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PHYSICS **0625/32**

Paper 3 Theory (Core) **October/November 2025**

1 hour 15 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.
- Take the weight of 1.0 kg to be 9.8 N (acceleration of free fall = 9.8 m / s^2).

INFORMATION

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **16** pages. Any blank pages are indicated.

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1 **(a)** Fig. 1.1 shows the speed–time graph for the journey of a cyclist.

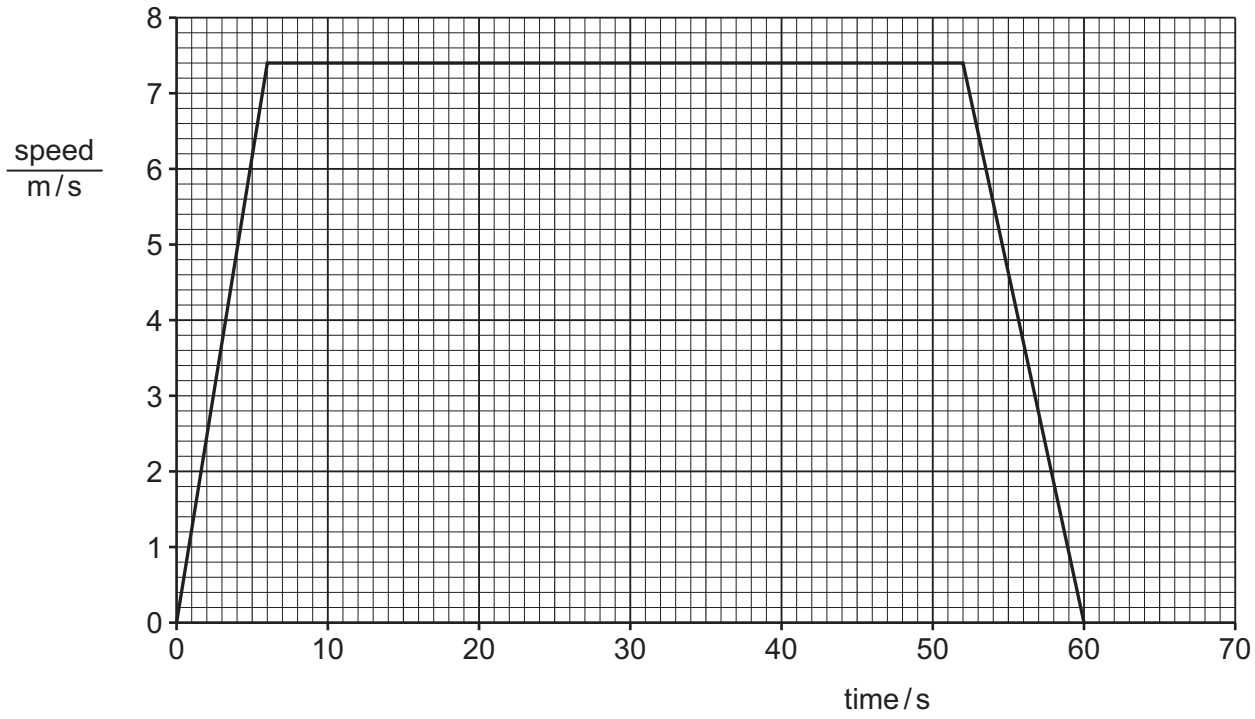


Fig. 1.1

(i) Determine the speed of the cyclist at time = 5.0 s.

speed = ... m/s [2]

(ii) Describe the motion of the cyclist between time = 52 s and time = 60 s.

..... [1]

(iii) Determine the distance travelled by the cyclist between time = 0 and time = 6.0 s.

distance = ... m [3]

(b) On a different journey, the cyclist travels 560 m in 130 s.
Calculate the average speed of the cyclist.

average speed = ... m/s [3]

[Total: 9]

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2 Fig. 2.1 shows the horizontal forces acting on an ice skater. The ice skater is moving forwards.

