

CO-ORDINATED SCIENCES (DOUBLE) (US)

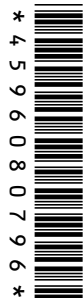
0442/13

Paper 1 Multiple Choice

May/June 2014

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, 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.

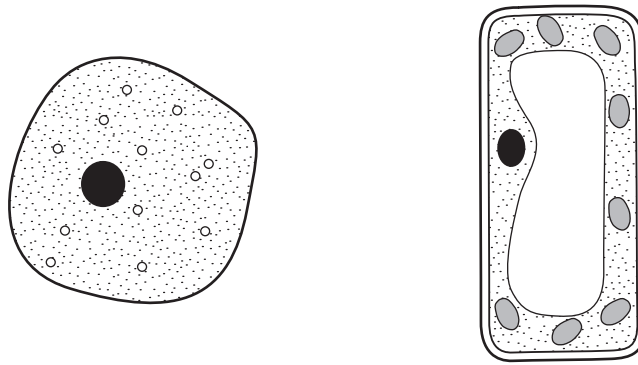
Any rough working should be done in this booklet.

A copy of the Periodic Table is printed on page 16.

Electronic calculators may be used.

This document consists of **15** printed pages and **1** blank page.

1 The diagram shows two different cells.



Which feature do they both have?

- A cell membrane
- B cell wall
- C central vacuole
- D chloroplasts

2 Which rows correctly match characteristics of living things with their descriptions?

	characteristic	description
1	excretion	removing the waste products of metabolism
2	growth	making more living things of the same type
3	nutrition	taking in or producing food
4	respiration	obtaining energy from food

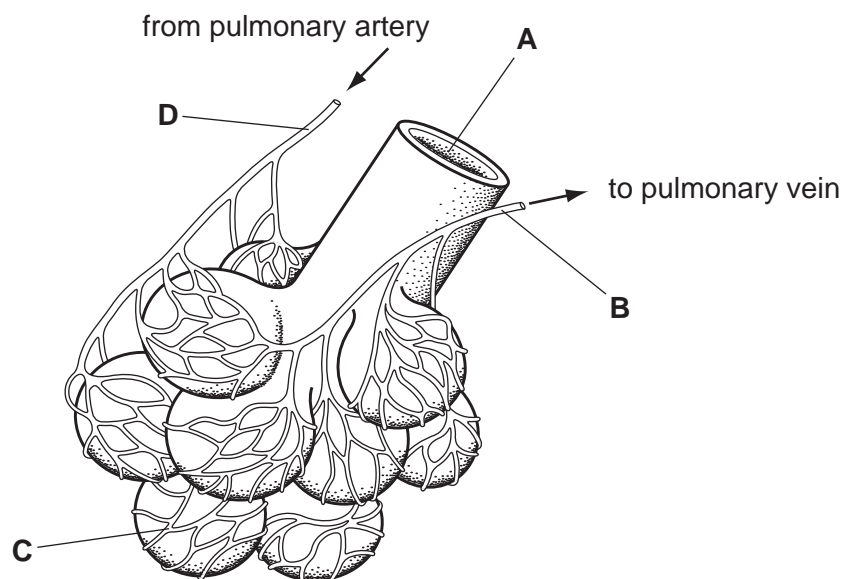
- A 1, 2 and 4      B 1, 3 and 4      C 1 and 3 only      D 2 and 4 only

3 A species of bacterium lives in acidic, hot springs at a temperature of 90°C.

Which conditions will best suit the enzymes of this bacterium?

- A 30°C and pH 4
- B 30°C and pH 9
- C 80°C and pH 4
- D 80°C and pH 9

- 4 Why are green plants called producers?
- A They can make oxygen from sunlight.
  - B They form organic nutrients from simple substances.
  - C They have cells containing chlorophyll.
  - D They produce starch from sugar.
- 5 In the maintenance of body temperature, which response does **not** need energy from respiration?
- A secretion of sweat
  - B shivering
  - C vasoconstriction
  - D vasodilation
- 6 How does oxygen pass from the alveoli to the blood capillaries in the lungs?
- A diffusion
  - B evaporation
  - C secretion
  - D transpiration
- 7 The diagram shows some of the structures in a human lung.  
Where is the oxygen concentration lowest?



