Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CO-ORDINATED SCIENCES	**0654/22**
Paper 2 Multiple Choice (Extended)	**October/November 2017**
	45 minutes

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, glue or correction fluid.
Write your name, Centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.
DO **NOT** WRITE IN ANY BARCODES.

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 separate Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.
A copy of the Periodic Table is printed on page 16.
Electronic calculators may be used.

International Examinations

[Turn over

1 What is homeostasis?

    A the maintenance of the body's external environment

    B the maintenance of the body's internal environment

    C the processes that produce heat in the body

    D the removal of wastes from the body

2 What is excretion?

    A breakdown of materials in kidney cells

    B chemical reactions in liver cells

    C removal of undigested food from the gut

    D removal of waste products

3 What would increase the risk of coronary heart disease?

    A reduced salt diet

    B relaxation therapy

    C regular exercise

    D smoking tobacco

4 Which statements about X chromosomes in humans are correct?

	present in body cells in males	present in body cells of females	carry genes
A	✓	✓	✓
B	✓	✗	✓
C	✓	✗	✗
D	✗	✓	✗

5 The test-tube shows gelatine with a layer of black dye. The dye can diffuse through the gelatine.

gelatine — black dye
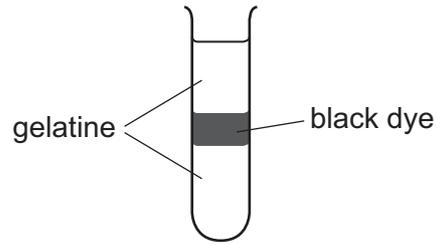
What was the appearance of the test-tube after six hours?

A	**B**	**C**	**D**
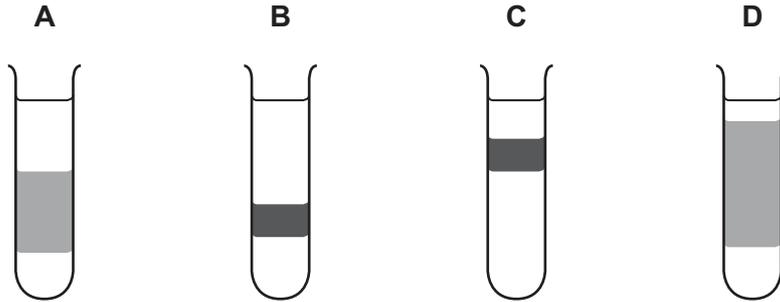
6 Which component of cigarette smoke can bind to haemoglobin and reduce the ability of the blood to carry oxygen?

A carbon monoxide

B nicotine

C smoke particles

D tar

7 When a suspension of powdered milk is completely digested by a protease enzyme it becomes clear.

The graph shows the time taken for a mixture of protease and powdered milk to clear at different temperatures.
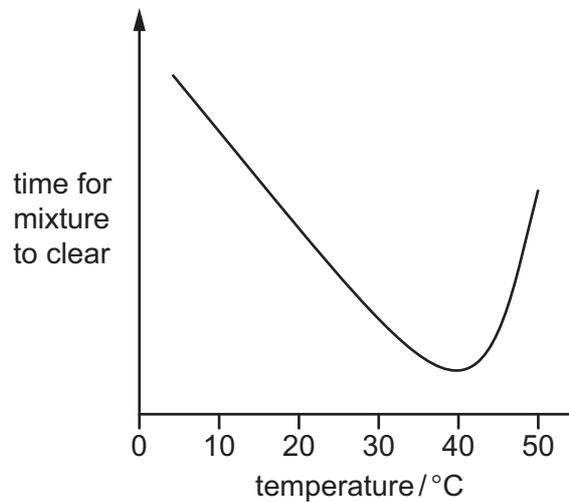
What is this enzyme's optimum temperature?

A 5 °C **B** 37 °C **C** 40 °C **D** 50 °C

8 What is a function of bile?

A emulsifying carbohydrates to decrease the surface area for the action of enzymes

B emulsifying carbohydrates to increase the surface area for the action of enzymes

C emulsifying fats to decrease the surface area for the action of enzymes

D emulsifying fats to increase the surface area for the action of enzymes

9 Predators that hunt at night have large eyes and ears.

This has resulted from the passing on of genes by the best-adapted organisms.

What is this process called?

A artificial selection

B conservation

C homeostasis

D natural selection

10 Why might auxins be used in the commercial growth of plants?

    A   to increase uptake of carbon dioxide for increased photosynthesis

    B   to reduce the amount of water needed by the plants

    C   to regulate growth of particular parts of the plants

    D   to stimulate production of chlorophyll for increased yield

11 A plant has a flower with a feathery, exposed stigma.

What does this tell us about the plant?