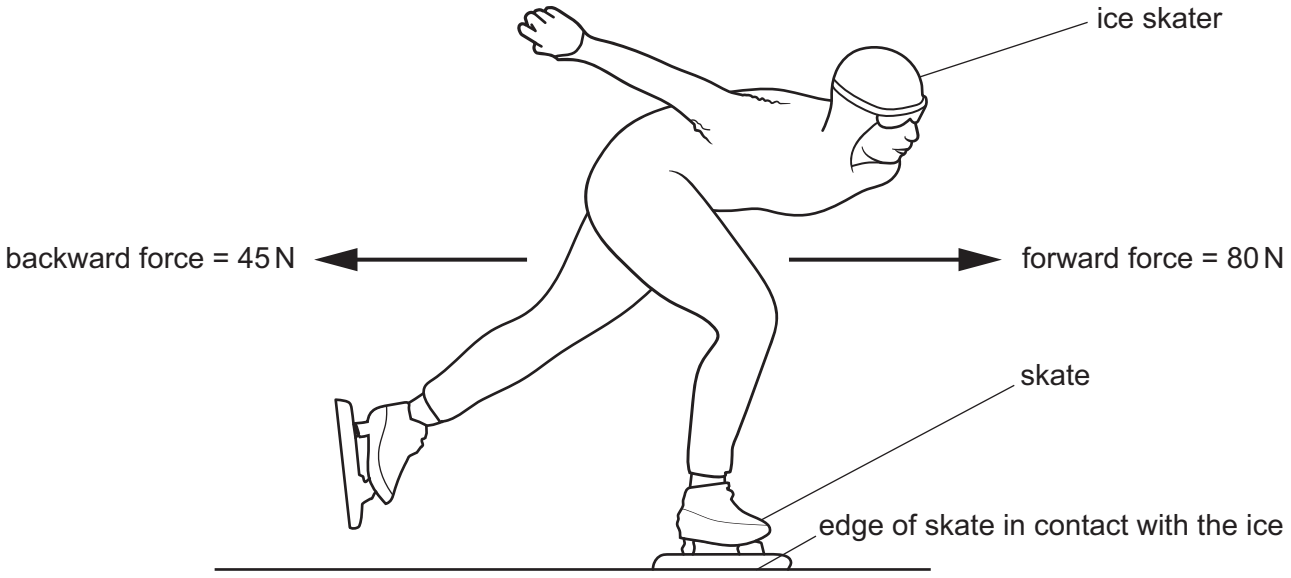


Fig. 2.1

(a) Calculate the resultant horizontal force acting on the ice skater. Determine the direction of the resultant force.

resultant horizontal force = ... N

direction = ...

[2]

(b) The weight of the ice skater is 700 N.
The area of the skate in contact with the ice is 6.2 cm^2.
Calculate the pressure on the surface of the ice exerted by the skate. Give your answer to two significant figures.

pressure = ... N/cm^2 [3]

(c) The weight of the ice skater is 700 N.
Calculate the mass of the ice skater. Give your answer to two significant figures.

mass of skater = ... kg [3]

[Total: 8]

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3 **(a)** State the principle of conservation of energy.

.....

.....

..... [2]

(b) Fig. 3.1 shows a student working on a battery-powered laptop computer.



Fig. 3.1

The diagram in Fig. 3.2 shows the energy flow from the battery to the surroundings. The diagram is incomplete.

