



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education Ordinary Level

CANDIDATE  
NAME

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**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**

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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.

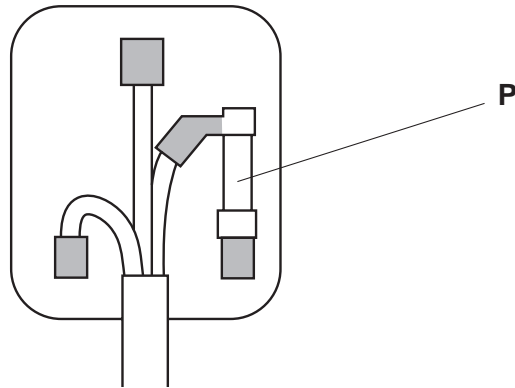


Fig. 1.1

- (a) Name component **P**. ..... [1]
- (b) State the colour of
- (i) the earth wire, ..... [1]
- (ii) the live wire. .... [2]

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

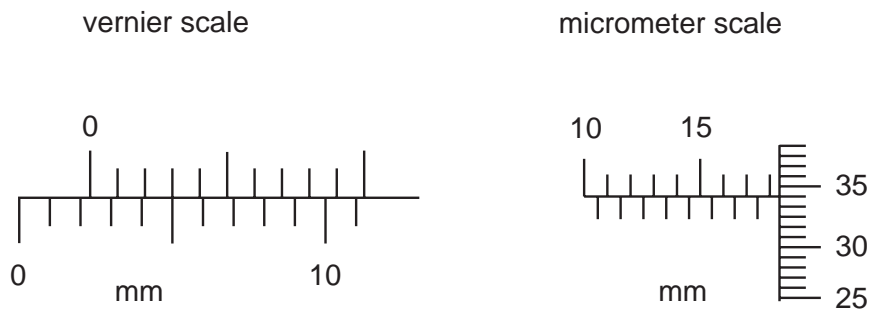


Fig. 2.1

- (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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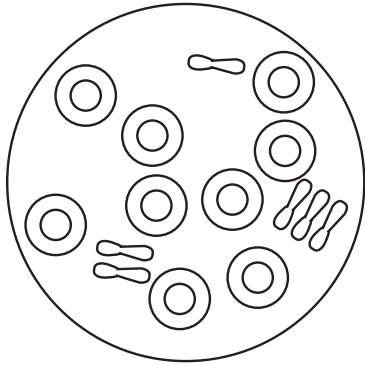


Fig. 3.1

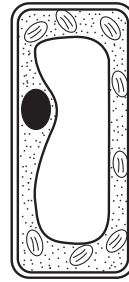


Fig. 3.2

(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.

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One spatula measure of copper(II) carbonate is added to 20 cm<sup>3</sup> 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.

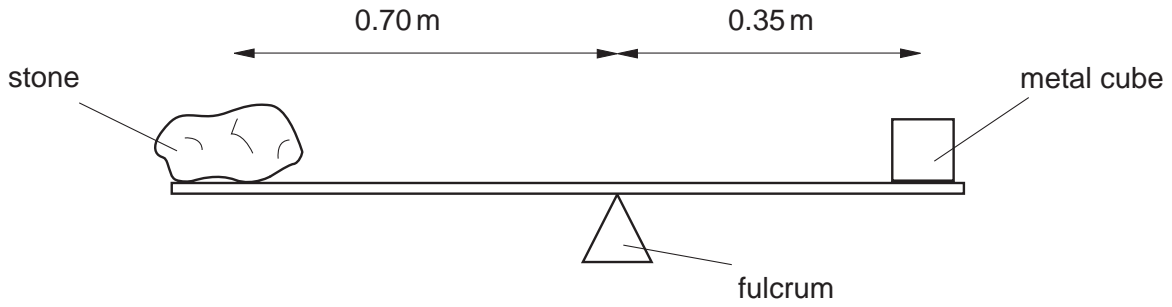
..... [1]

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

(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.

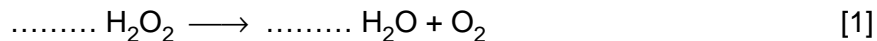
.....  
 ..... [1]

(ii) Calculate the weight of the stone.

[2]

6 The decomposition of hydrogen peroxide,  $\text{H}_2\text{O}_2$ , produces oxygen.

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

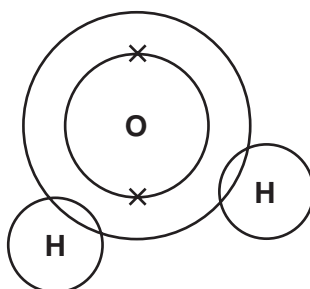


(b) Describe a test for oxygen.

