UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

COMBINED SCIENCE **5129/02**

Paper 2 **October/November 2007**

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 ON 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 **18** printed pages and **2** blank pages.

1 Fig. 1.1 is a diagram of a mains plug with its cover removed. Component **P** has been labelled.

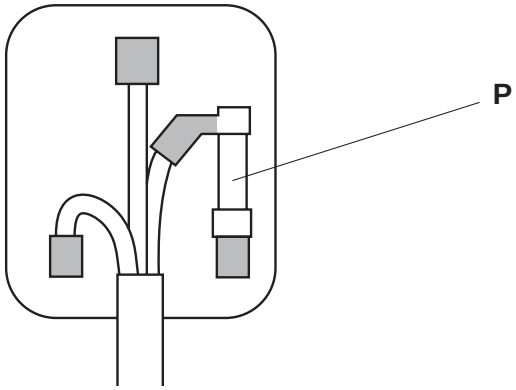

Fig. 1.1

(a) Name component **P**. ……. [1]

(b) State the colour of

(i) the earth wire, …….

(ii) the live wire. ……. [2]

2 Fig. 2.1 shows a vernier scale and a micrometer scale.

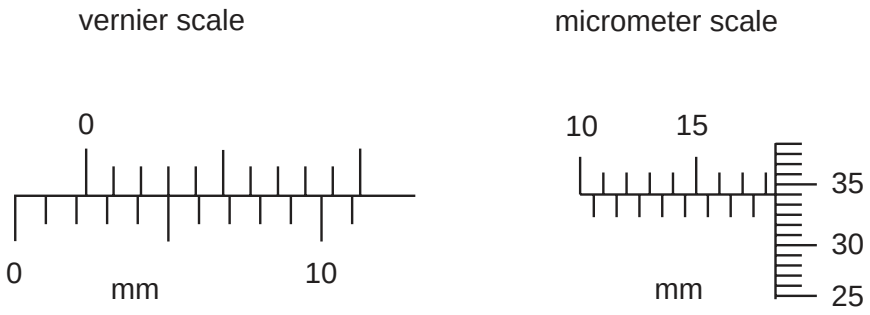

Fig. 2.1

(a) The vernier scale reads ……. mm. [1]

(b) The micrometer scale reads ……. mm. [1]

3 Fig. 3.1 shows some animal cells and Fig. 3.2 shows a plant cell, seen under a microscope.

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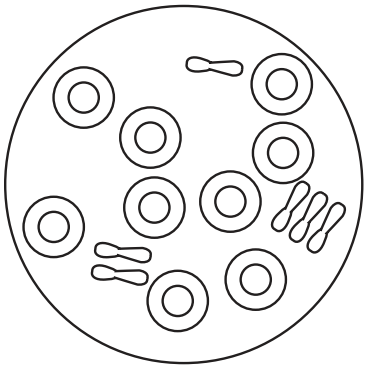


Fig. 3.1

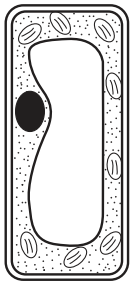


Fig. 3.2

(a) (i) The cells are placed in pure water.

Name the process, involving water movement, that is now likely to occur.

..... [1]

(ii) After 30 minutes, the animal cells have burst, but the plant cell has not.

Explain why.

.....

.....

..... [2]

(b) Fig. 3.1 shows red blood cells.

(i) What is the function of red blood cells?

.....

(ii) What do red cells contain that helps them to carry out this function?

..... [2]

4 Copper(II) sulphate crystals are made using the following method.

For Examiner's Use

One spatula measure of copper(II) carbonate is added to 20 cm^3 of dilute sulphuric acid. Once it has all reacted, further spatula measures are added until no more gas is given off. The reaction mixture is filtered. The filtrate is evaporated to about half its volume and then allowed to cool. The crystals are filtered off and dried.

(a) Name the gas given off in the reaction.

..... [1]

(b) **(i)** Explain why copper(II) carbonate is added until no more gas is given off.

.....

..... [1]

(ii) Explain why the reaction mixture is filtered.

.....

..... [1]

(iii) Explain why the filtrate is allowed to cool after being evaporated to half its volume.

.....

..... [1]

(c) State **one** substance, other than copper(II) carbonate, which can be added to sulphuric acid to make copper(II) sulphate crystals.