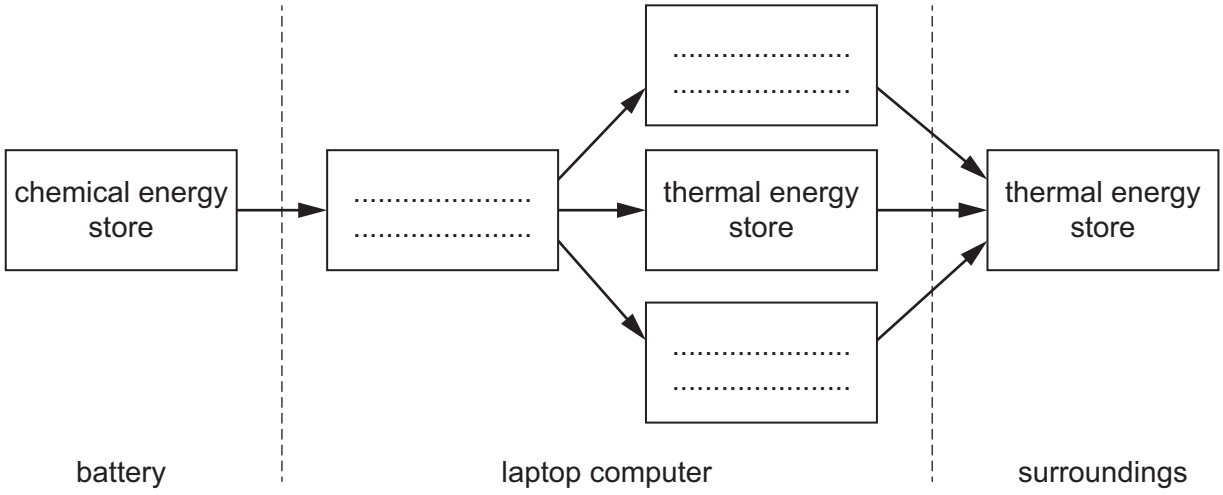


Fig. 3.2

Show the energy transfers by completing the labels on Fig. 3.2. [3]

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(c) Fig. 3.3 shows a person using a machine to push a large box along a flat horizontal floor.

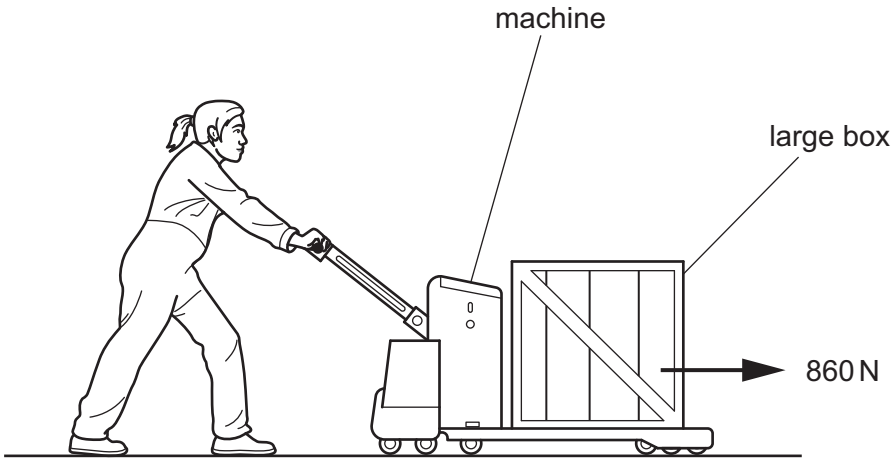


Fig. 3.3

(i) The machine pushes the large box with a constant horizontal force of 860 N for a distance of 15 m.
Show that the work done by the machine is about 13 000 J.

[3]

(ii) The work done by the machine in **(c)(i)** takes 18 s.
Calculate the power of the machine. Include the unit.

power = ... unit ..... [4]

[Total: 12]

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4 A group of students are studying a topic called 'Light and Sound'.

(a) Fig. 4.1 shows a demonstration using a noisy toy.

