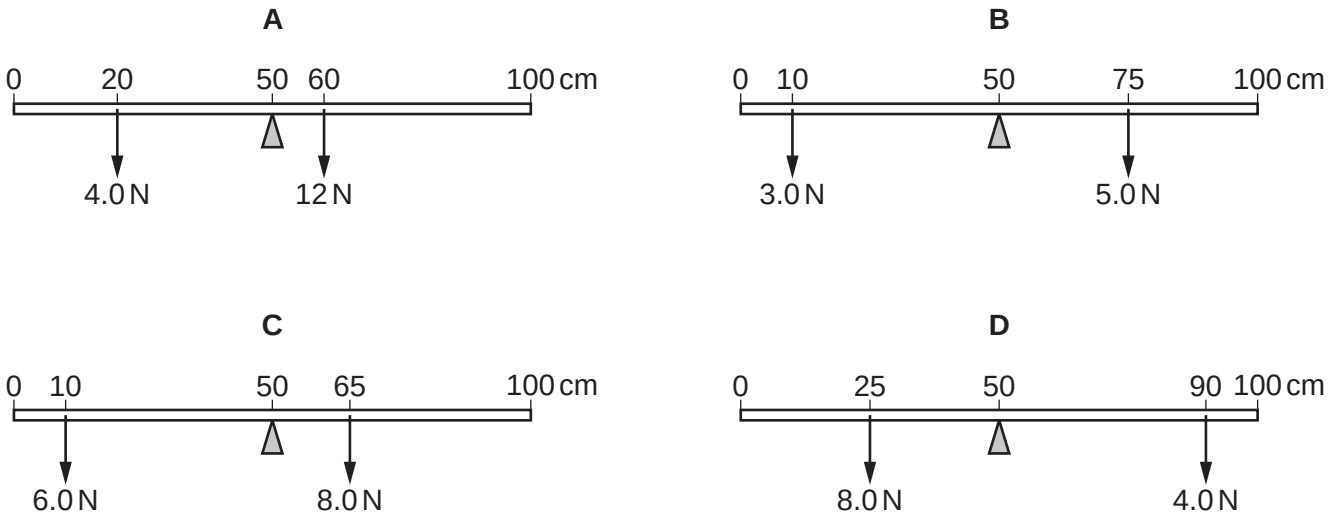
29 The diagram shows the extension–load graph for a spring.

Which labelled point is the limit of proportionality of the spring?



30 The diagrams show uniform metre rules each pivoted at the 50 cm mark. Different weights are placed on the rules at different distances from the 0 cm end as shown.

Which rule rotates in a clockwise direction?



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 What is meant by the *sensitivity* of a liquid-in-glass thermometer?

A how quickly the thermometer shows a change in temperature

B the accuracy of the thermometer

C the amount of change in the length of the liquid column per degree Celsius temperature rise

D the difference between the maximum and the minimum temperatures that the thermometer can measure

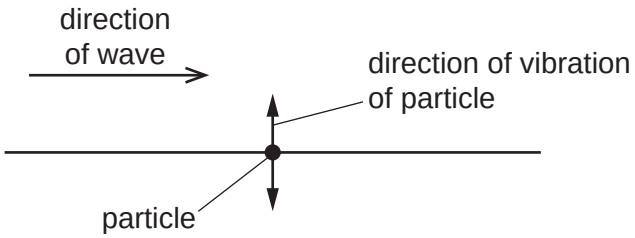
33 Three identical metal cans X, Y and Z are painted. X is painted dull black, Y is painted dull white and Z is painted shiny silver.

All three cans are filled with the same amount of water at 100 °C. They are left in a cool room for the same amount of time.

Which row shows possible temperatures of the water in each of the cans after this time?

	temperature of water in X / °C	temperature of water in Y / °C	temperature of water in Z / °C
A	35	39	42
B	35	42	39
C	42	39	35
D	42	35	39

34 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.

