

## UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS International General Certificate of Secondary Education

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**CO-ORDINATED SCIENCES (US)** 

0442/13

Paper 1 Multiple Choice

May/June 2013

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, highlighters, glue or correction fluid.

Write your name, Center 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 20.

Electronic calculators may be used.

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



- 1 What is respiration?
  - A the absorption of organic substances and mineral ions
  - **B** the breakdown of molecules to release energy
  - **C** the manufacture of carbohydrates from raw materials
  - **D** the removal of excess substances, toxic materials and waste products
- 2 Urea is made in the liver and is transported in the blood plasma for removal by the kidneys.

Which sequence of blood vessels is the shortest correct route for these urea molecules?

- A hepatic artery → pulmonary artery → aorta → renal artery
- **B** hepatic vein  $\rightarrow$  pulmonary artery  $\rightarrow$  pulmonary vein  $\rightarrow$  renal artery
- **C** hepatic vein  $\rightarrow$  pulmonary vein  $\rightarrow$  pulmonary artery  $\rightarrow$  renal artery
- **D** renal vein  $\rightarrow$  vena cava  $\rightarrow$  aorta  $\rightarrow$  hepatic artery
- **3** Which statement about the alimentary canal is correct?
  - **A** The large intestine includes the colon and rectum.
  - **B** The large intestine includes the duodenum and rectum.
  - **C** The small intestine includes the colon and ileum.
  - **D** The small intestine includes the ileum and rectum.
- 4 What are the functions of a red blood cell and a root hair cell?

	red blood cell	root hair cell
Α	carries oxygen	absorbs inorganic ions
В	carries glucose	anchors the plant
С	forms part of a clot	absorbs carbon dioxide
D	prevents infection	absorbs water

5 Tests were carried out on a clear liquid, with the following results.

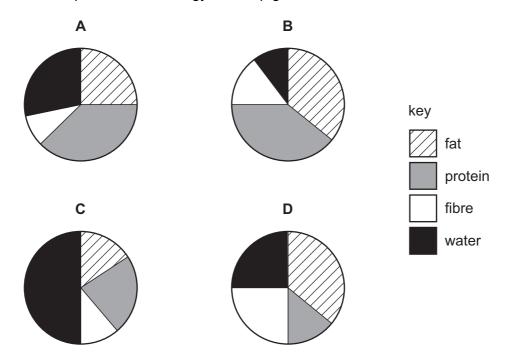
test	color obtained
Benedict's	blue
biuret	purple
iodine	blue/black

What did the clear liquid contain?

- A protein only
- **B** protein and starch only
- **C** protein and reducing sugar only
- **D** protein, reducing sugar and starch

**6** The amounts of four dietary constituents are shown for four different foods.

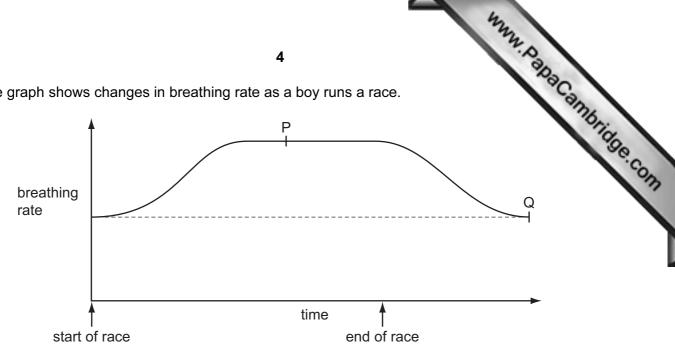
Which food would provide most energy and help growth?



- **7** 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

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8 The graph shows changes in breathing rate as a boy runs a race.



What is happening at points P and Q?

	Р	Q
Α	breathing rate maximum	breathing at resting rate
В	breathing rate maximum	respiration stops
С	lungs fully inflated	breathing at resting rate
D	lungs fully inflated	respiration stops

- 9 Which sequence shows the correct order of structures through which air passes when we breathe in?
  - Α alveolus  $\rightarrow$  bronchiole  $\rightarrow$  trachea  $\rightarrow$  bronchus
  - В bronchus  $\rightarrow$  trachea  $\rightarrow$  alveolus  $\rightarrow$  bronchiole
  - C bronchiole  $\rightarrow$  alveolus  $\rightarrow$  bronchus  $\rightarrow$  trachea
  - D trachea  $\rightarrow$  bronchus  $\rightarrow$  bronchiole  $\rightarrow$  alveolus
- 10 An organism has 28 chromosomes in each body cell.

How many chromosomes would there be in a gamete of the same organism?