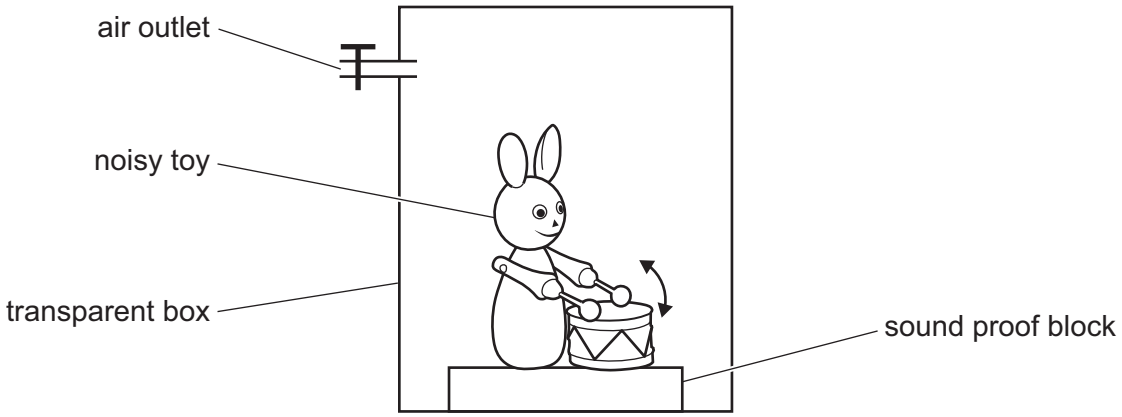


Fig. 4.1

The teacher puts the noisy toy into a sealed, transparent case that contains air. The teacher removes the air from inside the case.

The sound of the noisy toy becomes quieter until the students cannot hear it. The students can see the toy moving, but cannot hear it, because light and sound have different properties.

State **three** differences between the properties of light and the properties of sound.

1 .....

2 .....

3 .....

[3]

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(b) The students go to a large park to determine the speed of sound.
Describe an experiment for determining the speed of sound.
You may draw a diagram as part of your answer.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(c) The students find that the speed of sound is 340 m / s. They strike a tuning fork of frequency 260 Hz.
Calculate the wavelength of the sound that the tuning fork produces.

wavelength = ... m [3]

[Total: 10]

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5 **(a)** Fig. 5.1 shows small cubes of ice in a glass of water.

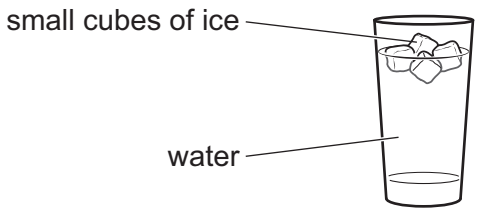


Fig. 5.1

Table 5.1 shows the density of ice and of water.

Table 5.1

	density / g/cm^3
ice	0.92
water	0.99

(i) Explain why the cubes of ice float in the water.

..... [1]

(ii) The volume of a cube of ice is 3.4 cm^3.
Calculate the mass of a cube of ice.

mass = ... g [3]

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(b) Cubes of ice are added to the water. One cube of ice falls to the floor.
Fig. 5.2 shows this cube of ice as it changes from a solid into a liquid.

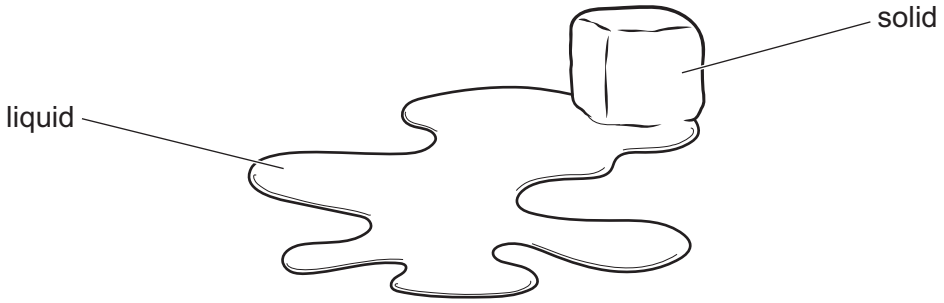


Fig. 5.2

(i) State the name of the process when a solid changes into a liquid.

..... [1]

(ii) Describe the changes in the arrangement and motion of the particles as the ice changes from solid to liquid.

arrangement .....

