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5129/02

May/June 2008

2 hours 15 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.

Write in dark blue or black pen.

You may use a soft pencil for any diagrams, graphs or rough working.

Do not use staples, paper clips, highlighters, glue or correction fluid.

DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

A copy of the Periodic Table is printed on page 20.

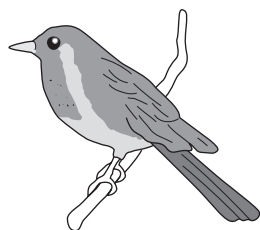
At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [] at the end of each question or part question.

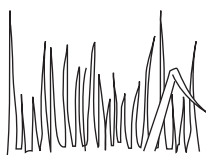
For Examiner's Use

This document consists of **19** printed pages and **1** blank page.

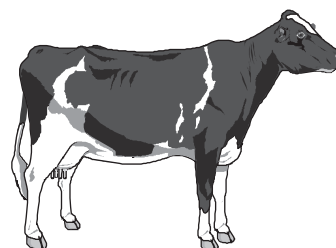
- 1 Fig. 1.1 shows some organisms in an ecosystem. They are not drawn to the same scale.



small bird



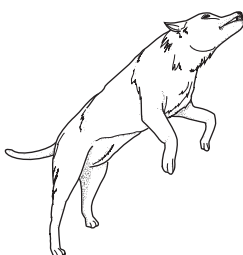
grass



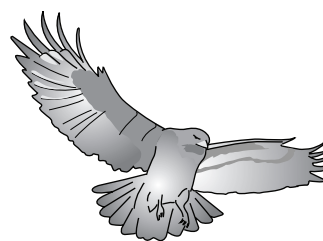
cow



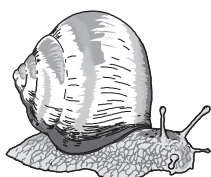
flower



wild dog



hawk



snail



rabbit



tree

Fig. 1.1

- (a) From Fig. 1.1 name

- (i) a producer,

.....[1]

- (ii) a herbivore.

.....[1]

(b) Choose organisms from Fig. 1.1 to complete this food chain.

1		2		3		4
grass	→		→	small bird	→	

[2]

(c) State the energy source for the food chain.

.....[1]

(d) State the essential type of organism **not** shown in the ecosystem.

.....[1]

(e) Suggest why a food chain rarely has more than five stages.

.....

[2]

2 The following is a list of metals.

aluminium	copper	iron
magnesium	potassium	zinc

Complete the sentences by choosing metals from the list.
 Each metal may be used once, more than once or not at all.

- (a) is used for electrical wiring in houses. [1]
- (b) reacts vigorously with water producing hydrogen. [1]
- (c) is extracted from haematite. [1]
- (d) does not react with dilute sulphuric acid. [1]
- (e) is used to galvanise iron to prevent it from rusting. [1]

- 3 Fig. 3.1 shows two resistors, **A** and **B**, connected in series. The resistance of **A** is $7.0\ \Omega$. The ammeter reads 0.20 A .

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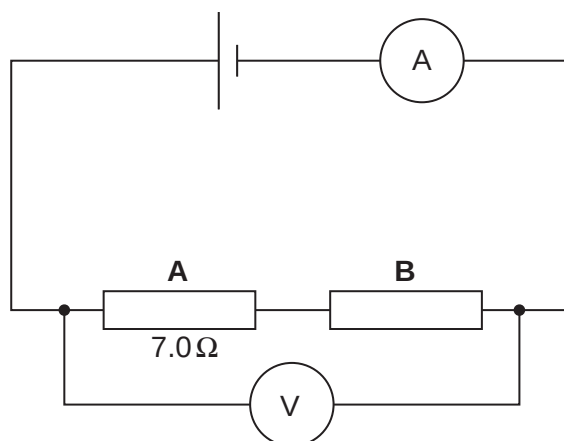


Fig. 3.1

(a) Calculate

- (i) the charge that passes through resistor **A** in 3.0 minutes,

charge = C [2]

- (ii) the potential difference across resistor **A**.

potential difference = V [2]

(b) The voltmeter reads 2.0 V .