    A   It is insect-pollinated.

    B   It is wind-pollinated.

    C   Its fruits are animal-dispersed.

    D   Its fruits are wind-dispersed.

12 Lichens grow on the bark of trees. Lichen growth can be affected by sulfur dioxide and other pollutants. Their absence is often used as an indicator of pollution.

The table shows the percentage cover of lichens at distances from the centre of a large city.

distance from city centre / km	percentage cover by lichens on the bark
0	3
5	10
8	15
12	30
20	40

Which conclusion can be made from these results?

    A   Lichen growth is reduced by sulfur dioxide.

    B   Lichens cannot survive in the city.

    C   Lichens grow better further away from the city centre.

    D   Lichens grow equally well on all species of trees.

13 Which statement about food chains is correct?

A A carnivore is a consumer that gets its energy from plants.

B A carnivore is a producer that gets its energy from animals.

C A herbivore is a consumer that gets its energy from plants.

D A herbivore is a producer that gets its energy from animals.

14 Which row describes the melting point and boiling point of salt water?

	melting point / °C	boiling point / °C
A	0	less than 100
B	0	100
C	less than 0	more than 100
D	more than 0	100

15 Which statement about fractional distillation is correct?

A A chemical change occurs because new substances are formed.

B A chemical change occurs because no new substances are formed.

C A physical change occurs because new substances are formed.

D A physical change occurs because no new substances are formed.

16 Hand warmers keep hands warm on a cold day.

Which statement describes how hand warmers work?

A An endothermic process occurs in which chemical energy is transformed into thermal energy.

B An endothermic process occurs in which thermal energy is transformed into chemical energy.

C An exothermic process occurs in which chemical energy is transformed into thermal energy.

D An exothermic process occurs in which thermal energy is transformed into chemical energy.

17 Ammonia is oxidised as shown.
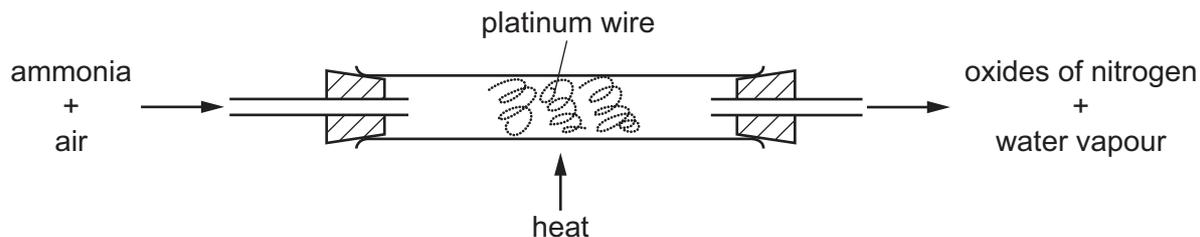
The platinum is chemically unchanged at the end of the reaction.

What is the reason for using platinum?

A   to absorb the heat from the reaction

B   to filter out oxygen from the air

C   to increase the rate of the reaction

D   to neutralise the ammonia

18 Which equation shows iron or one of its compounds being reduced?

A $2FeCl_2 + Cl_2 \rightarrow 2FeCl_3$

B $Fe + CuSO_4 \rightarrow FeSO_4 + Cu$

C $Fe + H_2SO_4 \rightarrow FeSO_4 + H_2O$

D $FeSO_4 + Mg \rightarrow MgSO_4 + Fe$

19 Which substances react with dilute sulfuric acid to form a salt?

	magnesium	magnesium oxide	magnesium carbonate	magnesium chloride
A	✓	✓	✓	✗
B	✓	✓	✗	✓
C	✓	✗	✓	✓
D	✗	✓	✓	✓

20 Which statement about Group I elements is **not** correct?

A   Caesium and rubidium are electrical conductors.

B   Caesium is softer than lithium.

C   Potassium has a higher melting point than rubidium.

D   Sodium is more reactive than rubidium.

21 Sodium is a metal in Group I of the Periodic Table.

Some of the properties of sodium are listed.

       1   It conducts electricity.

       2   It forms white compounds.

       3   It forms a basic oxide.

       4   It is malleable.

Nickel is a transition metal.

Which properties are shown by nickel as well as by sodium?

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

22 Which reaction does **not** occur in the blast furnace?

A $C + O_2 \rightarrow CO_2$

B $C + CO_2 \rightarrow 2CO$

C $4Fe + 3O_2 \rightarrow 2Fe_2O_3$

D $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$

23 Gases from a car engine pass through the catalytic converter in the exhaust system of the car.

Which gases are at lower concentrations when they leave the catalytic converter?