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]

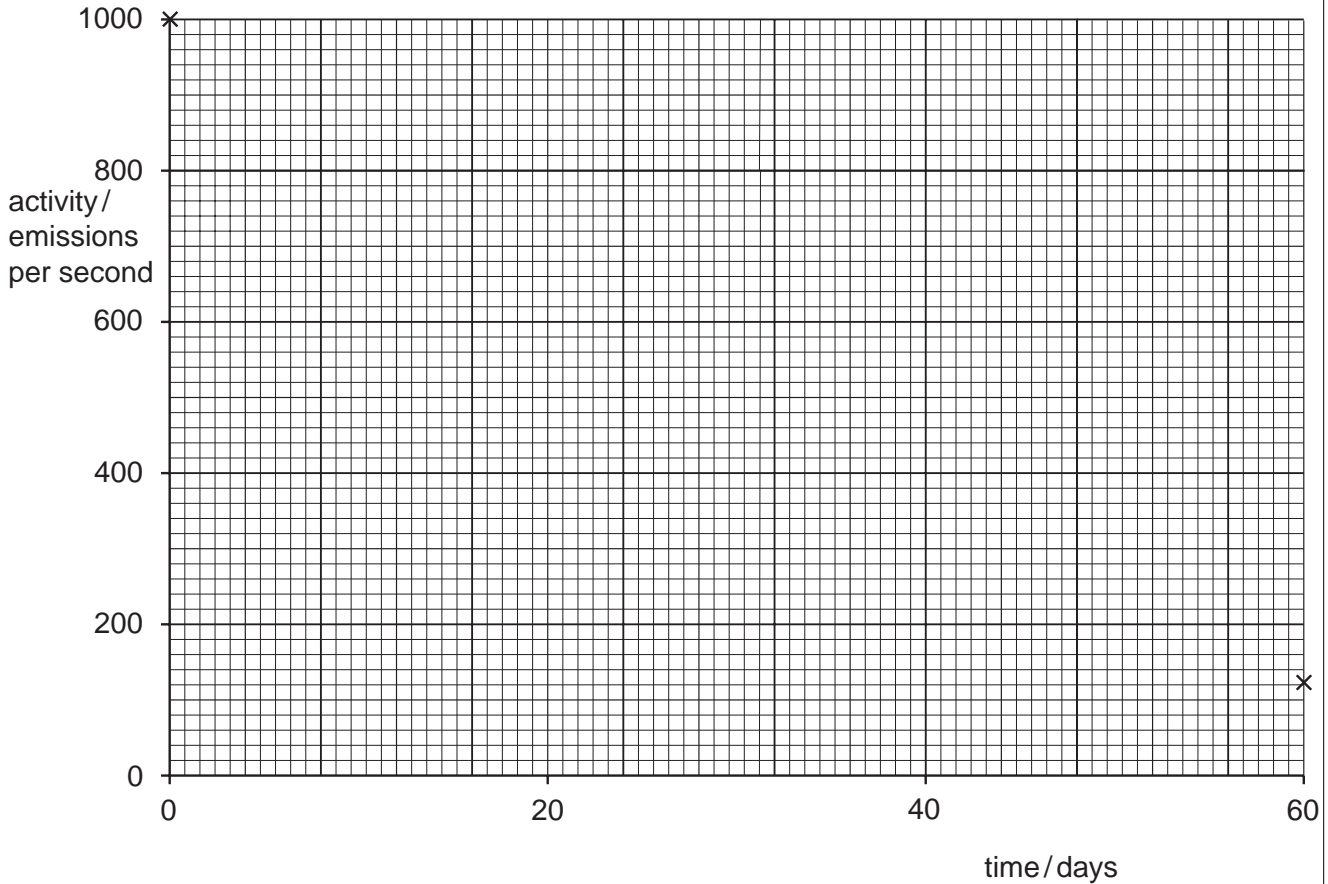
(c) What happens in the liver to excess products of protein digestion?

.....

.....

..... [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).



**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.

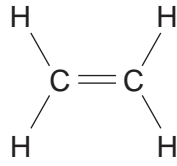


Fig. 9.1

- (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.

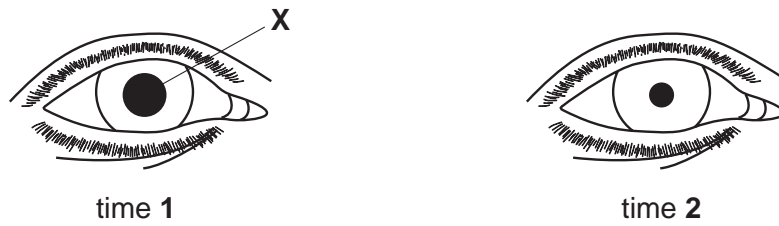


Fig. 10.1

(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.