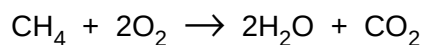
Calculate the potential difference across resistor **B**.

potential difference = V [1]

- 4 Methane is the main constituent of natural gas.
Methane burns in excess oxygen to form carbon dioxide and water.

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The equation for the reaction is



- (a) Describe a test to show that carbon dioxide is produced.

test

result[2]

- (b) (i) Calculate the relative molecular mass of

methane,

carbon dioxide.[2]

(A_r : C, 12; H, 1; O, 16.)

- (ii) Calculate the mass of carbon dioxide produced by burning 4g of methane.

mass = g [2]

- 5 Pieces of blue cobalt chloride paper are placed on the upper and lower surfaces of a plant leaf. They are held in place by glass slides as shown in Fig. 5.1.

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The plant is watered normally.

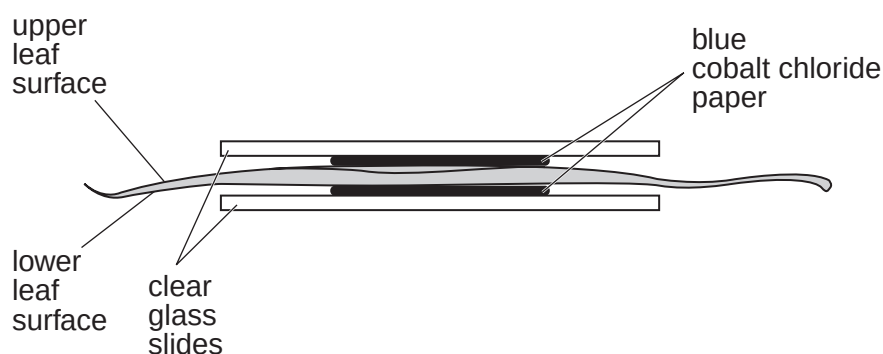


Fig. 5.1

Cobalt chloride paper is blue when dry and pink when it absorbs water.

- (a) Complete the table to show the colour of each piece of cobalt chloride paper after one hour.

	upper surface	lower surface
start	blue	blue
after one hour		

[1]

- (b) (i) Name the process by which water is lost from the leaf.

.....[1]

- (ii) State two ways in which the upper surface of a leaf differs from the lower surface, causing a difference in the rate of water loss.

1.

2.[2]

- (c) Name the cells through which most water enters a plant and also the process involved.

name of cells

process[2]

- 6 Fig. 6.1 shows apparatus used to investigate the reaction between copper(II) oxide and hydrogen.

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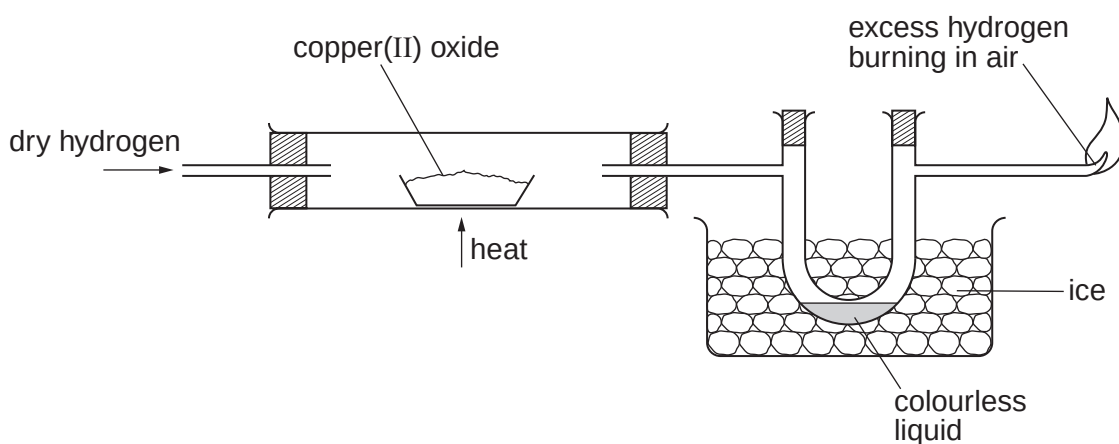
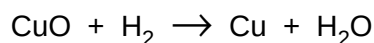


Fig. 6.1

The equation for the reaction is



- (a) What type of reaction does the copper(II) oxide undergo?