- **A** 7
- В 14
- 28
- D 56

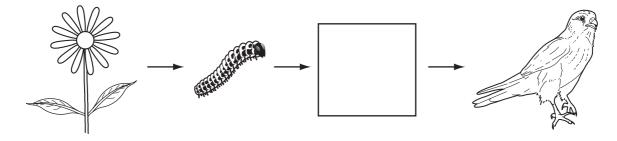
www.PapaCambridge.com 11 The diagram shows a calendar for February and March with four days shaded.

	Fe	brua	ary	March				
	7	14	21	28	7	14	21	28
1	8	15	22	1	8	15	22	29
2	9	16	23	2	9	16	23	30
3	10	17	24	3	10	17	24	31
4	11	18	25	4	11	18	25	
5	12	19	26	5	12	19	26	
6	13	20	27	6	13	20	27	

Menstruation for a woman starts on February 14th.

During which day will the lining of the uterus be at its thickest and be richest in blood vessels?

- February 10th
- В February 15th
- February 24th
- March 15th D
- 12 The diagram shows a food chain.



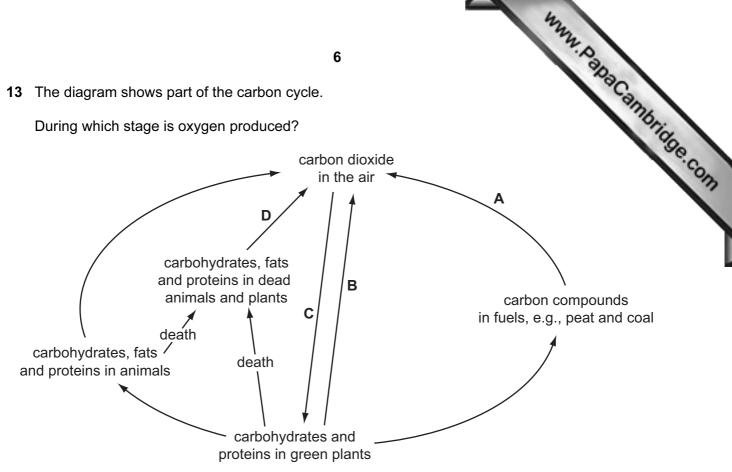
What does the empty box represent?

- consumer
- В herbivore
- C photosynthesis
- producer

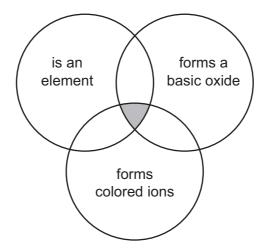
6

13 The diagram shows part of the carbon cycle.

During which stage is oxygen produced?



14 The diagram shows overlapping circles into which different chemical formulae can be placed.



Which formula can be placed in the shaded area because it has all three properties?

- A Br<sub>2</sub>
- B CO
- C Cu
- D Na

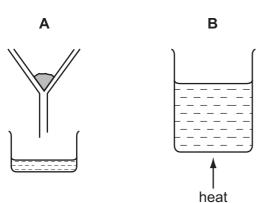
**15** Atoms of element X have 11 nucleons and 6 neutrons.

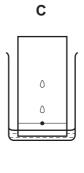
What is element X?

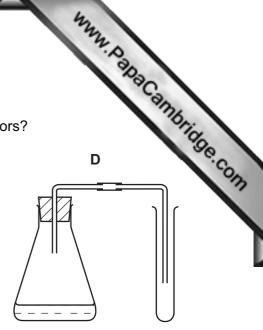
- boron
- В carbon
- C chlorine
- sodium

**16** Henna is a dye extracted from a plant.

Which apparatus is used to show henna is a mixture of different colors?







17 Which substance is a nonmetallic element?

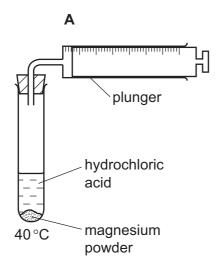
	state at 25°C	good electrical conductor	listed in the Periodic Table
Α	gas	no	no
В	liquid	no	yes
С	liquid	yes	yes
D	solid	yes	no

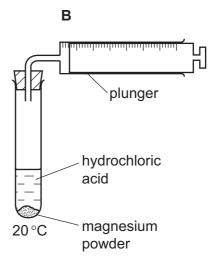
chloric acid of Cambridge Com

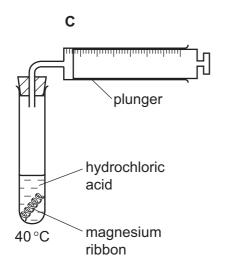
**18** Equal masses of magnesium are reacted with 10 cm<sup>3</sup> of hydrochloric acid concentration.