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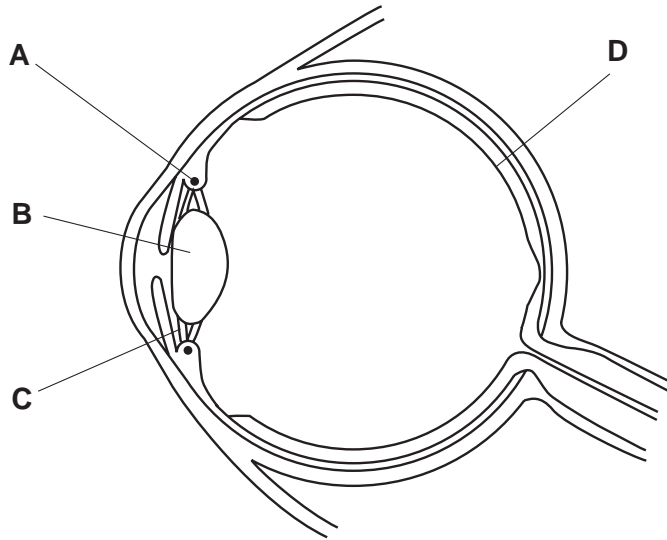


Fig. 10.2

(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.

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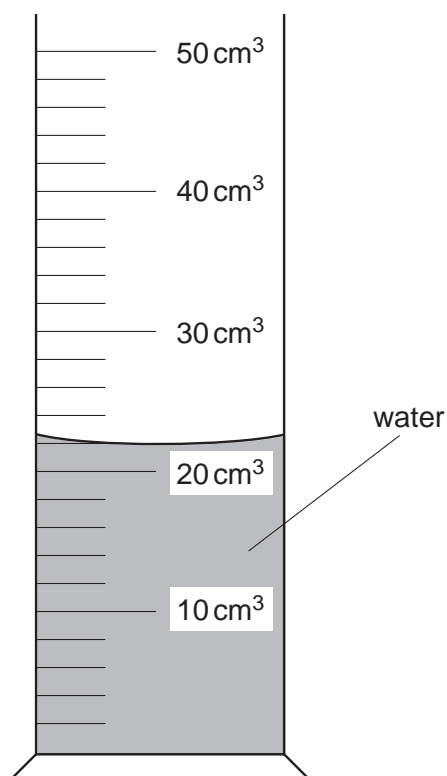


Fig. 11.1

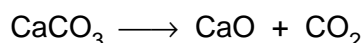
- (a) State the volume of water in the measuring cylinder. .... cm<sup>3</sup> [1]
- (b) A stone of volume 26 cm<sup>3</sup> is placed in the water in the measuring cylinder. The stone is completely below the surface of the water. The water rises to a new level.
- (i) On Fig. 11.1, mark the new level 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.

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The equation for the reaction is



- (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.

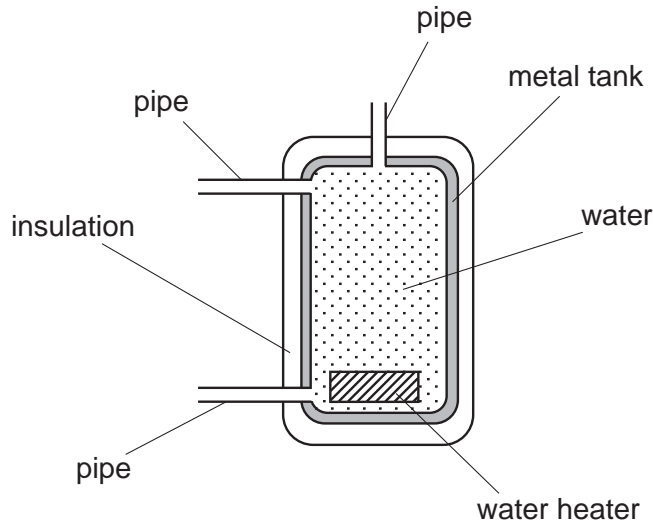


Fig. 14.1

(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,  $\text{NH}_4^+$ , and sulphate ions,  $\text{SO}_4^{2-}$ .

