Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

6437538466

PHYSICS **0625/31**

Paper 3 Theory (Core) **May/June 2016**

1 hour 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 an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.
Take the weight of 1.0 kg to be 10 N (acceleration of free fall = 10 m/s^2).

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.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

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

1 Fig. 1.1 shows part of the speed-time graphs for a cyclist and for a runner.

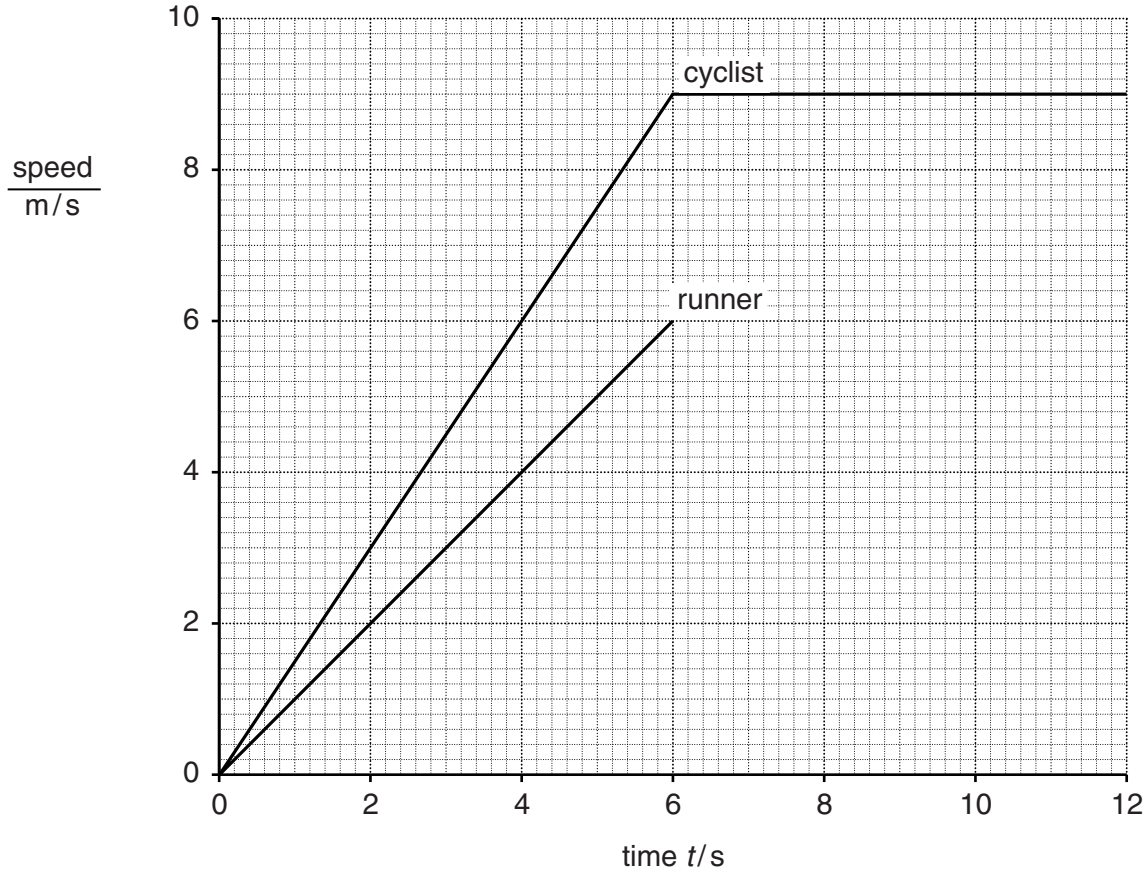

Fig. 1.1

(a) Compare the motion of the cyclist and the runner during the first 6 seconds. Explain your answer.

.....

.....

.....

.....[3]

(b) Describe the motion of the cyclist between time $t = 6.0\,s$ and time $t = 12.0\,s$.

.....[1]

(c) Calculate the total distance travelled by the cyclist between $t = 0$ and $t = 12.0\,s$.

distance travelled = ... m [4]

(d) After the first 6.0 seconds, the runner moves at constant speed for 4.0 seconds. He then slows down uniformly and stops in a further 2.0 seconds.

On Fig. 1.1, complete the graph for the runner's motion. [2]

[Total: 10]

2 A boy steps off a high board into a swimming pool.

Fig. 2.1 shows the forces acting on the boy at one point in his fall.