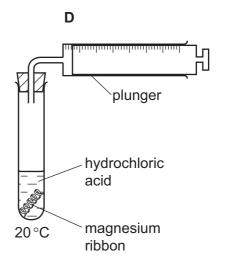
Hydrogen is produced.

Under which conditions does the hydrogen push the plunger of the syringe out most quickly?



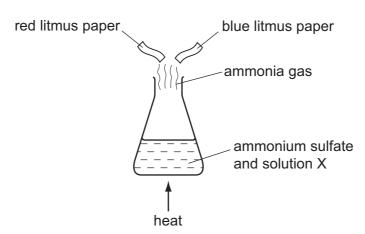






19 When ammonium sulfate is heated with solution X, ammonia gas is given off.

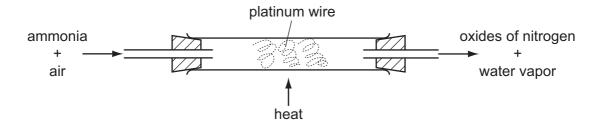
A piece of moist red litmus paper and a piece of moist blue litmus paper are held in the gas



What is solution X and how does the color of the litmus paper change?

	solution X	color change of litmus paper
Α	hydrochloric acid	blue to red
В	hydrochloric acid	red to blue
С	sodium hydroxide	blue to red
D	sodium hydroxide	red to blue

20 Ammonia is oxidized as shown.



The platinum is chemically unchanged at the end of the reaction.

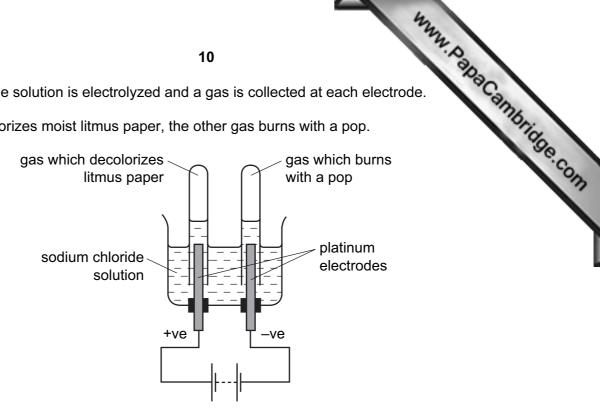
What is the reason for using platinum?

- 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 neutralize the ammonia

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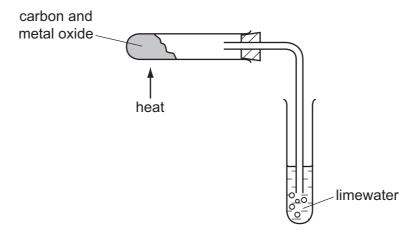
21 Sodium chloride solution is electrolyzed and a gas is collected at each electrode.

One gas decolorizes moist litmus paper, the other gas burns with a pop.



Which statement is correct?

- Α Chlorine gas is collected at the anode.
- В Hydrogen gas is collected at the anode.
- **C** Oxygen gas is collected at the cathode.
- **D** Sodium is formed at the cathode.
- 22 A metal oxide is mixed with carbon and heated as shown.



The limewater turns cloudy.

Which term describes what happens to the metal oxide?

- combustion
- В neutralization
- oxidation
- reduction

www.PapaCambridge.com 23 An old iron sword that had been buried under the ground was found covered with a la

When the tar was removed no rust could be observed on the sword.

What is the reason for this?

- The tar allowed oxygen and water to come into contact with the iron sword.
- В The tar allowed oxygen but not water to come into contact with the iron sword.
- C The tar prevented oxygen and water from coming into contact with the iron sword.
- The tar prevented oxygen but not water from coming into contact with the iron sword. D
- 24 Which household substances are acidic?

	table salt solution	lemon juice	sugar solution	vinegar
Α	✓	✓	X	X
В	✓	X	✓	X
С	x	✓	x	✓
D	X	X	✓	✓

key

√ = yes

**x** = no

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The reaction is exothermic.

Which graph shows how the temperature changes as the acid is added to the alkali?

start temperature 0 volume of acid

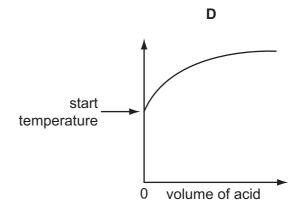
s as the acid is added to the alkali?