8 A plant shoot grows towards a light source.

This an example of what?

- A geotropism
- B homeostasis
- C photosynthesis
- D phototropism

9 What is a function of adrenaline?

- A to increase the concentration of blood sugar
- B to raise the level of oxygen in the blood
- C to reduce the rate of heart beat
- D to remove urea from the blood

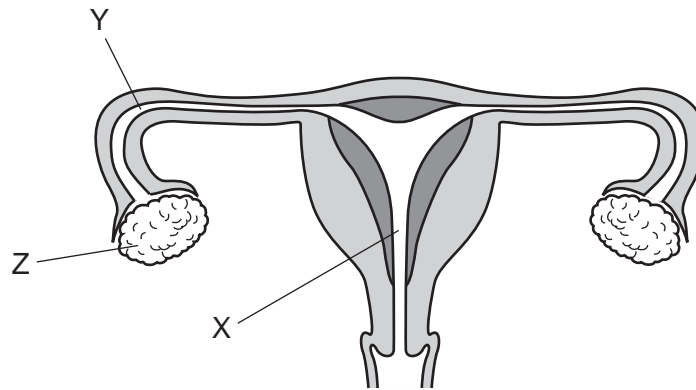
10 The diagram shows the flower of a pea plant and the fruit that develops from the flower after fertilization.



Which part of the flower becomes part X on the fruit?

- A ovary
  - B sepal
  - C stamen
  - D stigma
- 11 What is **not** produced by artificial selection?
- A bacteria with antibiotic resistance
  - B cows with high milk yield
  - C sheep with thick wool
  - D wheat with resistance to disease

12 The diagram shows the female reproductive system.



Which structures are the ovary and the oviduct?

	ovary	oviduct
<b>A</b>	X	Y
<b>B</b>	X	Z
<b>C</b>	Z	X
<b>D</b>	Z	Y

13 The diagram shows a food chain.

oak tree → insect → small bird → hawk

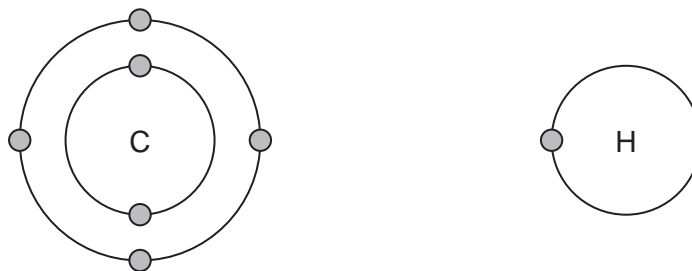
Which statement describes a member of this food chain?

- A** The oak tree is a consumer.
- B** The insect is a producer.
- C** The small bird is a consumer.
- D** The hawk is a producer.

14 Which process is used to separate the colored compounds in chlorophyll?

- A** chromatography
- B** distillation
- C** evaporation
- D** filtration

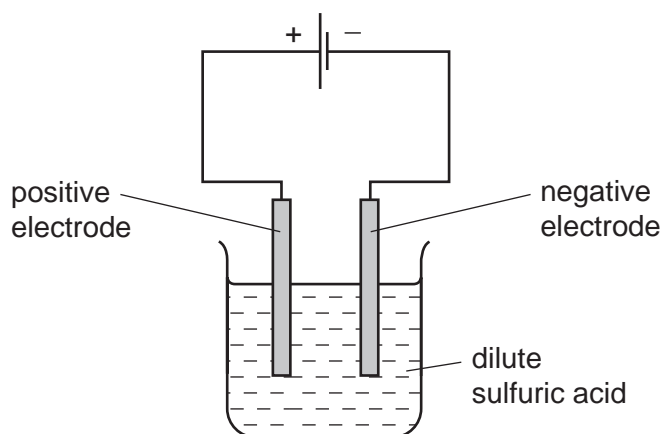
15 The diagram shows the electronic structures of carbon and hydrogen atoms.



What is the formula of the simplest compound formed between carbon and hydrogen?

- A** CH<sub>2</sub>      **B** CH<sub>4</sub>      **C** C<sub>2</sub>H      **D** C<sub>4</sub>H

16 When dilute sulfuric acid is electrolyzed each electrode gives off a different gas.



Which test identifies the gas given off at the positive electrode?

