UNIVERSITY Ger	OF CAMBRIDGE INTERNATION neral Certificate of Education Ordi	IAL EXAMINATIONS inary Level
ADDITIONAL CO	MBINED SCIENCE	5130/01
Paper 1 Multiple (Choice	October/November 2004
Additional Materials:	Multiple Choice Answer Sheet Soft clean eraser Soft pencil (type B or HB is recommen	1 hour

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, highlighters, 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.

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 included on page 20.

This document consists of 18 printed pages and 2 blank pages.



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1 The diagram shows a speed-time graph.



In which region is the acceleration decreasing?

- A V to W
- B W to X
- C X to Y
- D Y to Z
- **2** The diagram shows a step in an experiment to determine the position of the centre of mass of a thin card.

A pencil line is drawn between **P** and **Q**.



What is the next step in this experiment?

- A Find the mid-point of PQ.
- **B** Hang the card from point **R**.
- **C** Measure the mass of the card.
- **D** Measure the thickness of the card.

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3 The diagram shows a boy weighing 500 N sitting on a see-saw. He sits 2 m from the pivot.



What is the force F needed to balance the see-saw?

- **A** 250 N
- **B** 750 N
- **C** 1000 N
- **D** 3000 N
- **4** Which quantity is calculated by multiplying the magnitude of a force by the distance moved in the direction of the force?
 - A acceleration
 - B power
 - C pressure
 - D work
- 5 The diagram shows a clinical thermometer.



Why does the stem have a very narrow bore?

- A to increase the temperature range measured
- B to improve its sensitivity
- **C** to prevent mercury returning to the bulb
- **D** to reduce the amount of mercury used

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6 A wave has a frequency of 10 kHz.

What are the possible values of its velocity and wavelength?

	velocity in m/s	wavelength in m
Α	330	0.33
В	330	33
С	3 x 10 ⁸	30
D	3 x 10 ⁸	3 x 10 ⁴

- 7 In which situation could sound waves **not** travel
 - A between two spaceships in space
 - **B** from a surface ship to a submarine
 - **C** from inside a diving chamber to a microphone in water outside
 - **D** through a balloon filled with helium gas
- **8** Which diagram correctly shows the directions of the electrostatic forces on a pair of charged spheres?



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9 A student tests the circuit of a press-button telephone with a bulb and a battery.



Which single switch can be pressed to make the bulb light?



10 The diagram shows the information given on an electric iron.



If electricity costs 7 cents per unit, what is the cost of using this iron at maximum power for 10 hours?

- **A** 17 cents **B** 70 cents **C** 84 cents **D** 220 cents
- **11** Which particles are emitted by the hot filament of a cathode ray oscilloscope and which type of field is used to accelerate them?

	particles	type of field
Α	electrons	electric
В	electrons	magnetic
С	protons	electric
D	protons	magnetic

- **12** Which of the following equations represents the decay of the nuclide $^{226}_{88}$ Ra by the emission of an alpha particle?
 - **A** $^{226}_{88}$ Ra $\rightarrow ^{226}_{87}$ Fr + alpha particle
 - **B** $^{226}_{88}$ Ra $\rightarrow ^{225}_{88}$ Ra + alpha particle
 - **C** $^{226}_{88}$ Ra $\rightarrow ^{224}_{84}$ Po + alpha particle
 - **D** $^{226}_{88}$ Ra $\rightarrow ^{222}_{86}$ Rn + alpha particle
- 13 A nucleus of the element cobalt may be represented by the symbol $\frac{59}{27}$ Co.

What is the structure of a neutral atom of cobalt?

	number of protons	number of neutrons	number of electrons
Α	27	59	27
В	59	27	59
С	27	32	27
D	59	32	59

14 Solution **X** contains a simple salt.

The table shows the results of some tests on solution X.

test	result of test
addition of aqueous sodium hydroxide	green precipitate forms
addition of acidified barium nitrate	white precipitate forms

What is the name of the salt in solution X?

- A copper(II) carbonate
- **B** copper(II) chloride
- **C** iron(II) sulphate
- **D** iron(III) sulphate

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15 The graph shows the change in temperature with time when ice at -20 °C is heated to 120 °C.



Which entry in the table shows the correct change taking place between the points?

	points	change
Α	P to Q	average energy of particles remains constant
В	Q to R	ice melting
С	S to T	average energy of particles increasing
D	T to U	water boiling

16 The table gives data about three different particles.

particle	nucleon number	number of protons	number of neutrons	number of electrons
Al	27	13	х	13
F⁻	19	Y	10	10
Mg ²⁺	24	12	12	Z

What are the correct values of X, Y and Z?