B

start
temperature

0 volume of acid

start temperature 0 volume of acid



- 26 Why do farmers add lime to soil?
  - A It acts as a fertilizer.
  - **B** It adds nitrogen to the soil.
  - **C** It decreases the pH of the soil.
  - **D** It increases the pH of the soil.

www.PapaCambridge.com 27 The diagram represents the arrangement of atoms in a molecule of a compound.





hydrogen atom

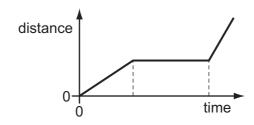
What is the molecular formula of the compound?

- A CH<sub>2</sub>
- $C_3H_6$
- $\mathbf{C}$   $C_3H_8$
- $C_6H_3$

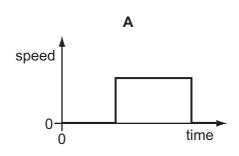
28 Which property of an object cannot be affected by applying a force?

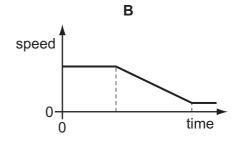
- direction of movement
- В mass
- C shape
- D speed

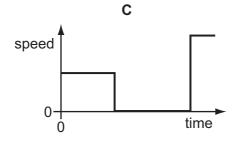
29 The diagram shows a distance/time graph for a journey.

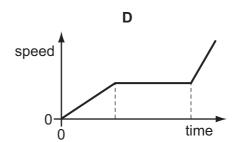


Which is the speed/time graph for this journey?









**30** A beaker of cool liquid stands in a warm room. The temperature of the liquid is fall molecules are escaping from the surface of the liquid.

Which row gives the name of this process, and also shows which molecules are escaping the liquid?

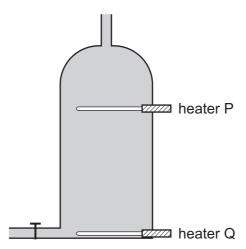
	name of process	molecules that are escaping
Α	condensation	least energetic
В	condensation	most energetic
С	evaporation	least energetic
D	evaporation	most energetic

31 Which row shows what happens to the temperature of a solid as it melts and what happens to the temperature of a liquid as it boils?

	temperature when a solid melts	temperature when a liquid boils				
Α	increases	increases				
В	increases	no change				
С	no change	increases				
D	no change	no change				

- **32** From which type of energy is electrical energy obtained in a hydroelectric power station?
  - A chemical energy
  - **B** gravitational energy
  - C nuclear energy
  - **D** strain energy

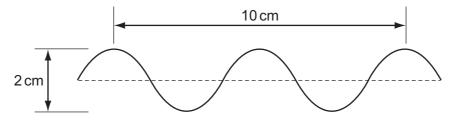
www.papaCambridge.com 33 A hot water tank is fitted with two identical heaters P and Q. Heater P is two thirds of the tank and heater Q is at the very bottom. The tank is full of cold water.



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

What happens to the tank of cold water if only heater P is switched on?

- All the water reaches 60 °C in less time than before.
- **B** All the water reaches 60 °C in the same time as before.
- The bottom two thirds of the water reaches 60 °C in two thirds of the original time. C
- D The top one third of the water reaches 60 °C in one third of the original time.
- **34** Which change to a sound wave would make it louder?
  - A decreasing the amplitude
  - **B** increasing the amplitude
  - C decreasing the wavelength
  - **D** increasing the wavelength
- **35** The diagram shows a wave.

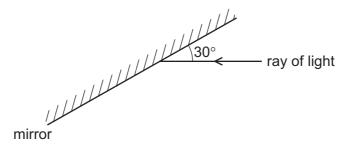


What is the amplitude of the wave?

- **A** 1 cm
- 2cm В
- 5cm
- 10 cm

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**36** A ray of light strikes a plane mirror.



What is the angle of reflection of the ray?

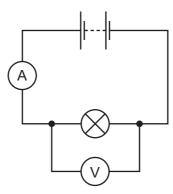
- **A** 150°
- **B** 90°
- **C** 60°
- **D** 30°

37 An electronic engineer wishes to make a remote controller to operate a television.

Which type of electromagnetic radiation must the remote controller emit?

- A infra-red waves
- **B** microwaves
- C radio waves
- **D** ultraviolet waves

38 The circuit shown is used to determine the resistance of a lamp.



The ammeter reading is 2.0 A and the voltmeter reading is 6.0 V.

What is the resistance of the lamp?

- **A**  $0.33\Omega$
- **B**  $3.0\Omega$
- $\mathbf{C}$  8.0  $\Omega$
- **D**  $12\Omega$

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The magnet is then turned around so that its poles have changed positions. The magnet is again brought near to the metal rod.