- A** Damp red litmus is bleached.  
**B** Damp red litmus turns blue.  
**C** A glowing splint relights.  
**D** A lighted splint burns with a squeaky pop.

17 Magnesium forms an ionic compound with chlorine.

Which row describes how the magnesium ion is formed and the formula of the magnesium ion?

	formation of the ion	formula of the ion
<b>A</b>	electron gain	Mg <sup>2+</sup>
<b>B</b>	electron gain	Mg <sup>2-</sup>
<b>C</b>	electron loss	Mg <sup>2+</sup>
<b>D</b>	electron loss	Mg <sup>2-</sup>

18 Marble (calcium carbonate) reacts with dilute hydrochloric acid.

1 g of powdered marble reacts faster with the same volume and concentration of acid than a 1 g lump of marble.

What is the reason for this observation?

- A The powder has a larger mass.
- B The powder has a larger surface area.
- C The powder has a smaller mass.
- D The powder has a smaller surface area.

19 A pupil wants to find out if the reaction of  $25\text{cm}^3$  of an acid with  $25\text{cm}^3$  of an alkali is exothermic.

Which two pieces of apparatus are needed?

- A balance and graduated cylinder
- B Bunsen burner and graduated cylinder
- C Bunsen burner and thermometer
- D thermometer and graduated cylinder

20 Some white anhydrous copper(II) sulfate powder is put into a beaker of water and stirred.

Which observation shows that the process is exothermic?

- A A blue solution forms.
- B A colorless solution forms.
- C The beaker feels cooler.
- D The beaker feels warmer.

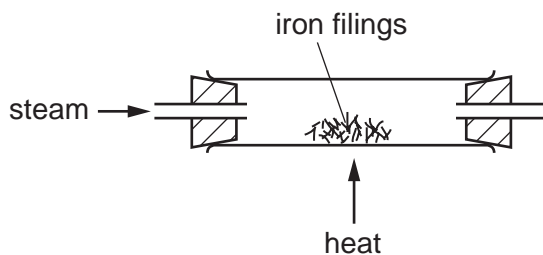
21 Hydrochloric acid is added to calcium carbonate.

Gas X, which turns limewater milky, is given off.

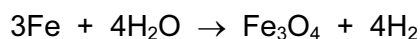
What is X?

- A carbon dioxide
- B chlorine
- C hydrogen
- D oxygen

- 22 When iron is heated with steam a black solid is formed.



The equation for the reaction is shown:



Which statement is correct for this reaction?

- A Iron has been oxidized because it has gained oxygen.
  - B Iron has been reduced because it removed oxygen from water.
  - C Iron oxide has been reduced because it contains oxygen.
  - D Water has been oxidized because it contains oxygen.
- 23 Calcium carbonate,  $\text{CaCO}_3$ , is decomposed by heating in an industrial process as shown:



Which statement is **not** correct?

- A The common name for calcium carbonate is limestone.
  - B The common name for  $\text{CaO}$  is lime.
  - C  $\text{CaO}$  is used to neutralize alkaline soil.
  - D  $\text{CaO}$  is used to neutralize industrial waste products.
- 24 Which row describes an element on the left of the Periodic Table and its oxide?

	type of oxide	type of element
A	acidic	metallic
B	acidic	nonmetallic
C	basic	metallic
D	basic	nonmetallic



25 Which Group I metal and which Group VII nonmetal react together most vigorously?

	Group I	Group VII
<b>A</b>	potassium	bromine
<b>B</b>	potassium	chlorine
<b>C</b>	sodium	bromine
<b>D</b>	sodium	chlorine

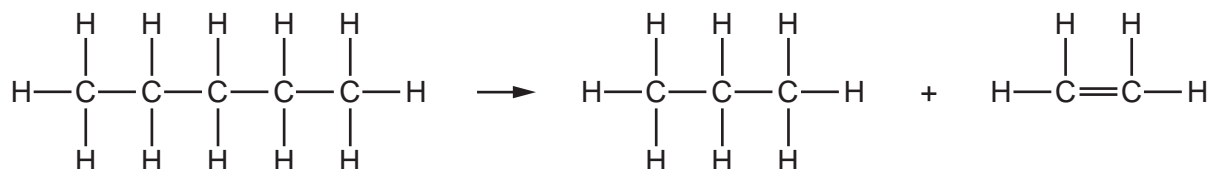
26 The main element present in coal is .....1..... .