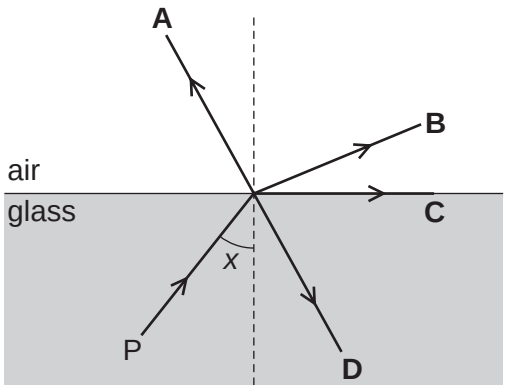


Which row states the type of wave that passes the particle, and gives an example of this type of wave?

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

35 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?



36 Which list consists of three regions of the electromagnetic spectrum in order of increasing frequency (lowest first)?

A microwaves, radio waves, ultraviolet waves

B microwaves, ultraviolet waves, radio waves

C radio waves, microwaves, ultraviolet waves

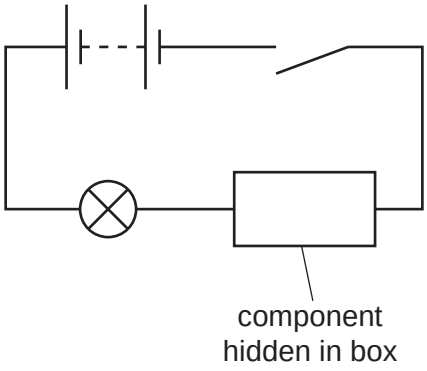
D ultraviolet waves, radio waves, microwaves

37 There is a current of 12 A in an electric kettle.

How much charge passes through the kettle in one minute?

A 0.20 C **B** 5.0 C **C** 12 C **D** 720 C

38 The series circuit shown includes a single component hidden in a box. The switch is open.



The switch is now closed and the lamp lights briefly before going off.

The switch is now opened, and then closed again. This time the lamp does **not** light.

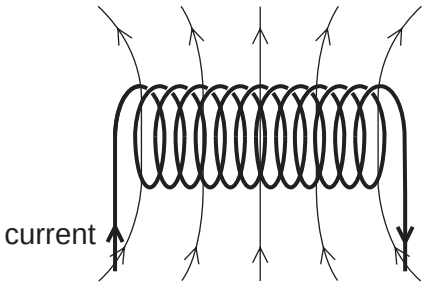
Which symbol represents the component in the box?

A **B** **C** **D**

39 A solenoid carrying a current produces a magnetic field.

Which diagram shows the magnetic field pattern?

A



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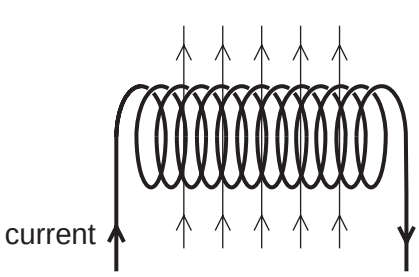

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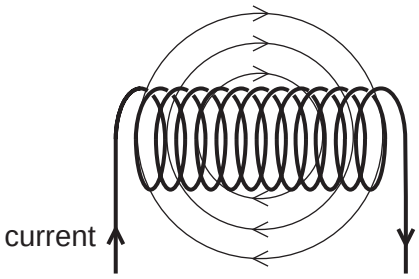

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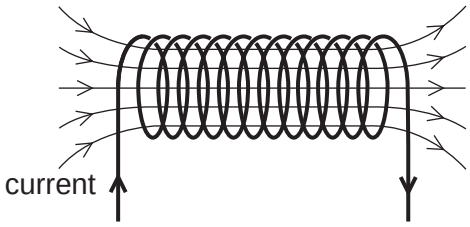

40 Which type of radiation has the greatest ionising effect?

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.).