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

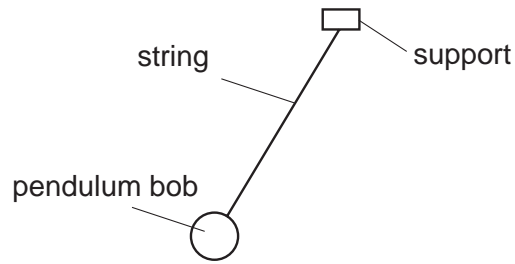
(i) used for electrical wiring in a house, ..... [1]

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

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

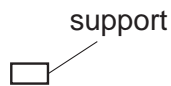
..... and ..... [2]

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



**Fig. 17.1**

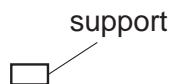
- (a) On Fig. 17.1, draw an arrow to show the direction of the force of gravity on the pendulum bob. [1]
- (b) In the space below, draw a diagram to show the position of the pendulum when it has the most kinetic energy.



[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.

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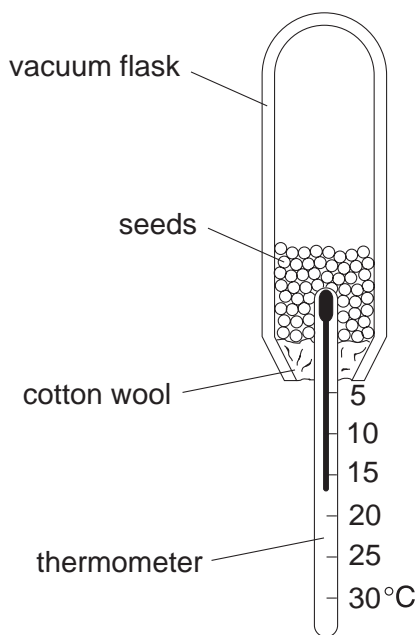


Fig. 18.1

(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.

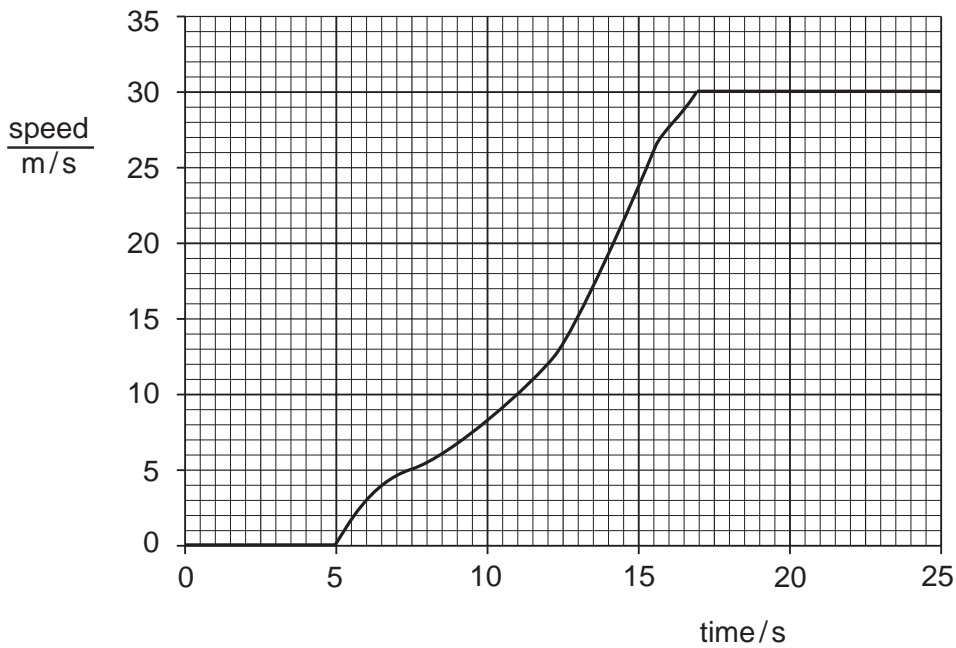


Fig. 19.1

(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  $0.3 \text{ m/s}^2$ .

[2]



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

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		39 <b>K</b> Potassium 19	40 <b>Ca</b> Calcium 20	45 <b>Sc</b> Scandium 21	48 <b>Ti</b> Titanium 22	51 <b>V</b> Vanadium 23	52 <b>Cr</b> Chromium 24	55 <b>Mn</b> Manganese 25	56 <b>Fe</b> Iron 26	59 <b>Co</b> Cobalt 27	59 <b>Ni</b> Nickel 28	64 <b>Cu</b> Copper 29	65 <b>Zn</b> Zinc 30	70 <b>Ga</b> Gallium 31	73 <b>Ge</b> Germanium 32	75 <b>As</b> Arsenic 33	79 <b>Se</b> Selenium 34	80 <b>Br</b> Bromine 35	84 <b>Kr</b> Krypton 36																																																																																																																																																																														
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\*58-71 Lanthanoid series  
†90-103 Actinoid series

**Key**

a	X
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a = relative atomic mass  
X = atomic symbol  
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.).