When coal is .....2..... , an .....3..... gas that is harmful to trees is produced.

Which words correctly complete gaps 1, 2 and 3?

	1	2	3
<b>A</b>	carbon	burned	acidic
<b>B</b>	carbon	distilled	alkaline
<b>C</b>	nitrogen	reduced	acidic
<b>D</b>	sulfur	burned	alkaline

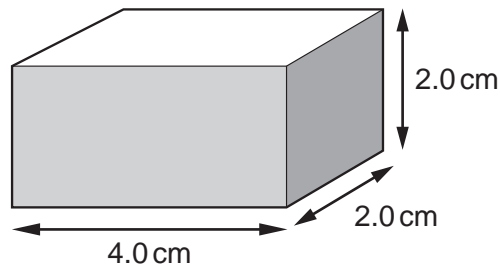
27 An alkane molecule undergoes the chemical change shown:



What is the name of the chemical change?

- A** cracking
- B** fractional distillation
- C** polymerization
- D** reduction

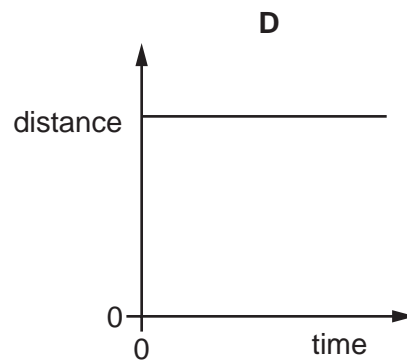
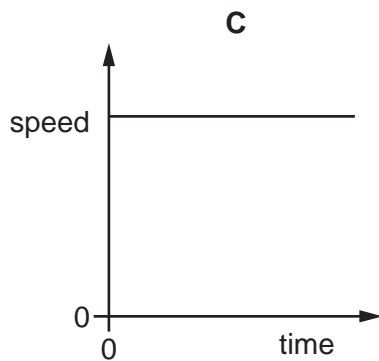
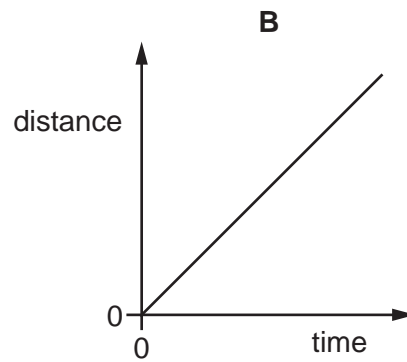
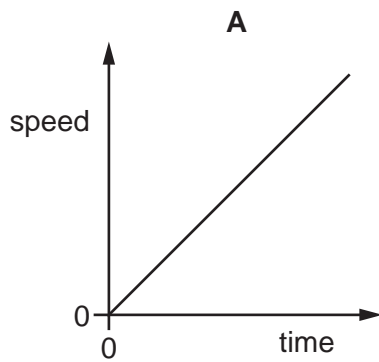
28 The rectangular block shown has a mass of 48 g.



What is the density of the block?

- A**  $0.17 \text{ g/cm}^3$     **B**  $0.33 \text{ g/cm}^3$     **C**  $3.0 \text{ g/cm}^3$     **D**  $6.0 \text{ g/cm}^3$

29 Which graph represents the motion of an object that is accelerating?



30 A person wearing wet clothes can feel cold even on a warm day.

Why does he feel cold?

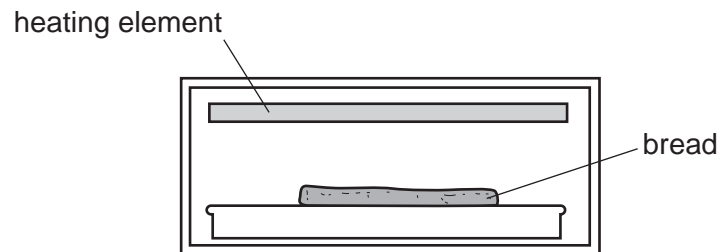
- A** Water gives out heat as it evaporates.  
**B** Water takes in heat as it evaporates.  
**C** Water vapor gives heat out as it condenses.  
**D** Water vapor takes heat in as it condenses.