..... [1]

5 A metal cube has a mass of 0.05 kg.
On Earth, the gravitational field strength g = 10 N / kg.

For Examiner's Use

(a) Calculate the weight of the metal cube.

[2]

(b) Fig. 5.1 shows a stone and the metal cube on a balanced lever.

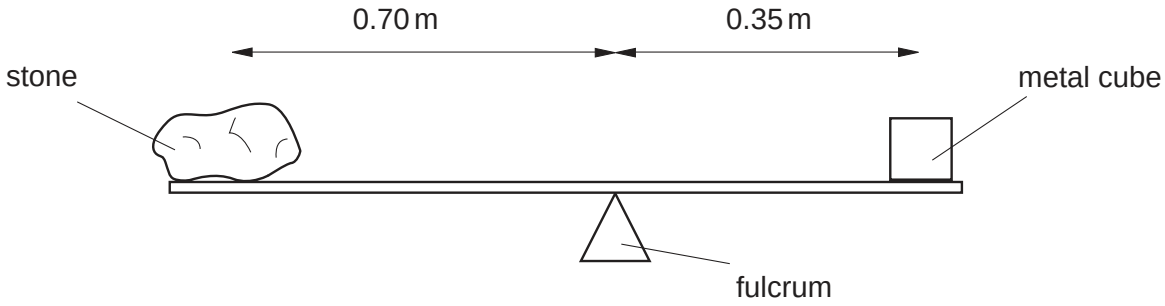


Fig. 5.1

The distance of the stone from the fulcrum (pivot) is 0.70 m.
The distance of the metal cube from the fulcrum is 0.35 m.

(i) State the principle of moments.

.....

..... [1]

(ii) Calculate the weight of the stone.

[2]

6 The decomposition of hydrogen peroxide, H_2O_2, produces oxygen.

(a) Complete the equation for the decomposition of hydrogen peroxide.

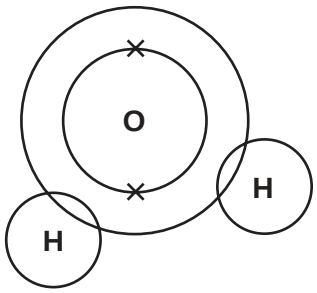
…… $H_2O_2 \longrightarrow$ …… $H_2O + O_2$ [1]

(b) Describe a test for oxygen.

test .....

result ..... [2]

(c) **(i)** Complete the diagram to show the arrangement of the electrons in a molecule of water.



[2]

(ii) State the type of bonding in a water molecule. …… [1]

7 **(a)** What product of protein digestion is transported to the liver?

..... [1]

(b) Suggest three uses for the products of protein digestion.

1. .....

2. .....

3. ..... [3]

(c) What happens in the liver to excess products of protein digestion?

.....

.....

..... [2]

8 The half-life of a radioactive source is 20 days.
Fig. 8.1 shows the initial activity (1000 emissions per second) and the activity after 60 days (120 emissions per second).