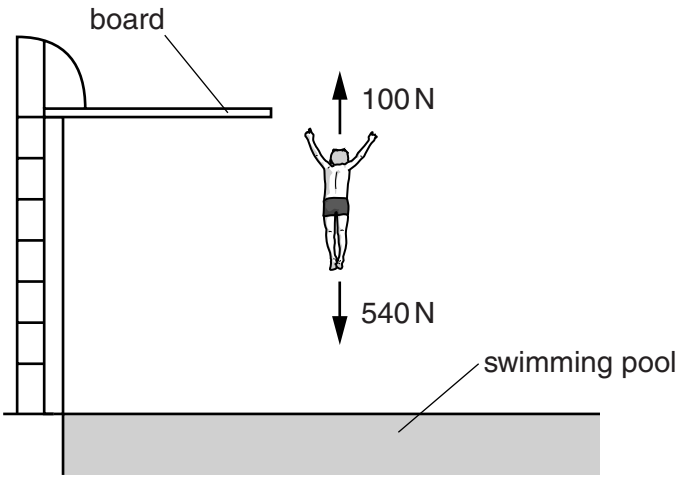

Fig. 2.1

(a) The 540 N force is caused by gravitational attraction.

State the cause of the 100 N force.

.....[1]

(b) Calculate the mass of the boy.

mass of boy = ... kg [2]

(c) Calculate the resultant force on the boy. State its direction.

resultant force = ... N

direction = ...
[2]

[Total: 5]

3 Fig. 3.1 shows a metal plate-warmer.

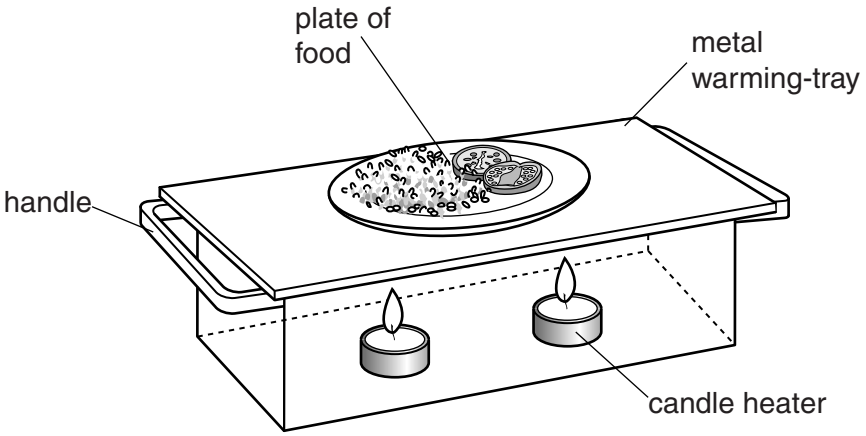

Fig. 3.1

The plate-warmer contains two small candle heaters. Plates of food are placed on top of the warming-tray.

(a) (i) State the name of a process by which the thermal energy from the candles passes to the warming-tray.

.....[1]

(ii) State the name of the process by which thermal energy moves through the warming-tray.

.....[1]

(b) The outside of the plate-warmer is shiny.

Suggest how this helps the plate-warmer to stay hot.

.....[1]

(c) The handles of the plate-warmer are made from metal.

Identify a problem with this, and suggest how the problem could be solved.

problem: .....

action: .....
[2]

[Total: 5]