.....[1]

- (b) State two properties that show that copper is a metal.

property 1

property 2[2]

- (c) Suggest a test to prove that the colourless liquid is **pure** water.

.....
.....[1]

- 7 A free-fall parachutist jumps out of an aircraft. Fig. 7.1 shows how his **downward** velocity changes with time.

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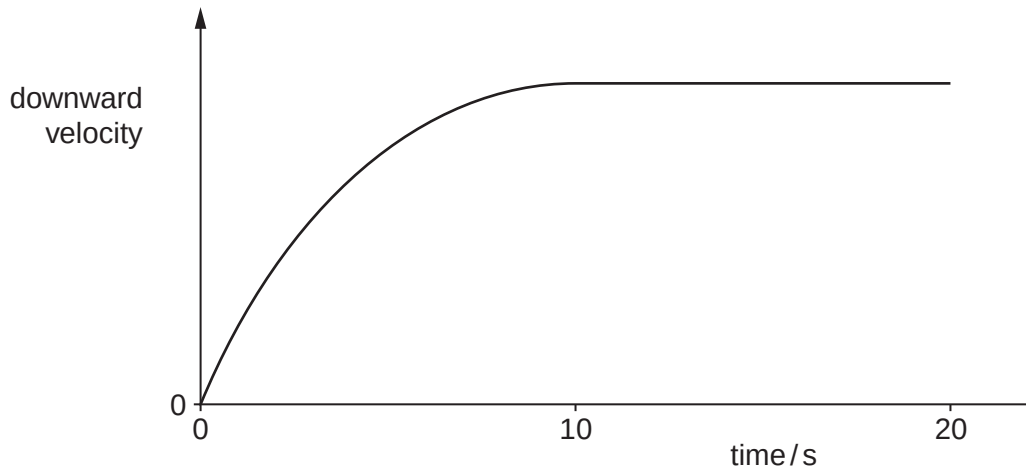


Fig. 7.1

(a) Name

(i) the downward force acting on the parachutist,[1]

(ii) the form of energy lost by the parachutist as he falls.[1]

(b) The parachutist accelerates during the first 10 seconds.

Explain how Fig. 7.1 shows that the acceleration is **not** constant.

.....
[1]

(c) The parachutist has a mass of 80 kg. At one point during his descent, the net downward force on him is 300 N.

Calculate his acceleration.

acceleration = [3]

8 Fig. 8.1 shows two similar metal cans.

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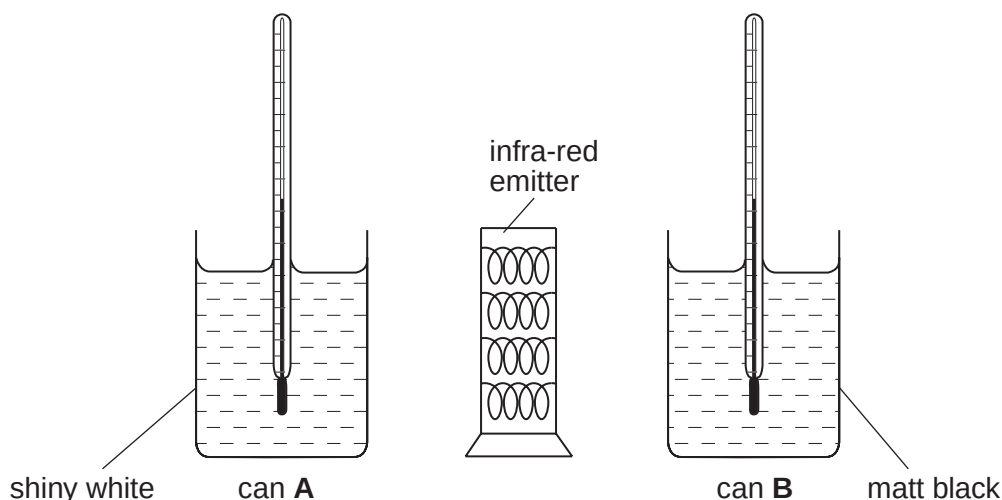


Fig. 8.1

Can **A** has a shiny white surface and can **B** has a matt black surface. Both cans contain equal masses of cold water at the same initial temperature. The cans are placed equal distances from a heater that emits infra-red radiation.