For Examiner's Use

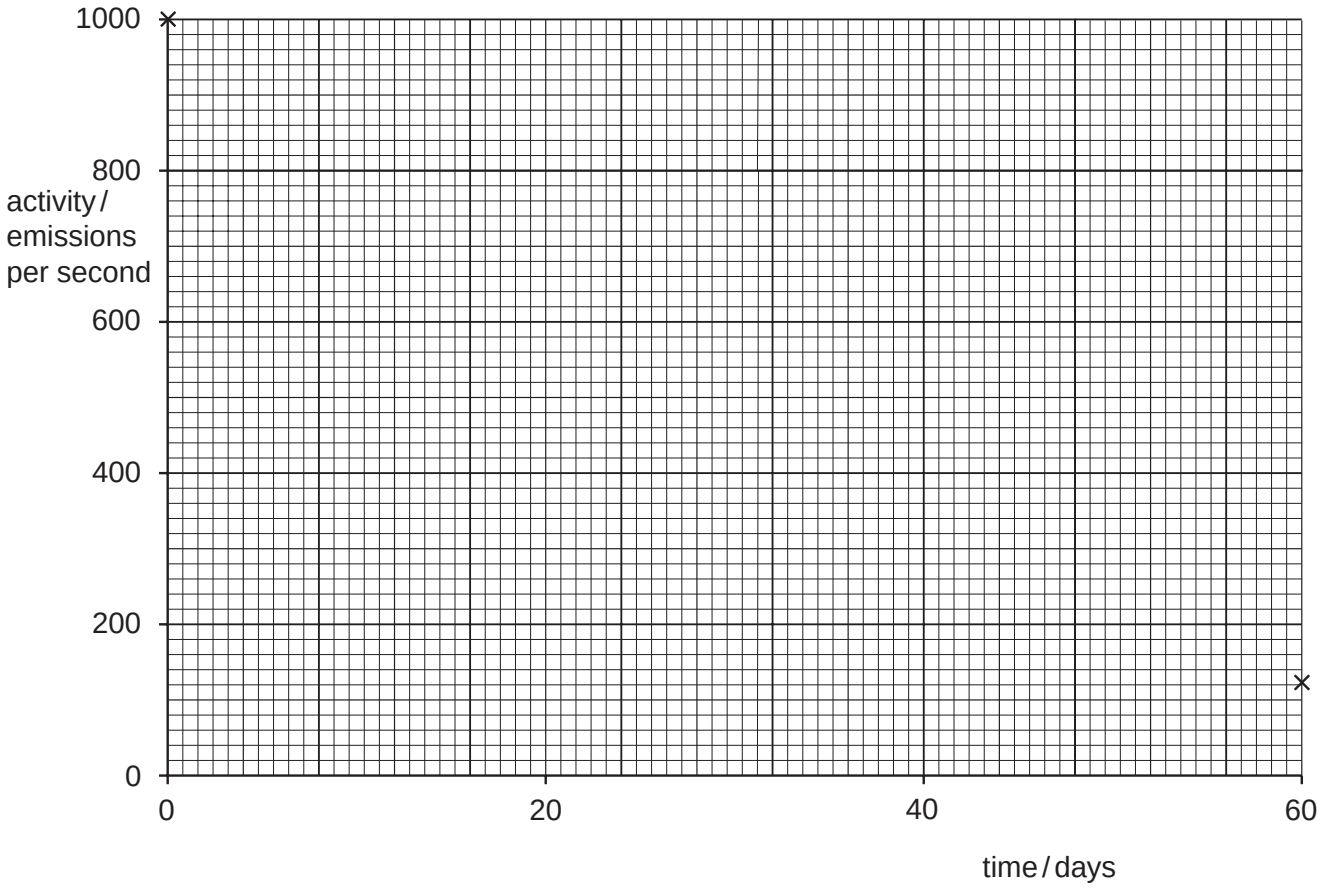


Fig. 8.1

(a) **(i)** On Fig. 8.1, plot points to show the activity after 20 days and after 40 days. [2]

(ii) Draw a line of best fit for the plotted points. [1]

(b) A radioactive source is used in a laboratory experiment by a student.

State two safety precautions that should be taken by the student.

1. .....

.....

2. .....

..... [2]

9 Fig. 9.1 shows the structure of an unsaturated hydrocarbon, ethene.

For Examiner's Use

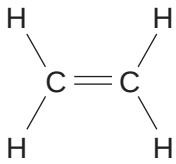


Fig. 9.1

(a) Explain the meaning of the terms

(i) *unsaturated,* .....

..... [1]

(ii) *hydrocarbon.* .....

.....

..... [2]

(b) Describe a test to show that ethene is unsaturated.

test .....

.....

result .....

..... [2]

(c) Ethene burns in excess oxygen to produce carbon dioxide and water.

Construct an equation for this reaction.

..... [2]

10 Fig. 10.1 shows a human eye seen from the front, at two different times.

For Examiner's Use

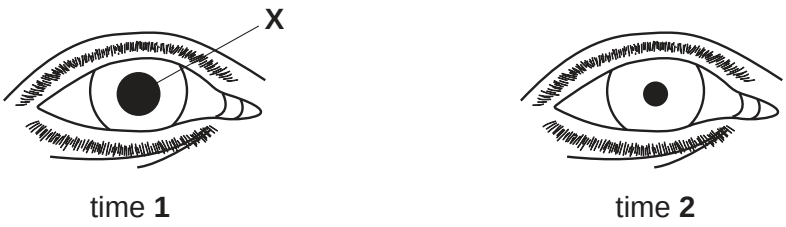


Fig. 10.1

(a) State the name of the part labelled **X**.

..... [1]

(b) **(i)** At time **2**, the part labelled **X** is smaller than at time **1**.