[Turn over

4 Fig. 4.1 is a simplified diagram of a geothermal power station.

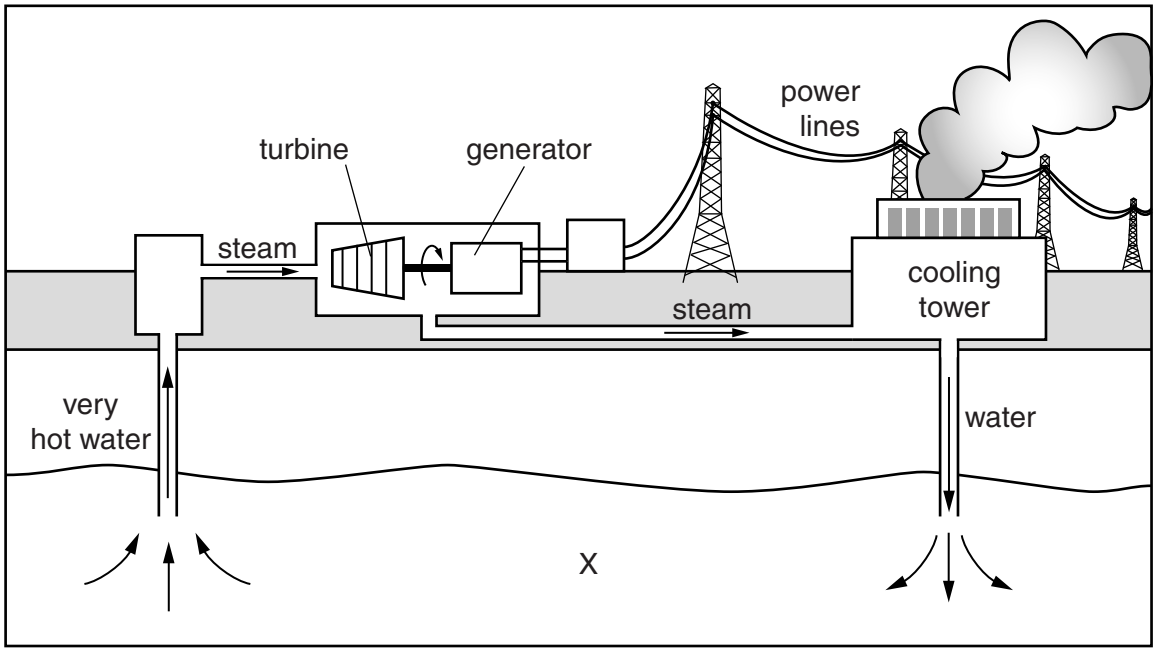

Fig. 4.1

(a) Describe the energy resource labelled X in Fig. 4.1.

.....[1]

(b) Identify the useful energy transformation that takes place in the geothermal power station. Tick **one** box in each column.

input energy		output energy	
chemical	☐	chemical	☐
electrical	☐	electrical	☐
gravitational	☐	gravitational	☐
sound	☐	sound	☐
thermal	☐	thermal	☐

[2]

(c) State **two** disadvantages of obtaining energy from fossil fuels.

1. .....

.....

2. .....

.....

[2]

[Total: 5]

5 Fig. 5.1 shows two men repairing a weak roof using a crawler-board.

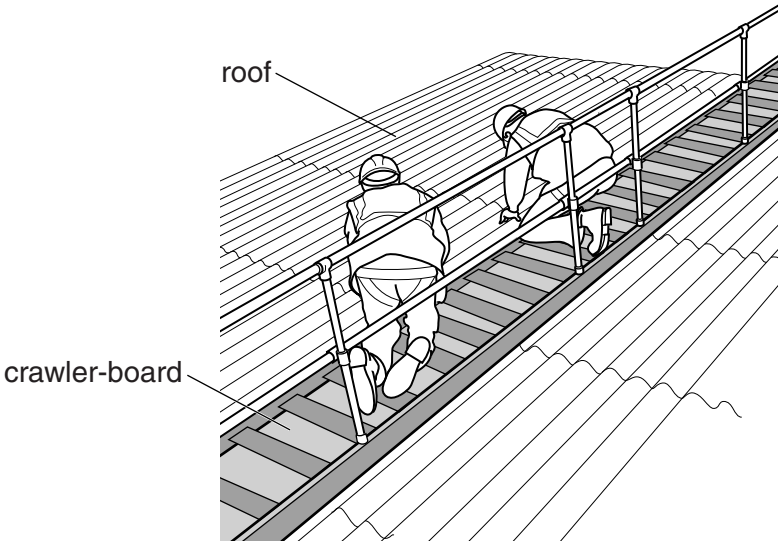

Fig. 5.1

(a) Explain why use of the crawler-board prevents the men from falling through the roof.

.....

.....

.....

.....[2]

(b) The crawler-board has a weight of 400 N. The total weight of the two men is 1600 N. The area of the crawler-board in contact with the roof is 0.8 m^2.

Calculate the pressure on the roof when the men are on the crawler-board. Include the unit.

pressure = ...[5]

[Total: 7]