A   carbon dioxide and nitrogen

B   carbon dioxide and nitrogen oxides

C   carbon monoxide and nitrogen

D   carbon monoxide and nitrogen oxides

24 Which row shows the conditions used for making sulfur trioxide in the Contact process?

|	temperature /°C	pressure /atm	catalyst
A	450	2	V_2O_5
B	450	200	Fe
C	1000	2	V_2O_5
D	1000	200	Fe

**25** Which word equation describes the manufacture of lime from limestone?

    A   calcium carbonate $\rightarrow$ calcium hydroxide + carbon dioxide

    B   calcium carbonate $\rightarrow$ calcium oxide + carbon dioxide

    C   calcium hydroxide $\rightarrow$ calcium oxide + water

    D   calcium oxide + carbon dioxide $\rightarrow$ calcium carbonate

26 What is the structure of but-2-ene?

    A $CH_3–CH_2–CH{=}CH_2$

    B $CH_3–CH{=}CH–CH_3$

    C $CH_3–CH{=}CH_2$

    D $CH_3–CH_2–CH_3$

27 The structures of four hydrocarbons are shown.
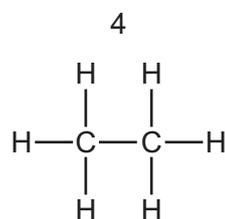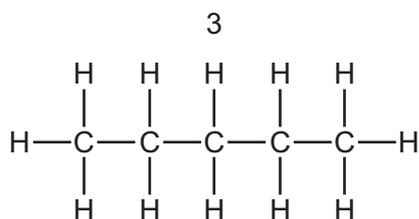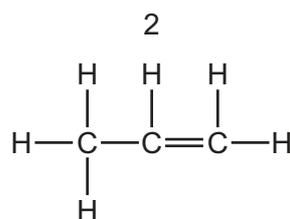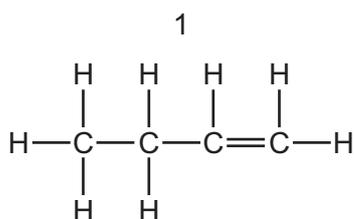
Which of the hydrocarbons change the colour of aqueous bromine?

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

28 A car moves with a constant speed of 15 m / s along a road for 20 s.

After this, the car is 100 m from where it started, measured in a straight line.

Which statement about the car is correct?

A It has travelled a distance of 100 m along the road.

B It has travelled a distance of 300 m along the road.

C Its direction was constant.

D Its velocity was constant.

29 A load is applied to a spring. The load is gradually increased from zero until the limit of proportionality of the spring is passed.

What **must** happen as soon as the limit of proportionality is passed?

A The extension becomes equal to the original length.

B The extension stops increasing.

C The spring breaks.

D The spring stops obeying Hooke's Law.

30 What is the definition of efficiency?

A $\dfrac{\text{energy input}}{\text{useful energy output}} \times 100\%$

B $\dfrac{\text{energy input}}{\text{wasted energy}} \times 100\%$

C $\dfrac{\text{useful energy output}}{\text{energy input}} \times 100\%$

D $\dfrac{\text{wasted energy}}{\text{energy input}} \times 100\%$

31 A worker carries bricks up a ladder.

The following quantities are known.

- the height the bricks are lifted up
- the time taken for the worker to lift the bricks
- the volume of the bricks
- the weight of the bricks

Which quantities are needed to calculate the useful power produced by the worker as he carries the bricks up the ladder?

A height, time and volume

B height, time and weight

C height, volume and weight

D time, volume and weight

32 Water in a beaker is heated in a laboratory.

Which statement about boiling and evaporation of the water is correct?

A Boiling and evaporation both occur at any temperature.

B Boiling only occurs at the surface of water.

C Evaporation only occurs at one temperature.

D Evaporation only occurs at the surface of water.

33 Which statement describes why convection is the main method of heat transfer in liquids?

A Heating a liquid decreases its density.

B Heating a liquid decreases its thermal capacity.

C Heating a liquid increases its density.

D Heating a liquid increases its thermal capacity.