- (a) Explain why the temperature of the water begins to rise more quickly in can **B** than in can **A**.

.....
[1]

- (b) As the water in the cans is heated, the volume of the water increases.

State the change, if any, that occurs in

(i) its mass,[1]

(ii) its density.[1]

- (c) Infra-red radiation is one component of the electromagnetic spectrum.

Name **two** other components of the electromagnetic spectrum that have longer wavelengths than infra-red radiation.

..... and[2]

- 9 (a) Explain **two** ways in which chewing aids the process of digestion.

1.

.....

2.

.....[2]

- (b) Describe the function of the salivary glands in the process of digestion.

.....

.....

.....[2]

- (c) Complete the following sentences about dental hygiene.

When grow between teeth, they produce acid.

This acid attacks the teeth causing [2]

- 10 Hydrochloric acid, HCl , and sulphuric acid, H_2SO_4 , are strong acids.
Ethanoic acid, $\text{CH}_3\text{CO}_2\text{H}$, is a weak acid.

- (a) State the name of the ion that causes acidity.[1]

- (b) State the colour of the solution obtained when Universal Indicator is added to a solution of

(i) hydrochloric acid, [1]

(ii) ethanoic acid. [1]

- (c) Acids react with alkalis to form salts.

Magnesium sulphate is prepared by reacting magnesium metal with sulphuric acid.
Hydrogen is also produced in the reaction.

- (i) Write the equation for the reaction between magnesium and sulphuric acid.

.....[1]

- (ii) Suggest the names of **two** other substances that produce magnesium sulphate when they are added to sulphuric acid.

..... and[2]

- 11 Fig. 11.1 shows paint droplets sprayed from a paint gun.

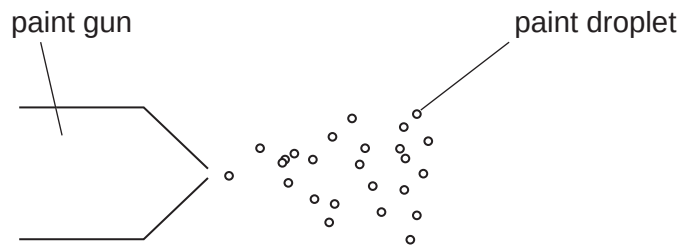


Fig. 11.1

Each droplet has a negative charge.

- (a) Explain why the paint droplets move away from each other.

.....
[1]

- (b) The paint droplets are attracted to a metal surface.

State whether the surface is uncharged, positively charged or negatively charged.

.....[1]

- 12 Fig. 12.1 lists some quantities that may be measured in physics experiments.

quantity measured	unit
frequency of a wave	
period of a pendulum	

Fig. 12.1

Complete the table by writing down the units in which each quantity could be measured. [2]

- 13 (a) The electronic structures of nitrogen and hydrogen are shown in Fig. 13.1.

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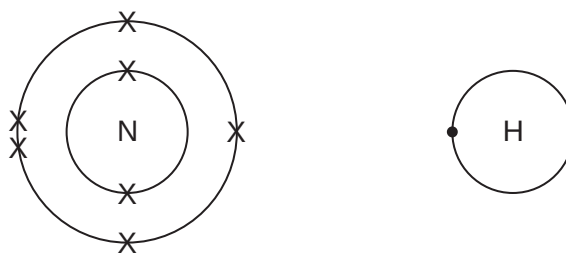


Fig. 13.1

Construct a dot and cross diagram to show the electronic arrangement in a molecule of ammonia.

[2]

- (b) Ammonia is manufactured from nitrogen and hydrogen using the Haber process. State the essential conditions for the Haber process.

temperature °C

pressure atm

catalyst

[3]

- (c) Ammonia is used to make the fertiliser ammonium sulphate. This contains nitrogen which is essential for the growth of plants. State the names of two **other** elements essential for the growth of plants.