6 Fig. 6.1 shows an experiment to observe the motion of smoke particles in air.

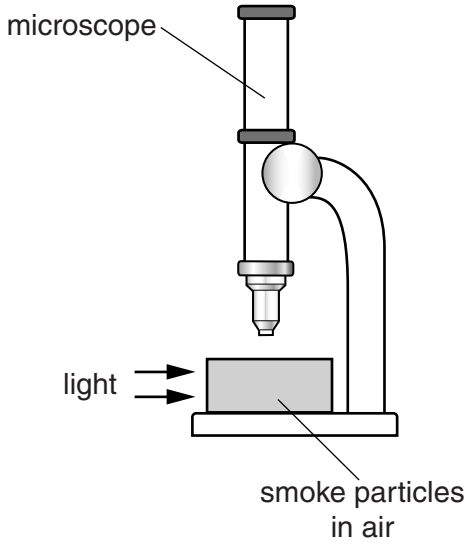

Fig. 6.1

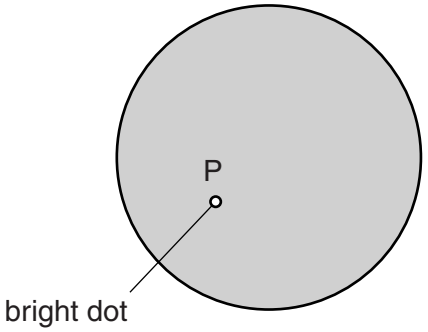

Fig. 6.2

(a) (i) Fig. 6.2 shows the view through the microscope of one smoke particle, labelled P.

On Fig. 6.2, draw 3 lines to show the movement of this particle.

[2]

(ii) Explain what causes the smoke particle to move.

.....

.....

.....

.....[2]

(b) The air containing the smoke particles becomes warmer.

Suggest how this changes the movement of the smoke particles.

.....

.....[1]

[Total: 5]

7 Fig. 7.1 shows equipment used to demonstrate thermal expansion.

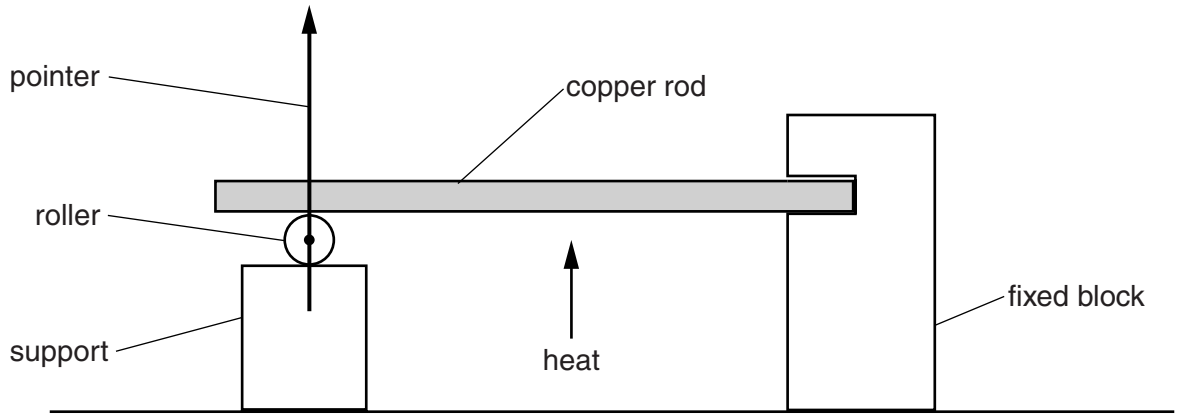

Fig. 7.1

(a) The copper rod is heated and expands. It turns the roller and moves the pointer.

On Fig. 7.1, draw the new position of the pointer.

[1]

(b) As the rod is heated, some of its properties change.

Identify how each property changes. Place **one** tick in each row of the table.

property of rod	decreases	increases	stays the same
volume			
mass			
density			

[3]

(c) Suggest **one** disadvantage of thermal expansion.

.....[1]

[Total: 5]

[Turn over

8 A student directs a ray of light towards a plane mirror, as shown in Fig. 8.1.

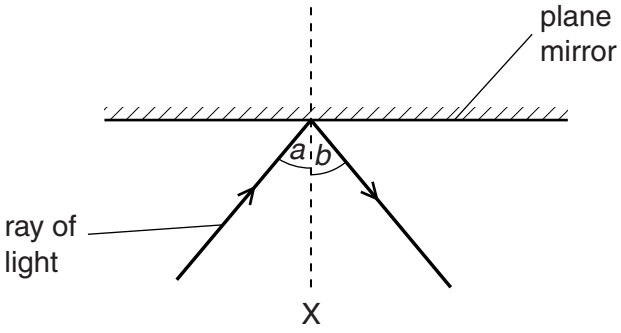

Fig. 8.1

(a) (i) Name the line labelled X.

.....[1]

(ii) When angle *a* is 45°, angle *b* is also 45°.

Angle *a* is changed to 20°.

What is the new value of angle *b*? Tick **one** box.