.....

.....

motion .....

.....

.....
[3]

(c) Later, the floor is dry.
State the name of the process that causes the liquid to disappear.

..... [1]

[Total: 9]

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6 Fig. 6.1 shows an object near a converging lens. The diagram also shows the image of the object that is produced by the lens.

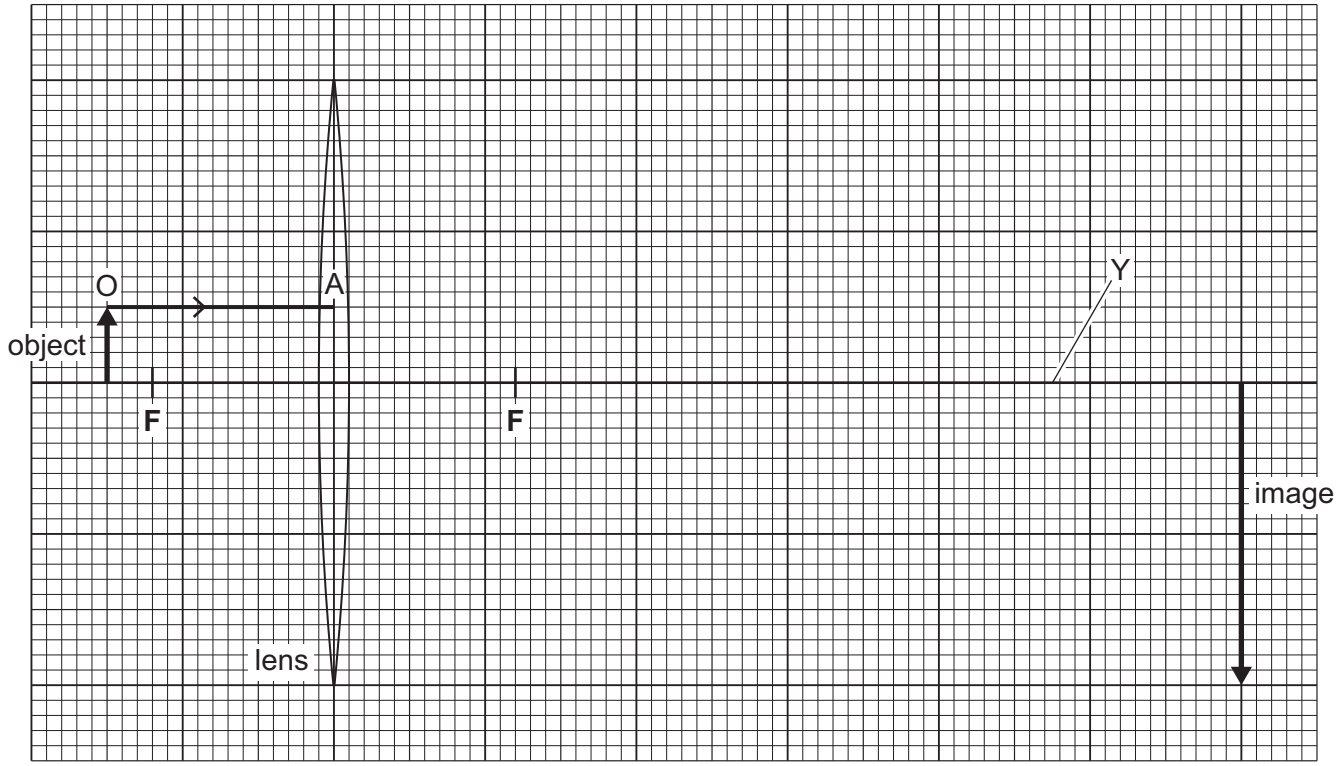


Fig. 6.1

(a) State the name of the line labelled Y.

..... [1]

(b) State the name of the points that are labelled F.