	Х	Y	Z
Α	13	9	10
В	13	10	12
С	14	10	12
D	14	9	10

- 17 Which substance does not have a macromolecular structure?
 - A diamond
 - B graphite
 - **C** silicon(IV) oxide (silica)
 - D sodium chloride
- 18 Which solution of sodium chloride has the greatest concentration?
 - A 0.10 mol NaCl in 0.10 dm³ of solution
 - **B** 0.10 mol NaCl in 1.00 dm³ of solution
 - **C** 0.01 mol NaCl in 100 cm^3 of solution
 - **D** 0.01 mol NaCl in 1000 cm^3 of solution
- **19** Aqueous copper(II) sulphate is electrolysed using copper electrodes. The current is constant and the cathode (negative electrode) is weighed at regular intervals.

Which graph is obtained when the mass of the cathode is plotted against time?



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20 Zinc reacts with an excess of dilute sulphuric acid. The graph shows how the volume of hydrogen given off changes with time.



Why is the graph horizontal at **X**?

- A All the sulphuric acid has reacted.
- B All the zinc has reacted.
- **C** Hydrogen is being produced at a constant rate.
- **D** The reaction is beginning to slow down.
- 21 A sample of pond water has a pH value of 9.

This means that the water is

- A weakly acidic.
- B neutral.
- C weakly alkaline.
- D strongly alkaline.
- 22 Which substance removes impurities from iron ore in the blast furnace?
 - A carbon
 - B limestone
 - C sand
 - D slag
- **23** Which three compounds, when mixed for use as a fertiliser, provide the three essential elements needed for plant growth?

	1	2	3
Α	ammonium nitrate	calcium phosphate	potassium chloride
В	ammonium nitrate	calcium phosphate	sodium nitrate
С	ammonium sulphate	calcium hydroxide	potassium chloride
D	ammonium sulphate	sodium nitrate	potassium chloride

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- 24 Which process would remove all the impurities from impure water?
 - A chlorination
 - **B** distillation
 - **C** filtration
 - D neutralisation

25 The diagrams show the structures of four organic molecules.



 A
 P and R
 B
 P and S
 C
 Q and R
 D
 R and S

26 Which of the following will decolourise aqueous bromine?



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27 Ethanol is produced from starch as follows

stage 1 stage 2 starch simple sugars ethanol

Which terms are used to describe these two stages?

	stage 1	stage 2
Α	cracking	oxidation
В	fermentation	distillation
С	hydrolysis	fermentation
D	polymerisation	hydrolysis

28 The diagram shows a root hair cell.

Which structure controls the uptake of nitrate ions into the cell?



29 An experiment to investigate osmosis is set up as shown.



What happens to the volume of the liquid in tube **X** and the concentration of the salt solution?

	volume of the liquid in tube X	concentration of salt solution
Α	decreases	decreases
в	decreases	increases
С	increases	decreases
D	increases	increases

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30 The diagram shows an investigation into the effect of the intensity of light on the rate of photosynthesis. The rate is measured by counting the number of bubbles released per minute.

The experiment is repeated using different light intensities.



Which graph shows the result of the investigation?



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31 The table shows the recommended daily intake of energy and of iron for females at four different ages: 6 months, 5 years, 25 years and 75 years.

	energy/MJ	iron/mg
Α	2.7	4.3
В	6.5	6.1
С	7.6	8.7
D	8.1	14.8

Which shows the recommended daily intake for the 25 year old?

32 The diagram shows a section through an alveolus and a blood capillary.



What are the oxygen concentrations in X, Y and Z?

	x	Y	Z
Α	high	low	high
в	high	low	low
С	low	high	high
D	low	high	low

33 The diagram shows a kidney machine.



Which substance must be at the same concentration in the dialysis fluid and in the blood?

- A glucose
- B salt
- **C** urea
- D water
- 34 Which disease can be cured by antibiotics?
 - A AIDS
 - B diabetes
 - C emphysema
 - D gonorrhoea
- 35 What is the principal source of energy input to biological systems?
 - **A** carbohydrates from plants
 - B light from the Sun
 - C nutrients from the soil
 - D oxygen from the air

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36 The diagram shows part of the carbon cycle.



Which numbered arrows represent respiration?

- **A** 1 and 3
- **B** 1 and 4
- **C** 2 and 3
- **D** 2 and 4
- 37 What is an effect of releasing untreated sewage into the environment?
 - A death of fish from lack of oxygen
 - B increased carbon dioxide in the atmosphere
 - **C** increased sulphur dioxide in the atmosphere
 - D using up of soil minerals
- 38 The diagram shows a flower cut in half.

Which part must receive pollen grains before fertilisation can take place?



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39 How are sperms different from egg cells in size and in number?

	size	number
Α	larger	fewer
В	larger	more
С	smaller	fewer
D	smaller	more

40 Some normal fruit flies are subjected to radiation in a laboratory. As a result, they produce offspring with unusual characteristics, such as white eyes.

What causes this?

- A continuous variation
- B discontinuous variation
- C dominance
- **D** mutation

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DATA SHEET The Periodic Table of the Elements



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