20° ☐ 25° ☐ 45° ☐ 65° ☐ 80° ☐

[1]

(b) The student now makes the ray of light from Fig. 8.1 pass into a glass block, as shown in Fig. 8.2.

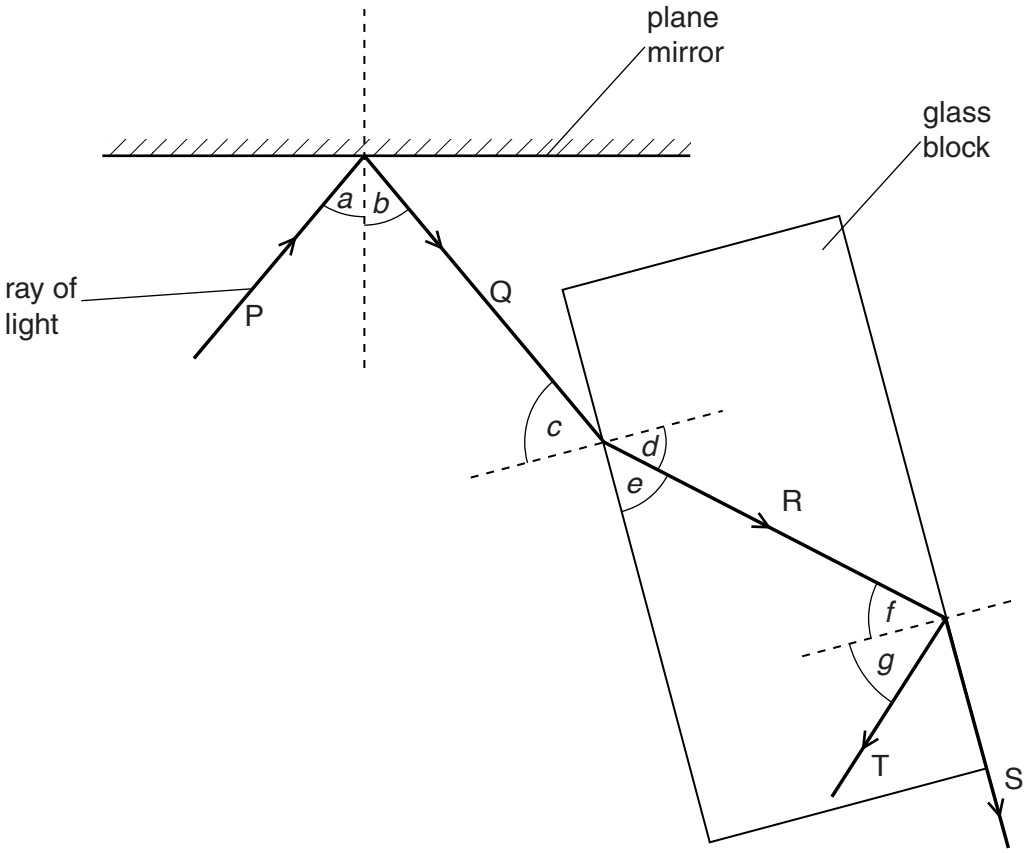

Fig. 8.2

Complete the table, using the labels from Fig. 8.2. The first label is done for you.

description	label
an angle of incidence	*a*
an angle of refraction	
an internally reflected angle	
a critical angle	
a refracted ray	

[4]

(c) The student uses a converging lens to produce an image of an object. Fig. 8.3 shows the arrangement.