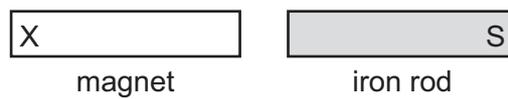**34** The diagram represents a converging lens forming an image of an object.

object   converging lens

P   Q   R   S

image
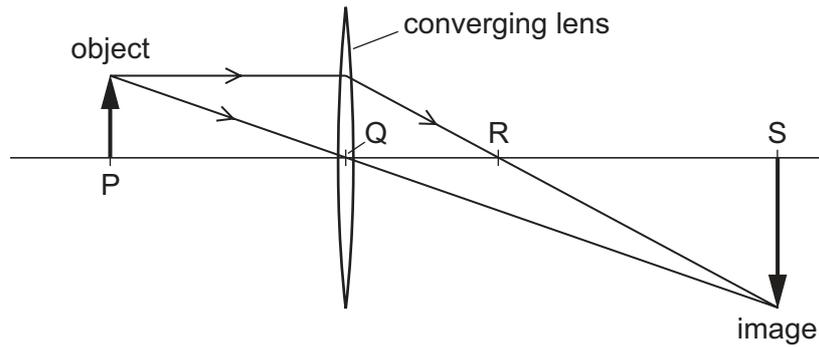
Which distance is the focal length of the lens?

A PQ   **B** PR   **C** QR   **D** QS

**35** A bar magnet is brought close to an unmagnetised iron rod.

One end of the rod becomes an S-pole, as shown.

| X | | S |
| magnet | | iron rod |

Which pole is at end X of the magnet, and what happens if the magnet is turned round so that end X is on the right?

|	pole at end X	if magnet is turned round
A	N	rod is attracted
B	N	rod is repelled
C	S	rod is attracted
D	S	rod is repelled

36 A battery of e.m.f. V is connected across a resistor of resistance R. There is a current in the resistor.
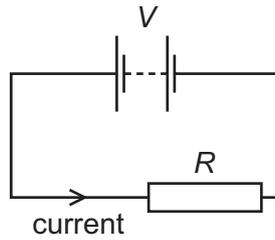
Which row shows two changes that **both** increase the current in the resistor?

	change 1	change 2
A	decrease V	decrease R
B	decrease V	increase R
C	increase V	decrease R
D	increase V	increase R

37 The diagram shows a $3.0\,\Omega$ resistor connected to a $6.0\,\text{V}$ battery.
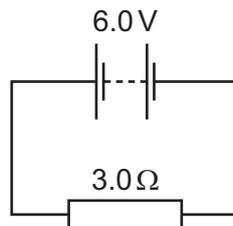
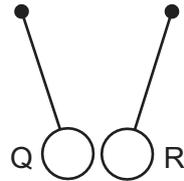How much energy is transferred in the $3.0\,\Omega$ resistor in 30 seconds?

| **A** 15 J | **B** 60 J | **C** 360 J | **D** 540 J |

 [Turn over

38 Three charged balls P, Q and R are suspended by insulating threads. Ball P is negatively charged.

Ball Q is brought close to ball P. The balls move away from each other.
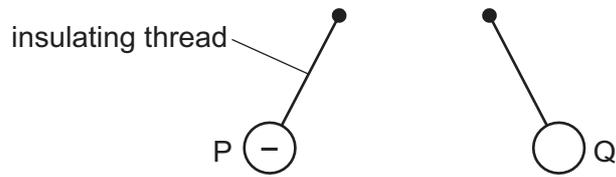
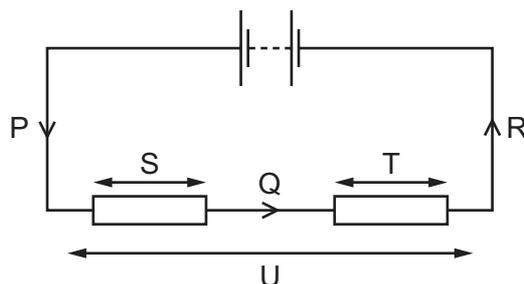Ball Q is now brought close to ball R. The balls move closer to each other.

What are the signs of the charges on ball Q and ball R?

	ball Q	ball R
A	negative	negative
B	negative	positive
C	positive	negative
D	positive	positive

39 The circuit in the diagram contains two resistors.

Currents P, Q and R, and potential differences S, T and U are labelled.

Which row shows the relationship between the currents and between the potential differences?

	currents	potential differences
A	P = Q = R	S = T = U
B	P = Q = R	S + T = U
C	P > Q > R	S = T = U
D	P > Q > R	S + T = U

40 The diagrams represent pairs of nuclei of some atoms.

Which pair shows nuclei of different isotopes of the same element?

The Periodic Table of Elements

Group

Key

atomic number
atomic symbol
name
relative atomic mass

I	II	III	IV	V	VI	VII	VIII
							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

(transition elements and rest of table)

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	114 Fl flerovium –	115	116 Lv livermorium –		

1 H hydrogen 1

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.).