What is the effect of part **X** becoming smaller?

.....

..... [2]

(ii) State a change in the environment that will cause part **X** to become smaller.

..... [1]

(c) Fig. 10.2 shows a section through the eye.

For Examiner's Use

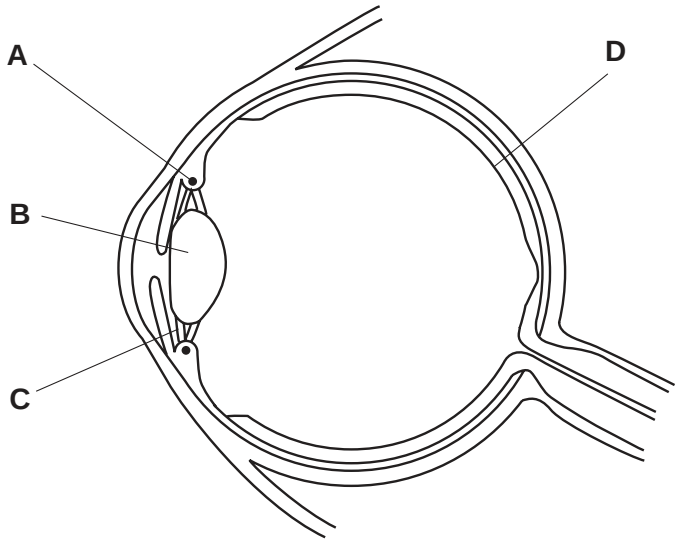


Fig. 10.2

(i) Name the parts labelled **A**, **B**, **C** and **D**.

A .....

B .....

C .....

D ..... [4]

(ii) State the changes that occur in the parts labelled **A** and **B** as the eye is focusing on a distant object.

A .....

.....

B .....

..... [2]

11 Fig. 11.1 shows a measuring cylinder that contains water.

For Examiner's Use

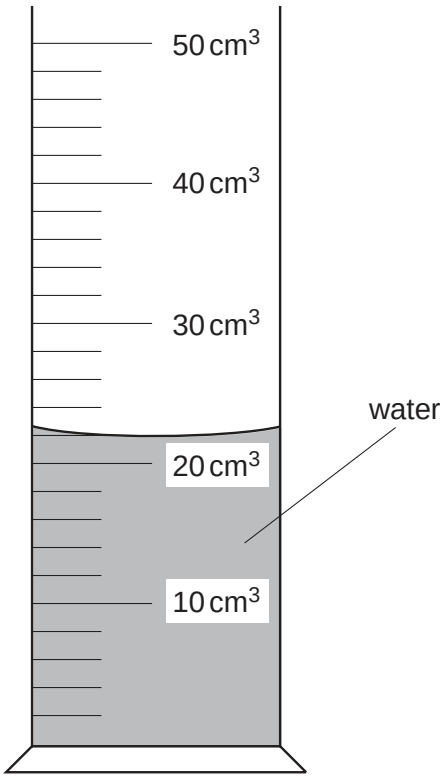


Fig. 11.1

(a) State the volume of water in the measuring cylinder. ..... cm^3 [1]

(b) A stone of volume 26 cm^3 is placed in the water in the measuring cylinder. The stone is completely below the surface of the water. The water rises to a new level.

(i) On Fig. 11.1, mark the new level of the water. [1]

(ii) The stone has a mass of 65 g.
Calculate the density of the stone.

density = ... [3]

12 When calcium carbonate is heated strongly, it decomposes to form calcium oxide and carbon dioxide.

The equation for the reaction is

$$CaCO_3 \longrightarrow CaO + CO_2$$

(a) Calculate the relative molecular mass of

(i) calcium carbonate, ……

(ii) calcium oxide. …… [2]

(b) Calculate the mass of calcium oxide produced from 5 g of calcium carbonate.

.....

..... [2]

(c) Explain why calcium carbonate is added to a blast furnace during the extraction of iron.

.....

.....

..... [2]

13 **(a)** Use words from the following list to complete the sentences below.
Each word may be used once, or not at all.

addictive **digestion** **drug** **enzyme**

hormone **liver** **reactions** **skin**

Alcohol is a …… that damages the …… .

It slows a person's …… and is …… .
[4]

(b) State two problems associated with the drug heroin.

1. .....

.....

2. .....