..... and[2]

- 14 (a) Describe what is meant by the term *famine*.

.....
[1]

- (b) State and explain two ways by which famine may be caused.

1.

 2.

[4]

- 15 (a) Complete Fig. 15.1 to show how the voltage output of a simple a.c. generator changes with time. Show the voltage change for **two** complete rotations of the coil.



Fig. 15.1

[3]

- (b) State **one** way by which the maximum voltage output of an a.c. generator could be increased.

.....[1]

- 16** A uniform metre rule is placed on a knife edge so that it balances horizontally. A soft-iron rod of weight 0.10 N is hung at the 20 cm mark. The rule is balanced by placing a lead disc at the 70 cm mark, as shown in Fig. 16.1.

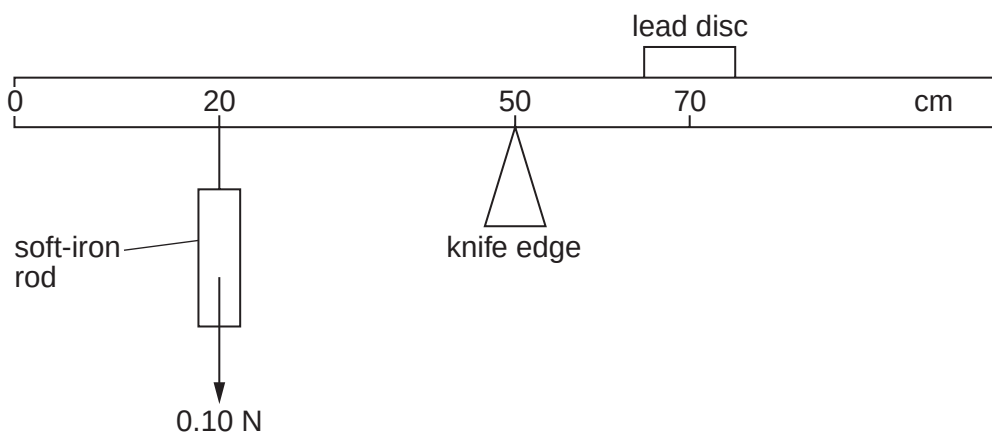


Fig. 16.1

- (a)** Calculate the weight of the lead disc.

weight = N [2]

- (b)** A magnet is held under the soft-iron rod.

Explain what will happen to the balanced metre rule.

.....

[2]

17 The electronic structure of aluminium is shown in Fig. 17.1.

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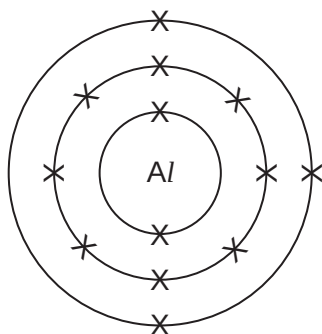


Fig. 17.1

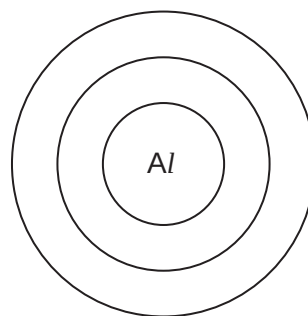


Fig. 17.2

(a) (i) Complete Fig. 17.2 to show the electronic structure of an aluminium **ion**. [1]

(ii) State the charge on the aluminium ion.[1]

(b) Using the electronic structure and the Periodic Table, explain why aluminium is a metal.

.....

[2]

(c) Aluminium is used to make food containers because it is resistant to corrosion.

Explain why aluminium is resistant to corrosion.

.....
[2]

18 Fig. 18.1 shows a germinating seed.

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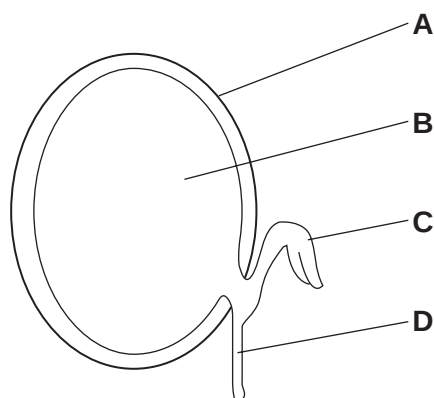


Fig. 18.1

(a) Name the parts labelled in Fig. 18.1.