In both cases the metal rod is attracted to the magnet.

What could the metal rod be?

- A another bar magnet
- В a piece of aluminum
- C a piece of copper
- a piece of iron
- 40 Which row compares the number of protons and the number of neutrons in atoms of different isotopes of an element?

	number of protons	number of neutrons		
Α	different	different		
В	different	the same		
С	the same	different		
D	the same	the same		

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DATA SHEET
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	0	Helium	20 <b>Ne</b> Neon	40 <b>Ar</b> Argon	84 <b>Kr</b> , Krypton 36	131 <b>Xe</b> Xenon Xenon 54	Radon 86		175 <b>Lu</b> Lutetium 71	Lr Lawrencium 103	Candy
	IIA		19 Fluorine	35.5 <b>C1</b> Chlorine	80 <b>Br</b> Bromine 35	127 <b>T</b> lodine	At Astatine 85		173 <b>Yb</b> Ytterbium 70	Nobelium 102	Se Con
			16 Oxygen 8	32 <b>S</b> Sulfur 16	79 Selenium 34	128 <b>Te</b> Tellurium 52	Po Polonium 84		169 <b>Tm</b> Thulium 69	Md Mendelevium 101	
	>		14 <b>N</b> itrogen 7	31 <b>P</b> Phosphorus	75 <b>As</b> Arsenic 33	122 <b>Sb</b> Antimony 51	209 <b>Bi</b> Bismuth 83		167 <b>Er</b> Erbium 68	Fm Fermium 100	
	2		12 Carbon 6	28 <b>Si</b> Silicon	73 <b>Ge</b> Germanium 32	Sn Tin	207 <b>Pb</b> Lead		165 <b>Ho</b> Holmium 67	Essteinium 99	(r.t.p.).
	=		11 Boron 5	27 <b>A1</b> Auminum 13	70 <b>Ga</b> Gallium 31	115 <b>In</b> Indium	204 <b>T 1</b> Thallium 81		162 <b>Dy</b> Dysprosium 66	Californium	The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).
					65 <b>Zn</b> Zinc 30	112 <b>Cd</b> Cadmium 48	201 <b>Hg</b> Mercury 80		159 <b>Tb</b> Terbium 65	<b>Bk</b> Berkelium 97	ature and
					64 Copper 29	108 <b>Ag</b> Silver 47	197 <b>Au</b> Gold		157 <b>Gd</b> Gadolinium 64	Curium 96	n temper
Group					59 <b>N</b> ickel	106 <b>Pd</b> Palladium 46	195 <b>Pt</b> Platinum 78		152 <b>Eu</b> Europium 63	Am Americium 95	n³ at roor
Ģ					59 <b>Co</b> Cobalt	103 <b>Rh</b> Rhodium 45	192 <b>Ir</b> Iridium		Sm Samarium 62	<b>Pu</b> Plutonium	is is 24 dr
		T Hydrogen			56 Fe Iron	T01 <b>Ru</b> Ruthenium 44	190 <b>Os</b> Osmium 76		Pm Promethium 61	Np Neptunium 93	of any ga
					Mn Manganese 25	Tc Technetium 43	186 <b>Re</b> Rhenium 75		144 <b>Nd</b> Neodymium 60	238 <b>U</b> Uranium 92	one mole
					52 <b>Cr</b> Chromium 24	96 <b>Mo</b> Molybdenum 42	184 <b>W</b> Tungsten 74		Pr Praseodymium 59	<b>Pa</b> Protactinium 91	olume of c
					51 V Vanadium 23	93 <b>Nb</b> Niobium 41	181 <b>Ta</b> Tantalum 73		140 <b>Ce</b> Cerium	232 <b>Th</b> Thorium 90	The ×
					48 <b>Ti</b> Titanium	2r Zirconium 40	178 <b>Hf</b> Hafnium * 72			nic mass bol nic) number	
					Scandium	89 <b>&lt;</b> Yttrium 39	139 <b>La</b> Lanthanum s	Ac Actinium 189	series eries	a = relative atomic mass  X = atomic symbol b = proton (atomic) number	
	=		9 <b>Be</b> Beryllium	24 Mg Magnesium	40 <b>Ca</b> Calcium	Sr Strontium	137 <b>Ba</b> Barium 56	226 <b>Ra</b> Radium 88	*58-71 Lanthanoid series 190-103 Actinoid series	а <b>Х</b> Ф	
	_		7 Lithium	23 <b>Na</b> Sodium	39 K Potassium 19	Rb Rubidium	133 <b>CS</b> Caesium 55	Fr Francium 87	*58-71 Le	Key	

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