..... [2]

14 Fig. 14.1 shows a metal hot-water tank surrounded by insulation. Some connecting pipes are also shown.

For Examiner's Use

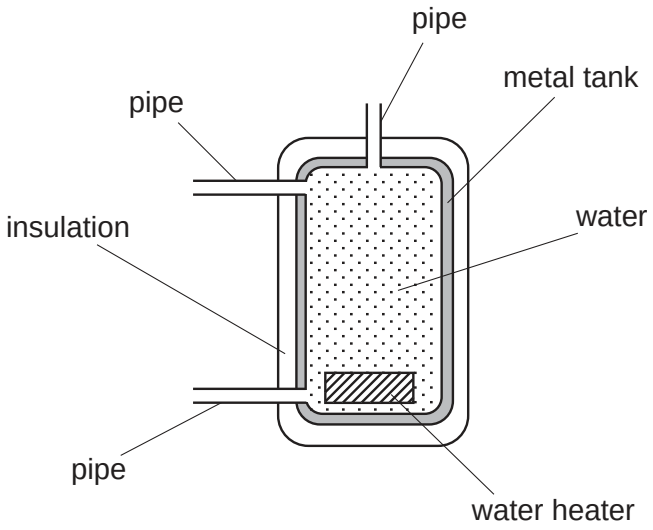


Fig. 14.1

(a) Heat can be transferred by conduction, convection or radiation.
State the main method by which heat is transferred

(i) through the metal of the tank, ……

(ii) through the water. …… [2]

(b) State the purpose of the insulation.

.....

..... [1]

(c) Some heat escapes and heats the surrounding air.

Explain, in detail, why heated air rises.

.....

.....

..... [2]

15 **(a)** Name the acid and the alkali reacted together to make ammonium sulphate.

acid .....

alkali ..... [2]

(b) Ammonium sulphate contains ammonium ions, NH_4^+, and sulphate ions, SO_4^{2-}.

Deduce the formula of ammonium sulphate. …… [1]

(c) A mixture of ammonium sulphate and calcium carbonate is used as a fertiliser.

(i) Name the element present in ammonium sulphate which makes it useful as a fertiliser.

..... [1]

(ii) Explain why calcium carbonate is used in the fertiliser.

.....

..... [2]

16 The following is a list of metals.

aluminium **copper** **iron** **sodium** **zinc**

Use the list to answer the following questions.

(a) Name the metal that is

(i) used for electrical wiring in a house, ……. [1]

(ii) extracted from haematite. ……. [1]

(b) Which two metals are used to make brass?

…….. and …….. [2]

17 Fig. 17.1 shows a pendulum in its highest position.

For Examiner's Use

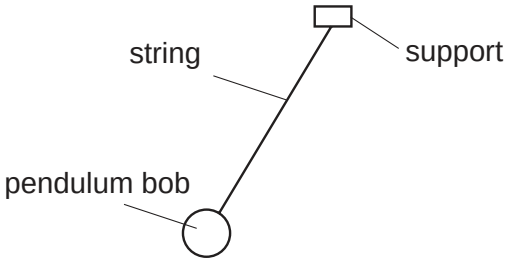
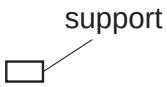


Fig. 17.1

(a) On Fig. 17.1, draw an arrow to show the direction of the force of gravity on the pendulum bob. [1]

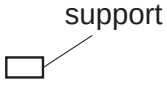
(b) In the space below, draw a diagram to show the position of the pendulum when it has the most kinetic energy.



[1]

(c) The period of the pendulum is 2.0 s. A student starts timing when the pendulum is in the position shown in Fig. 17.1.

In the space below, draw a diagram to show the position of the pendulum 5.0 s after the student starts timing.



[1]

18 Fig. 18.1 shows a vacuum flask containing germinating seeds and a thermometer.

For Examiner's Use

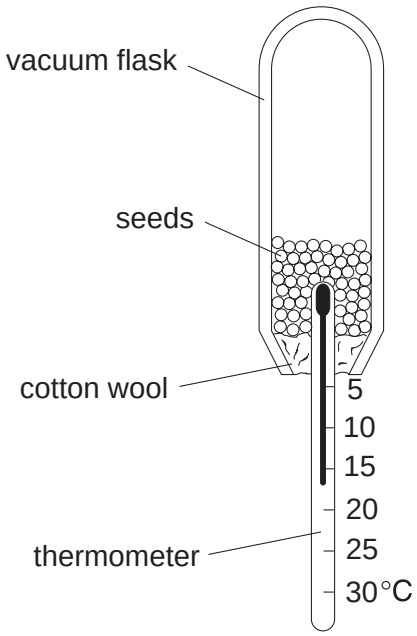


Fig. 18.1

(a) State three factors that are needed for the seeds to germinate.