A

B

C

D

[4]

(b) State three conditions that affect the germination of seeds.

1.

2.

3.[3]

- 19 Fig. 19.1 shows a measuring cylinder that contains some water.
Fig. 19.2 shows the same measuring cylinder with 50 metal spheres added.

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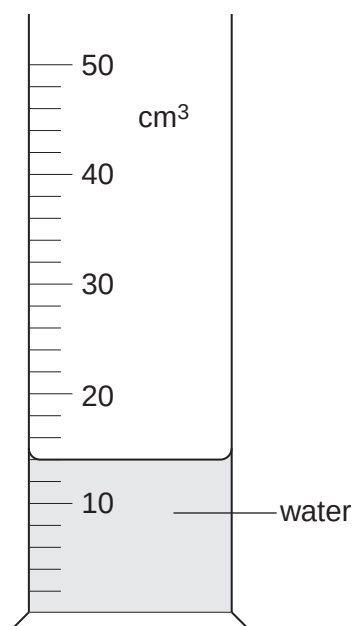


Fig. 19.1

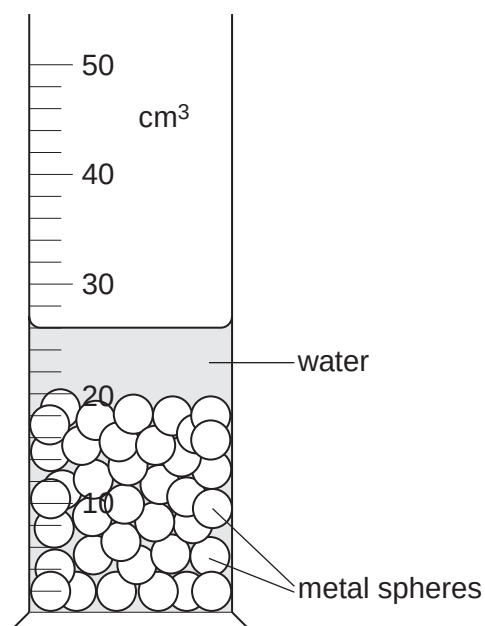


Fig. 19.2

Calculate

- (a) the volume of the 50 metal spheres,

volume = cm³ [2]

- (b) the volume of a single metal sphere.

volume = cm³ [1]

20 Fig. 20.1 shows an extension-load graph for a spring.

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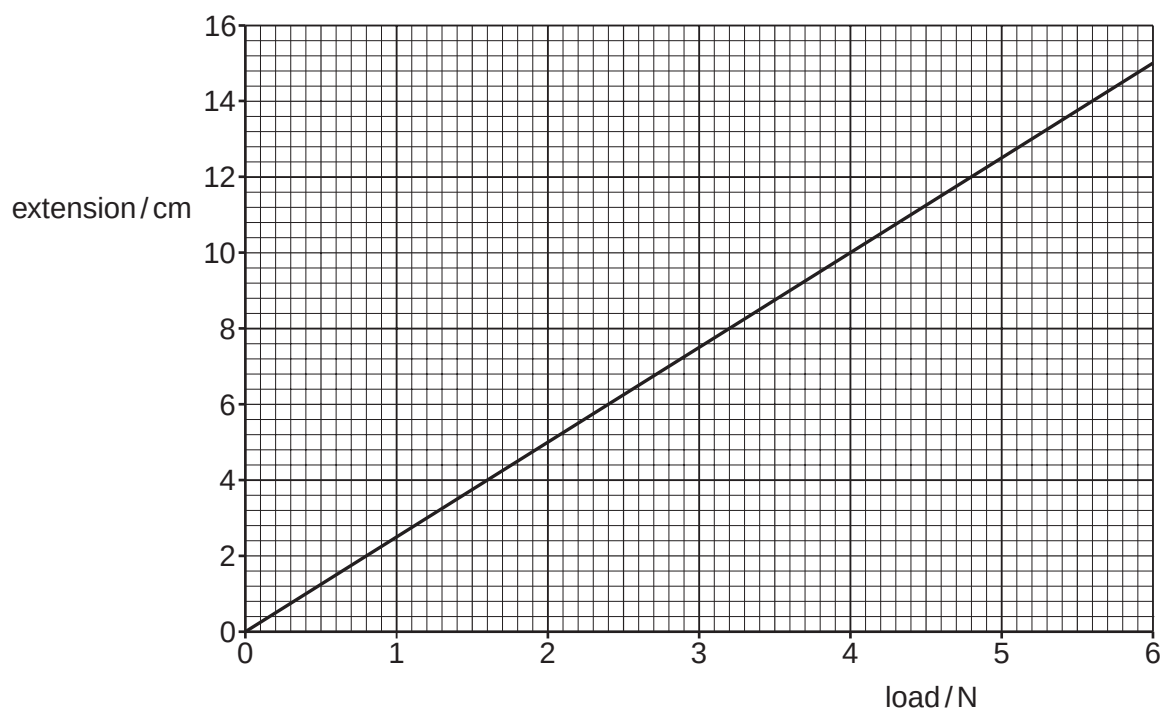