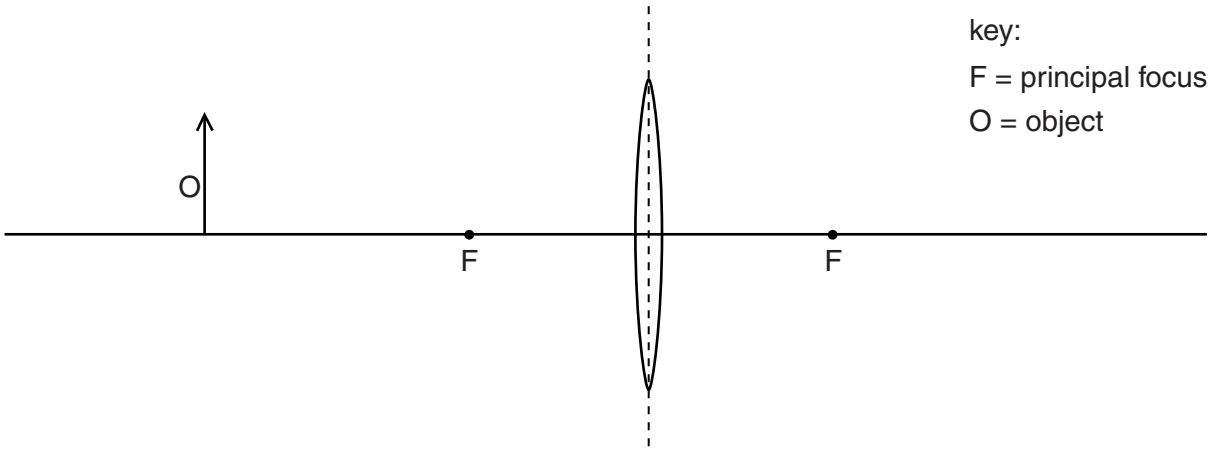

Fig. 8.3

On Fig. 8.3, using a ruler, carefully draw two rays from the object O to locate the position of the image. Use an arrow to represent the image. [3]

[Total: 9]

9 Fig. 9.1 represents the regions of the electromagnetic spectrum.

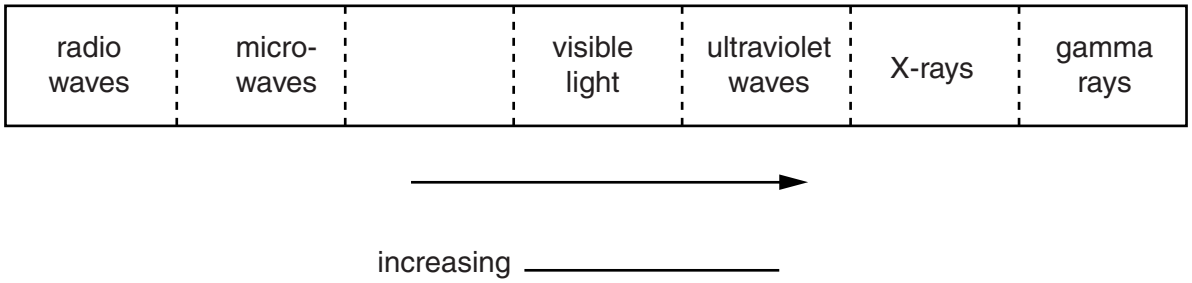

Fig. 9.1

(a) Complete Fig. 9.1:

(i) Add the label of the missing region. [1]

(ii) Complete the label under the arrow. [1]

(b) (i) State **two** uses of X-rays.

1. .....

2. .....

[2]

(ii) Describe **two** safety precautions taken by people using X-rays.

1. .....

2. .....

[2]

(iii) X-rays and light waves can both travel through a vacuum.

Identify the correct statement. Tick **one** box.

☐ X-rays travel at a slower speed than light waves.

☐ X-rays travel at the same speed as light waves.

☐ X-rays travel at a faster speed than light waves.

[1]

[Total: 7]

10 A student makes the circuit shown in Fig. 10.1 using a 12 V battery.

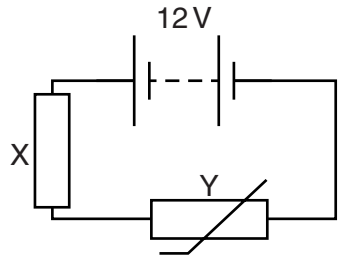

Fig. 10.1

(a) Complete the sentences about the circuit. Use words from the box.

fixed resistor	lamp	light-dependent resistor	parallel	series	thermistor

(i) Components X and Y are connected in .....[1]

(ii) The component Y is a .....[1]

(b) Fig. 10.2 shows how the resistance of Y varies with temperature.