31 The table lists four energy resources. For each resource it states if the energy resource was originally derived from the Sun's energy.

Which row contains an **error**?

	energy resource	derived from the Sun's energy
<b>A</b>	geothermal	no
<b>B</b>	hydroelectric	no
<b>C</b>	oil	yes
<b>D</b>	waves	yes

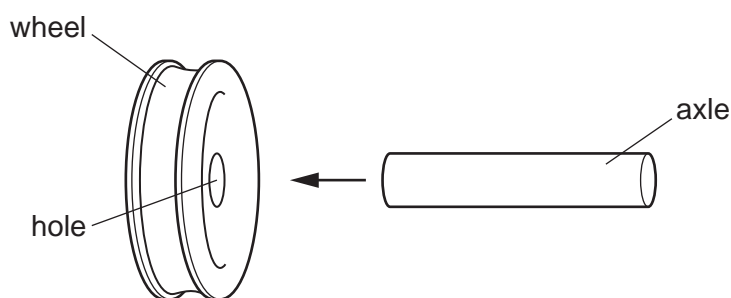
32 Bread can be cooked by placing it below a heating element.



Which process transfers thermal energy from the heating element to the bread?

- A** conduction
- B** convection
- C** evaporation
- D** radiation

- 33 A metal wheel has to be fitted to an axle made from the same metal. The axle is larger than the hole in the wheel.



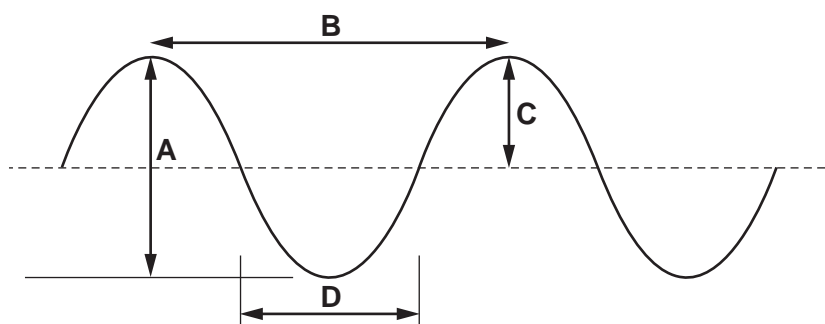
Which action could make it possible to fit the axle in the hole?

- A** cooling the axle only  
**B** cooling the axle and cooling the wheel by the same temperature change  
**C** heating the axle only  
**D** heating the axle and heating the wheel by the same temperature change
- 34 A short, loud sound is made in front of a tall building. An echo returns to the source of the sound 0.6 s later.