Fig. 20.1

(a) What is the extension for a load of 2.0 N?

..... cm [1]

(b) The length of the spring with no load is 20 cm.

What load gives the spring a total length of 30 cm?

load = N [2]

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DATA SHEET

The Periodic Table of the Elements

Group																			
I	II											III	IV	V	VI	VII	0		
		1H Hydrogen1																4He Helium2	
7Li Lithium3	9Be Beryllium4											11B Boron5	12C Carbon6	14N Nitrogen7	16O Oxygen8	19F Fluorine9	20Ne Neon10		
23Na Sodium11	24Mg Magnesium12											27Al Aluminium13	28Si Silicon14	31P Phosphorus15	32S Sulphur16	35.5Cl Chlorine17	40Ar Argon18		
39K Potassium19	40Ca Calcium20	45Sc Scandium21	48Ti Titanium22	51V Vanadium23	52Cr Chromium24	55Mn Manganese25	56Fe Iron26	59Co Cobalt27	59Ni Nickel28	64Cu Copper29	65Zn Zinc30	70Ga Gallium31	73Ge Germanium32	75As Arsenic33	79Se Selenium34	80Br Bromine35	84Kr Krypton36		
85Rb Rubidium37	88Sr Strontium38	89Y Yttrium39	91Zr Zirconium40	93Nb Niobium41	96Mo Molybdenum42	98Tc Technetium43	101Ru Ruthenium44	106Pd Palladium46	106Rh Rhodium45	108Ag Silver47	112Cd Cadmium48	115In Indium49	119Sn Tin50	122Sb Antimony51	128Te Tellurium52	127I Iodine53	131Xe Xenon54		
133Cs Caesium55	137Ba Barium56	139La Lanthanum57	178Hf Hafnium72	181Ta Tantalum73	184W Tungsten74	186Re Rhenium75	190Os Osmium76	195Pt Platinum78	192Ir Iridium77	197Au Gold79	201Hg Mercury80	204Tl Thallium81	207Pb Lead82	209Bi Bismuth83	210Po Polonium84	210At Astatine85	222Rn Radon86		
Fr Francium87	226Ra Radium88	227Ac Actinium89																	
58-71 Lanthanoid series †90-103 Actinoid series																			
		140Ce Cerium58	141Pr Praseodymium59	144Nd Neodymium60	150Sm Samarium62	152Eu Europium63	157Gd Gadolinium64	159Tb Terbium65	162Dy Dysprosium66	165Ho Holmium67	167Er Erbium68	169Tm Thulium69	173Yb Ytterbium70	175Lu Lutetium71					
		232Th Thorium90	238Pa Protactinium91	238U Uranium92	238Pu Plutonium94	238Am Americium95	238Cm Curium96	238Bk Berkelium97	238Cf Californium98	238Es Einsteinium99	238Fm Fermium100	238Md Mendelevium101	238No Nobelium102	238Lr Lawrencium103					
Key		aXb		a = relative atomic mass X = atomic symbol b = proton (atomic) number															

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).