..... [1]

(c) The tip of the object is point O. OA shows the path of a ray from the object as it travels to the lens. On Fig. 6.1, draw the path of this ray as it leaves the lens and travels to the image. [1]

(d) On Fig. 6.1, locate the tip of the image. Draw the path of another ray from point O, through the lens and to the tip of the image. [2]

(e) The image in Fig. 6.1 is enlarged and inverted.
State **one** more characteristic of the image.

..... [1]

[Total: 6]

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7 Fig. 7.1 shows a lamp connected in series with four 1.5 V cells and an ammeter. A voltmeter is connected across the lamp.

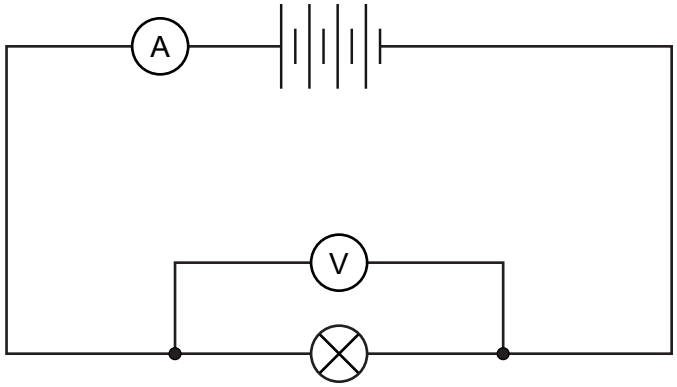


Fig. 7.1

(a) Determine the potential difference across the four cells.

potential difference = ...V [1]

(b) (i) The reading on the ammeter is 0.64 A.
The reading on the voltmeter is 5.8 V.
Calculate the resistance of the lamp.

resistance of the lamp = ... Ω [3]

(ii) Calculate the energy transferred by the lamp in 140 s.

energy transferred = ... J [3]

(c) On Fig. 7.1, draw a second lamp so that there is a bigger current in the ammeter when the second lamp is connected. [1]

[Total: 8]

8 **(a)** Fig. 8.1 shows a toy train on a railway track with a tunnel. The toy train consists of an engine with a truck that is carrying a magnet.

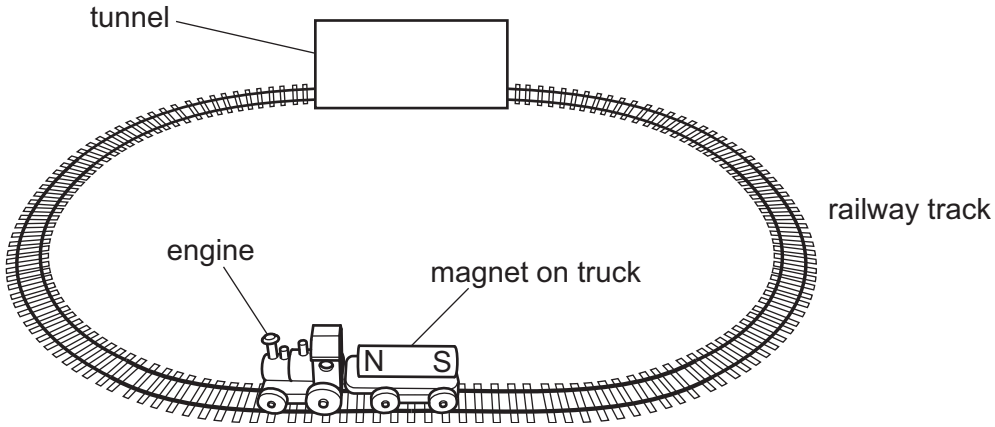


Fig. 8.1

Fig. 8.2 shows the toy train approaching the tunnel.