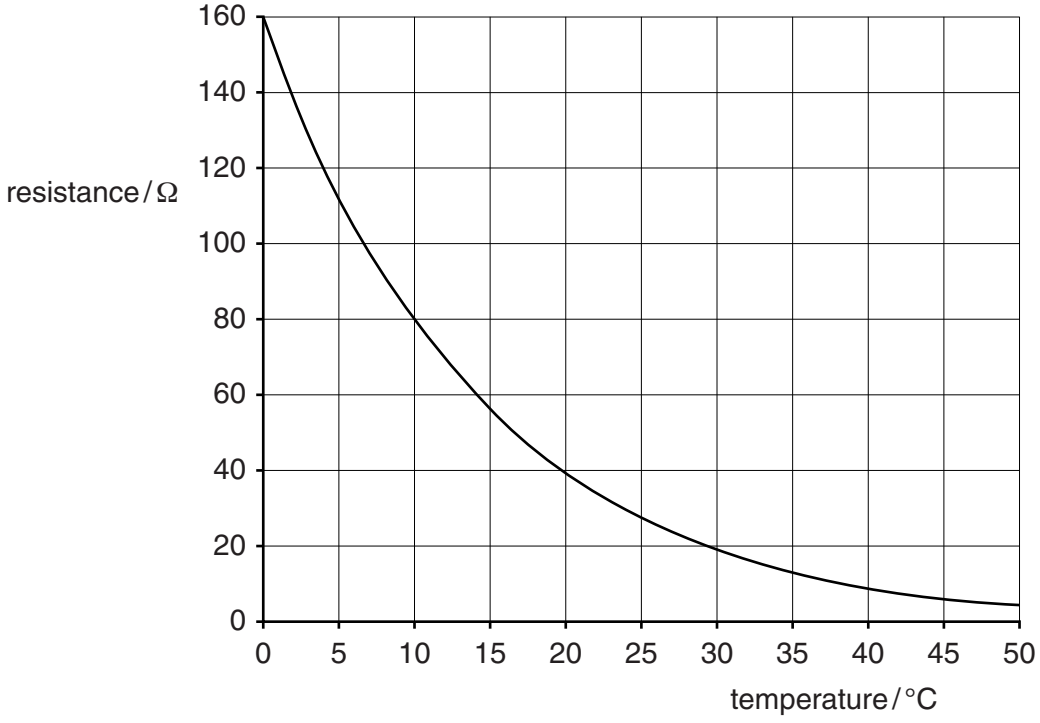

Fig. 10.2

(i) Describe how the resistance of Y varies with temperature.

.....

.....

.....[2]

(ii) The temperature of Y is 10 °C. The resistance of X is 20 Ω.

Calculate the combined resistance of Y and X.

resistance = ... Ω [3]

(iii) Calculate the current in the circuit.

current = ... A [3]

[Total: 10]

11 **(a)** Put a ring around the names of the metals which are attracted to magnets.

aluminium copper iron mercury magnesium steel tin

[2]

(b) Fig. 11.1 and Fig. 11.2 show magnetic field patterns for bar magnets.

On each diagram, correctly label the poles. Write **N** or **S**.

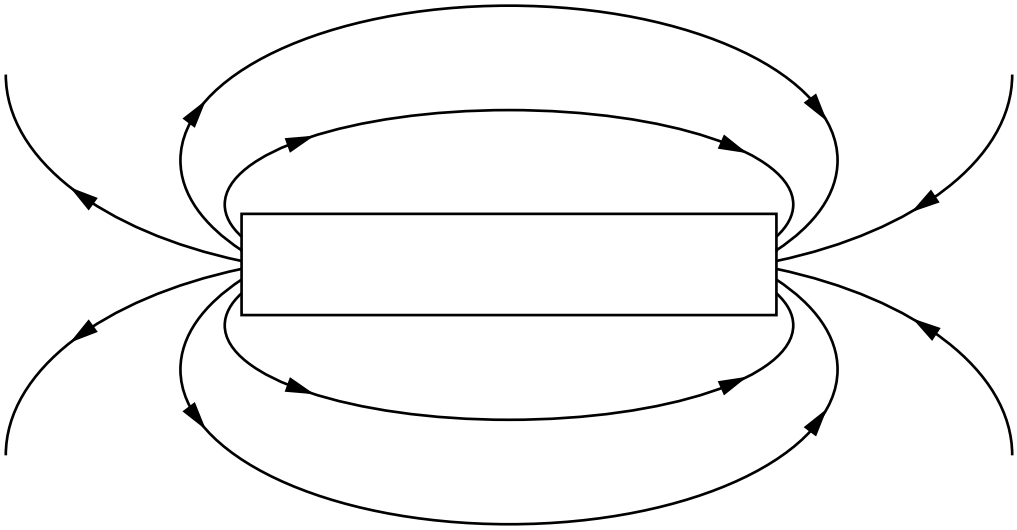

Fig. 11.1

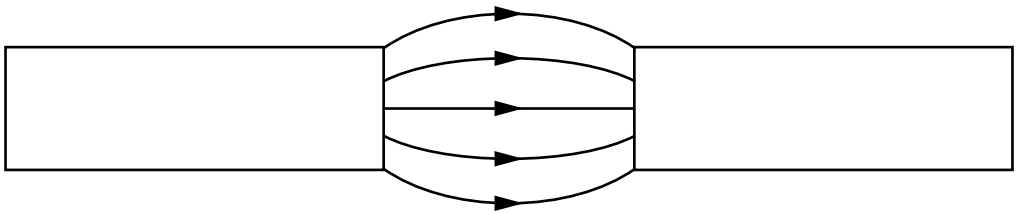

Fig. 11.2

[2]

(c) For each diagram in Fig. 11.3, describe the force acting, if any. Use the words *attraction*, *repulsion*, or *no force*.