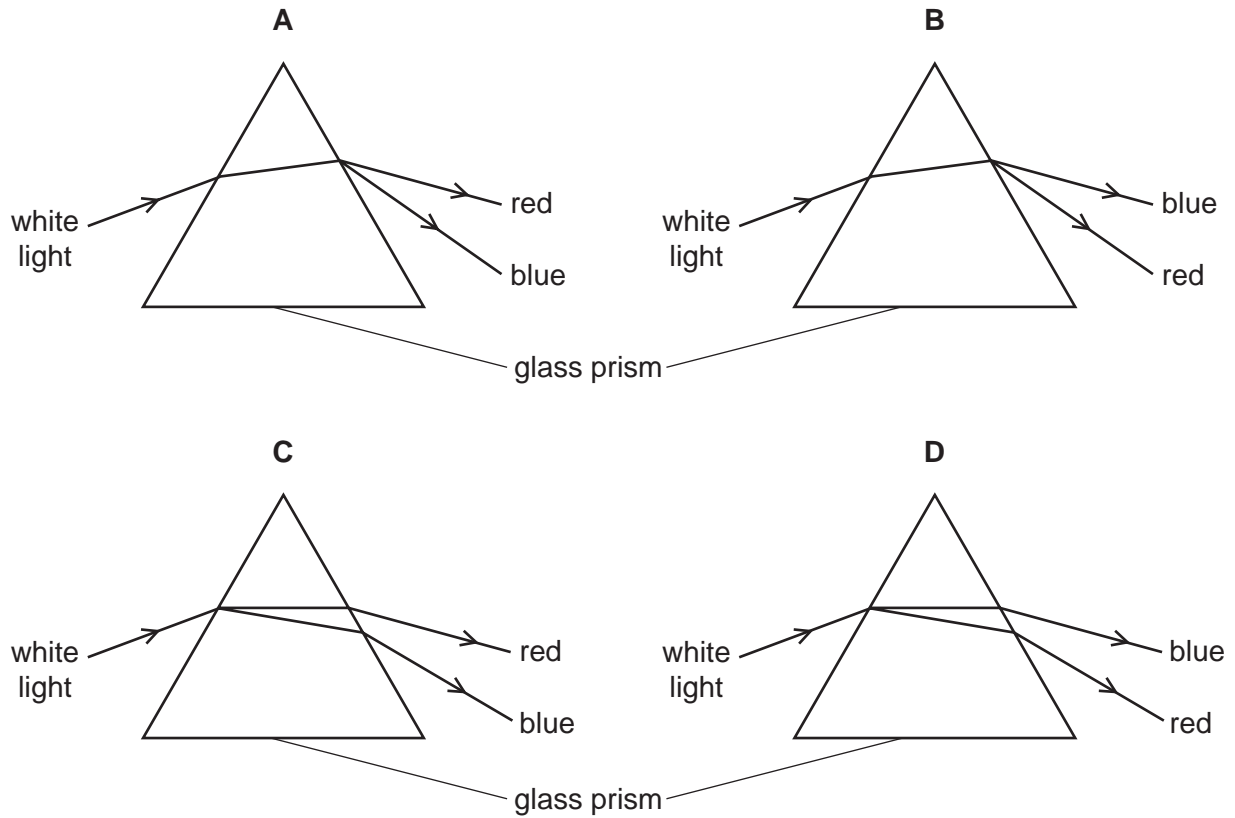
The speed of sound is 330 m/s.

How far away is the building from the source of the sound?

- A** 99 m      **B** 198 m      **C** 550 m      **D** 1100 m
- 35 Which distance on the diagram represents the amplitude of the wave?

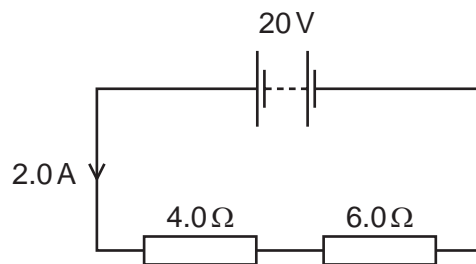


- 36 Which diagram shows the paths taken by the red light and by the blue light when a beam of white light enters a glass prism?



- 37 A 20V battery is connected in series with a  $4.0\Omega$  resistor and a  $6.0\Omega$  resistor.

The current in the circuit is 2.0A.

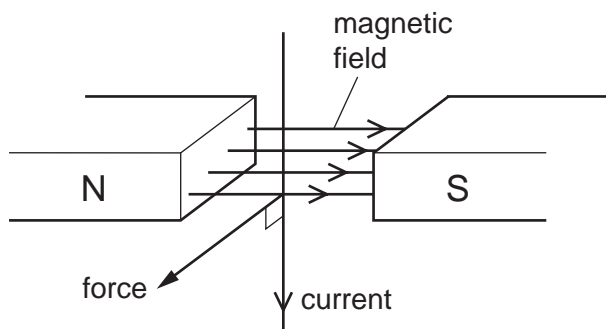


What is the potential difference across the  $6.0\Omega$  resistor?

- A 8.0V      B 10V      C 12V      D 20V

- 38 A wire in a magnetic field carries a current. The wire experiences a force due to the magnetic field.

The diagram shows the directions of the magnetic field, the current and the force.



The direction of the current and the direction of the magnetic field are both reversed.

In which direction does the force act now?

- A in the opposite direction from before the change
  - B in the same direction as before the change
  - C towards the north pole
  - D towards the south pole
- 39 A student believes that a certain steel bar is a magnet.

What shows that the bar is a magnet?