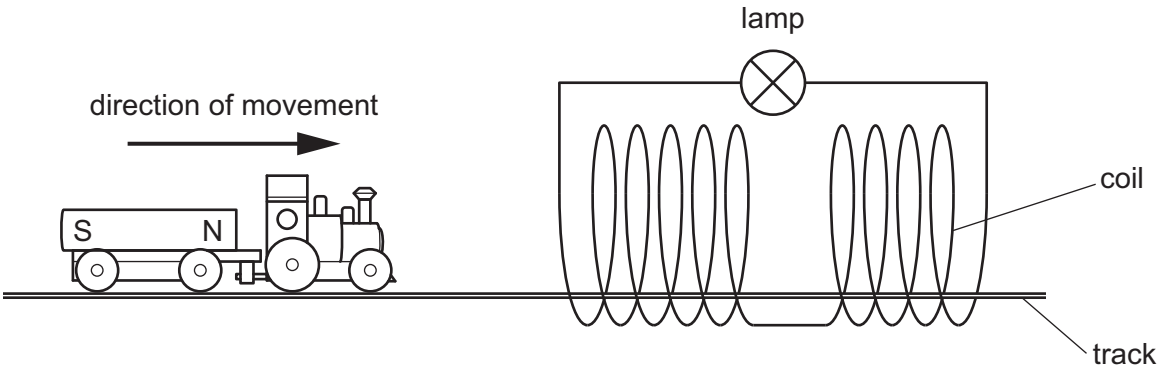


Fig. 8.2 (paper cover of tunnel not shown)

The tunnel consists of a coil of wire that is covered in paper. The ends of the coil are connected to a lamp.

When the toy train moves through the coil of wire, the lamp becomes bright.

(i) Explain why the lamp becomes bright when the toy train moves through the coil of wire.

.....

.....

.....

..... [2]

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(ii) Describe **two** ways of **increasing** the brightness of the lamp.

1 ..... [1]

2 ..... [1]

(b) Another toy train uses a transformer.
State which metals are used in a transformer.

(i) for the core of a transformer ..... [1]

(ii) for the coils of a transformer ..... [1]

[Total: 6]

9 Unstable nuclei emit ionising radiation when they decay.

(a) Draw **one** line from each type of ionising radiation to its nature.

type of ionising radiation	nature
alpha (α)	electromagnetic wave
beta (β)	helium nucleus
gamma (γ)	electron

[2]

(b) Iodine-131 is an unstable isotope of iodine.

(i) State the meaning of the term isotope.

.....

..... [2]

(ii) Fig. 9.1 shows the decay curve for a sample of iodine-131.

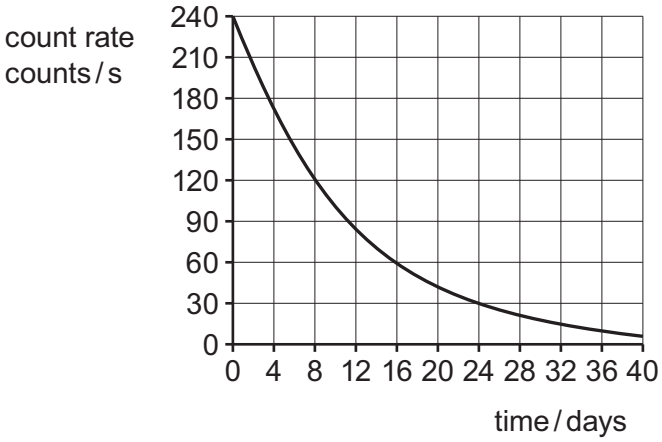


Fig. 9.1

Determine the half-life of iodine-131. Show your working clearly.

half-life = ... days [3]

[Total: 7]

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10 **(a)** Complete these sentences about the formation of the Solar System.

(i) Planets were formed from interstellar clouds of gas and ..... [1]

(ii) The interstellar clouds were pulled together by the force of ..... [1]

(iii) The rotation of material in the interstellar clouds formed an accretion ..... [1]

(b) The Big Bang Theory is a possible description of the beginning of the Universe.

State **one** piece of evidence that supports the Big Bang Theory and explain how this evidence supports the Big Bang Theory.

evidence .....

explanation .....

.....

.....

.....

[2]

[Total: 5]

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