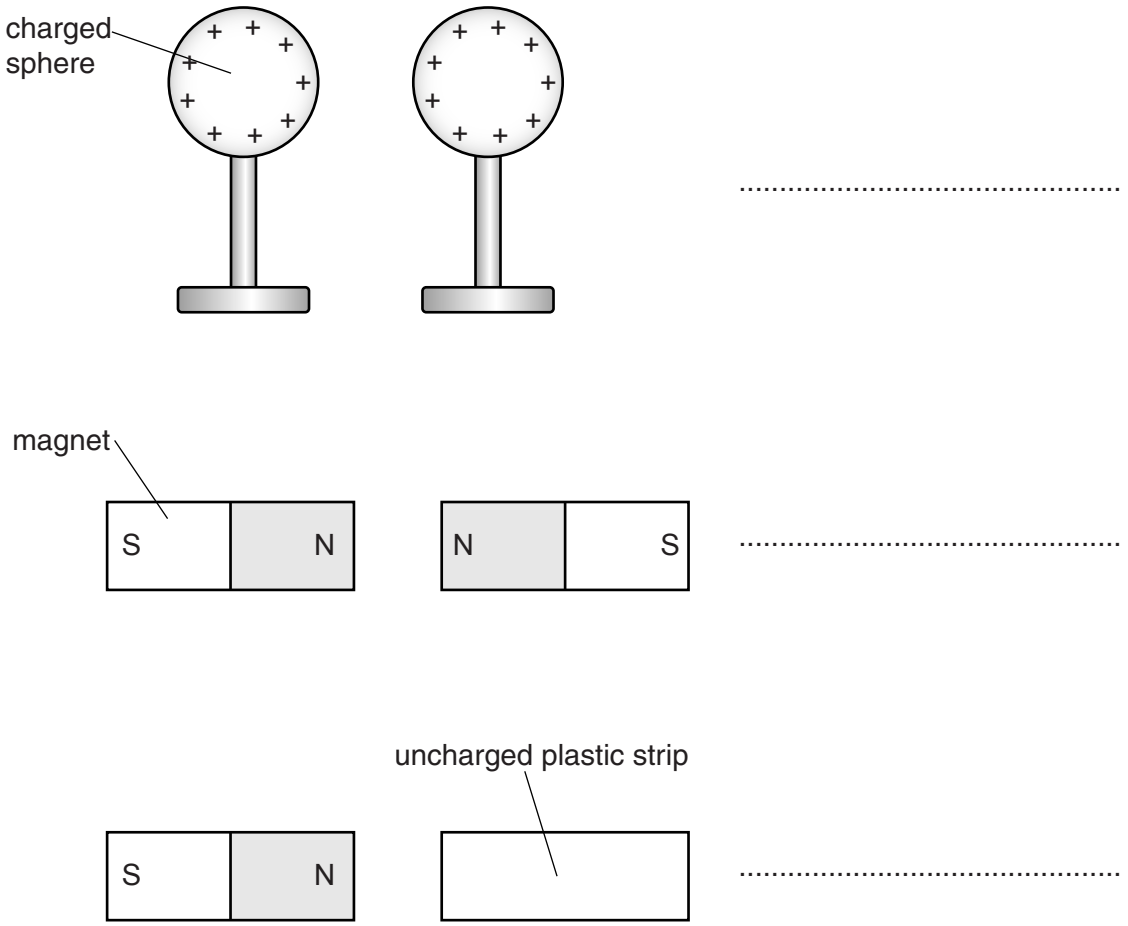

Fig. 11.3

[3]

[Total: 7]

12 Two radioactive sources are used by a teacher. One source emits only alpha particles and the other source emits only beta particles.

(a) Suggest how the sources can be identified.

.....

.....

.....

.....

.....[2]

(b) The teacher also has a source that emits gamma rays.

State **two** ways in which gamma rays are different from alpha particles.

1. .....

2. .....
[2]

(c) State an effect of ionising radiation on living things.

.....[1]

[Total: 5]

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