- A The bar attracts a copper rod.
  - B The bar is attracted by one end of another magnet.
  - C The bar is attracted by both ends of another magnet.
  - D The bar is repelled by one end of another magnet.
- 40 The table gives the nucleon number and the proton number of three atoms X, Y and Z.

	nucleon number	proton number
X	35	17
Y	37	17
Z	37	18

Which of these atoms are isotopes of the same element?

- A X and Y only
- B X and Z only
- C Y and Z only
- D X, Y and Z



**DATA SHEET**  
**The Periodic Table of the Elements**

		Group											
		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	
		1 <b>H</b> Hydrogen 1										4 <b>He</b> Helium 2	
7 <b>Li</b> Lithium 3	9 <b>Be</b> Beryllium 4											19 <b>F</b> Fluorine 9	
23 <b>Na</b> Sodium 11	24 <b>Mg</b> Magnesium 12	27 <b>Al</b> Aluminium 13	28 <b>Si</b> Silicon 14	31 <b>P</b> Phosphorus 15	32 <b>S</b> Sulfur 16	35.5 <b>Cl</b> Chlorine 17	40 <b>Ar</b> Argon 18						20 <b>Ne</b> Neon 10
39 <b>K</b> Potassium 19	40 <b>Ca</b> Calcium 20	70 <b>Ga</b> Gallium 31	73 <b>Ge</b> Germanium 32	75 <b>As</b> Arsenic 33	76 <b>Se</b> Selenium 34	79 <b>Br</b> Bromine 35	84 <b>Kr</b> Krypton 36						84 <b>Kr</b> Krypton 36
85 <b>Rb</b> Rubidium 37	88 <b>Sr</b> Strontium 38	115 <b>In</b> Indium 49	119 <b>Sn</b> Tin 50	122 <b>Sb</b> Antimony 51	126 <b>Te</b> Tellurium 52	127 <b>I</b> Iodine 53	131 <b>Xe</b> Xenon 54						131 <b>Xe</b> Xenon 54
133 <b>Cs</b> Caesium 55	137 <b>Ba</b> Barium 56	204 <b>Tl</b> Thallium 81	207 <b>Pb</b> Lead 82	209 <b>Bi</b> Bismuth 83	210 <b>Po</b> Polonium 84	210 <b>At</b> Astatine 85	210 <b>Rn</b> Radon 86						210 <b>Rn</b> Radon 86
226 <b>Ra</b> Radium 88	227 <b>Ac</b> Actinium 89											227 <b>Ac</b> Actinium 89	
*58-71 Lanthanoid series													
†90-103 Actinoid series													
140 <b>Ce</b> Cerium 58	141 <b>Pr</b> Praseodymium 59	144 <b>Nd</b> Neodymium 60	150 <b>Sm</b> Samarium 62	152 <b>Eu</b> Europium 63	157 <b>Gd</b> Gadolinium 64	162 <b>Dy</b> Dysprosium 66	165 <b>Ho</b> Holmium 67	167 <b>Er</b> Erbium 68	169 <b>Tm</b> Thulium 69	173 <b>Yb</b> Ytterbium 70	175 <b>Lu</b> Lutetium 71	175 <b>Lu</b> Lutetium 71	
232 <b>Th</b> Thorium 90	238 <b>U</b> Uranium 92	238 <b>Pa</b> Protactinium 91	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	
140 <b>Ce</b> Cerium 58	141 <b>Pr</b> Praseodymium 59	144 <b>Nd</b> Neodymium 60	150 <b>Sm</b> Samarium 62	152 <b>Eu</b> Europium 63	157 <b>Gd</b> Gadolinium 64	162 <b>Dy</b> Dysprosium 66	165 <b>Ho</b> Holmium 67	167 <b>Er</b> Erbium 68	169 <b>Tm</b> Thulium 69	173 <b>Yb</b> Ytterbium 70	175 <b>Lu</b> Lutetium 71	175 <b>Lu</b> Lutetium 71	
232 <b>Th</b> Thorium 90	238 <b>U</b> Uranium 92	238 <b>Pa</b> Protactinium 91	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	

Key

a	<b>X</b>	a = relative atomic mass
b	<b>X</b>	X = atomic symbol
	<b>X</b>	b = proton (atomic) number

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).

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