1. .....

2. .....

3. ..... [3]

(b) During germination, aerobic respiration takes place.

(i) Write a word equation for aerobic respiration.

.....

..... [2]

(ii) The temperature in the flask rises.

Explain why.

.....

..... [1]

19 Fig. 19.1 shows a speed-time graph for a car.

For Examiner's Use

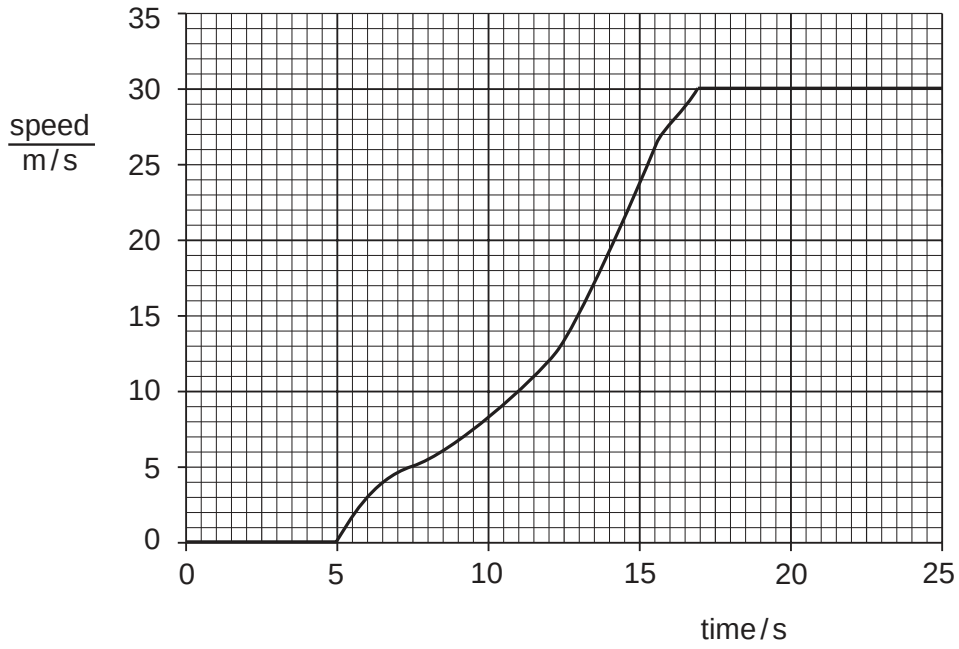


Fig. 19.1

(a) Complete the following sentences.

(i) The car is at rest from a time of ..... s to a time of ..... s.

(ii) It is accelerating from a time of ..... s to a time of ..... s. [2]

(b) The car travels around a circular track. When it is travelling with a constant speed it does not have a constant velocity.

Explain the difference between *speed* and *velocity*.

.....

..... [1]

(c) The car has a mass of 1200 kg.

Calculate, in newtons, the force needed to give the car an acceleration of 0.3 m/s^2.

[2]

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DATA SHEET
The Periodic Table of the Elements

Group																	
I	II										III	IV	V	VI	VII	0
							1 H Hydrogen 1									4 He Helium 2
7 Li Lithium 3	9 Be Beryllium 4										11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10
23 Na Sodium 11	24 Mg Magnesium 12										27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulphur 16	35.5 Cl Chlorine 17	40 Ar Argon 18
39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36
85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54
133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57 *	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	Po Polonium 84	At Astatine 85	Rn Radon 86
Fr Francium 87	226 Ra Radius 88	227 Ac Actinium 89 †															

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71
232 Th Thorium 90	Pa Protactinium 91	238 U Uranium 92	Np Neptunium 93	Pu Plutonium 94	Am Americium 95	Cm Curium 96	Bk Berkelium 97	Cf Californium 98	Es Einsteinium 99	Fm Fermium 100	Md Mendelevium 101	No Nobelium 102	Lr Lawrencium 103

*58-71 Lanthanoid series
†90-103 Actinoid series

Key

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

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