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PHYSICS **0625/33**

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 Fig. 1.1 shows a stone falling from a cliff to a beach.

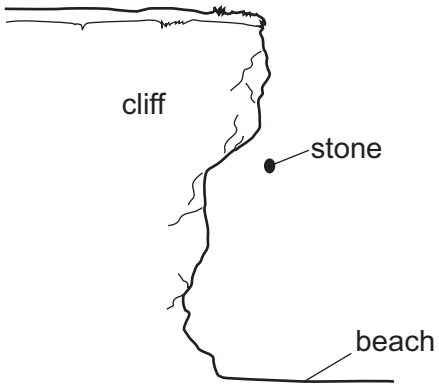


Fig. 1.1

(a) Fig. 1.2 shows the speed-time graph for the stone.

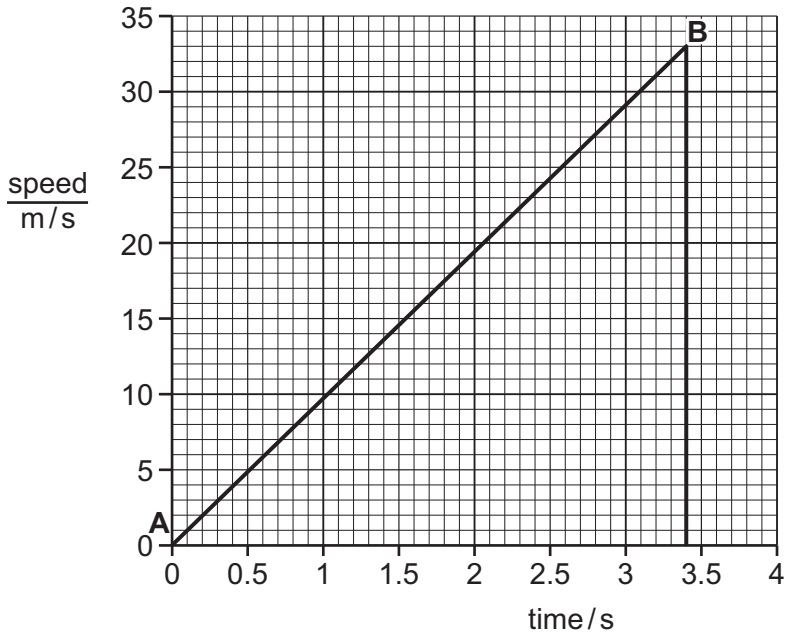


Fig. 1.2

(i) Determine the speed of the stone at time = 2.0 s.

speed = ... m/s [1]

(ii) Describe the motion of the stone during section AB of the graph in Fig. 1.2.

..... [1]

(iii) Calculate the distance travelled by the stone between time = 0 and time = 3.4 s.

distance = ... m [3]

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(b) The weight of the stone is 0.12 N.

Calculate the mass of the stone.

mass = ... kg [3]

[Total: 8]

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2 **(a)** A builder uses a metal bar to raise one end of the rock.

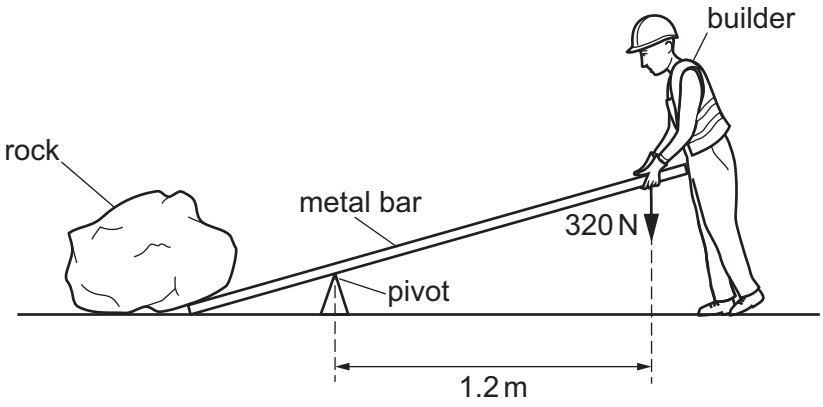


Fig. 2.1 (not to scale)

Calculate the moment of the 320 N force about the pivot.

moment = ... Nm [3]

(b) The builder lifts another rock using a truck as shown in Fig. 2.2.

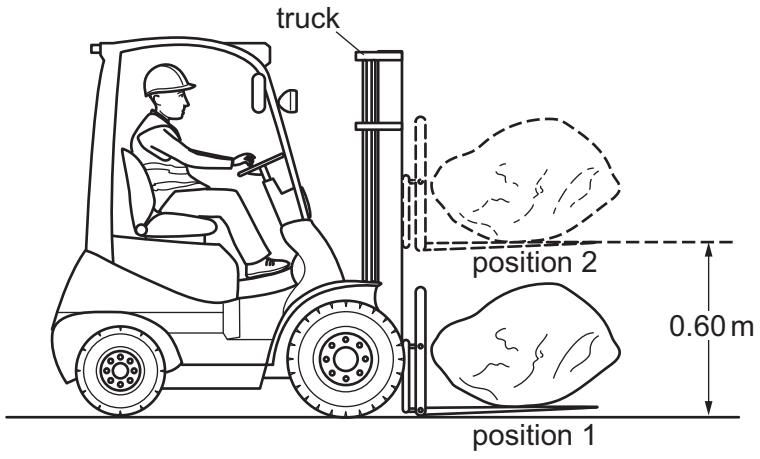


Fig. 2.2 (not to scale)

The truck lifts the rock through a vertical height of 0.60 m.

The weight of the rock is 4800 N.

Calculate the work done in lifting the rock.

work done ..... J [3]

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(c) The work done by the truck in lifting a different rock is 5800 J.

The truck lifts the rock in a time of 7.4 s.

Calculate the power of the truck in lifting the rock. Include the unit.

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

[Total: 10]

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3 **(a)** A scientist determines the density of a sample of sea water.

Describe an experiment to determine the density of the sea water. You may draw a diagram as part of your answer.

Include any equations in your answer.

.....

.....

.....

.....

..... [4]

(b) Table 3.1 shows the density of four materials.

Table 3.1

material	density / g/cm^3
plastic	0.905
wood	0.720
sea water	1.03
baby oil	0.815

Predict whether solid objects made from plastic or wood float in sea water or baby oil.

Use the data in Table 3.1.

Complete Table 3.2 by writing **Yes** or **No** in each space.

Table 3.2

liquid	does a plastic object float?	does a wooden object float?
sea water		
baby oil		

[2]

[Total: 6]

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4 **(a)** A teacher shows the class a demonstration about heat energy and states of matter.

The teacher heats a substance. A heater supplies thermal energy at a steady rate. The students measure the temperature of the substance every minute for 30 minutes.

Fig. 4.1 shows the graph of their results.

At point A, the substance is solid.

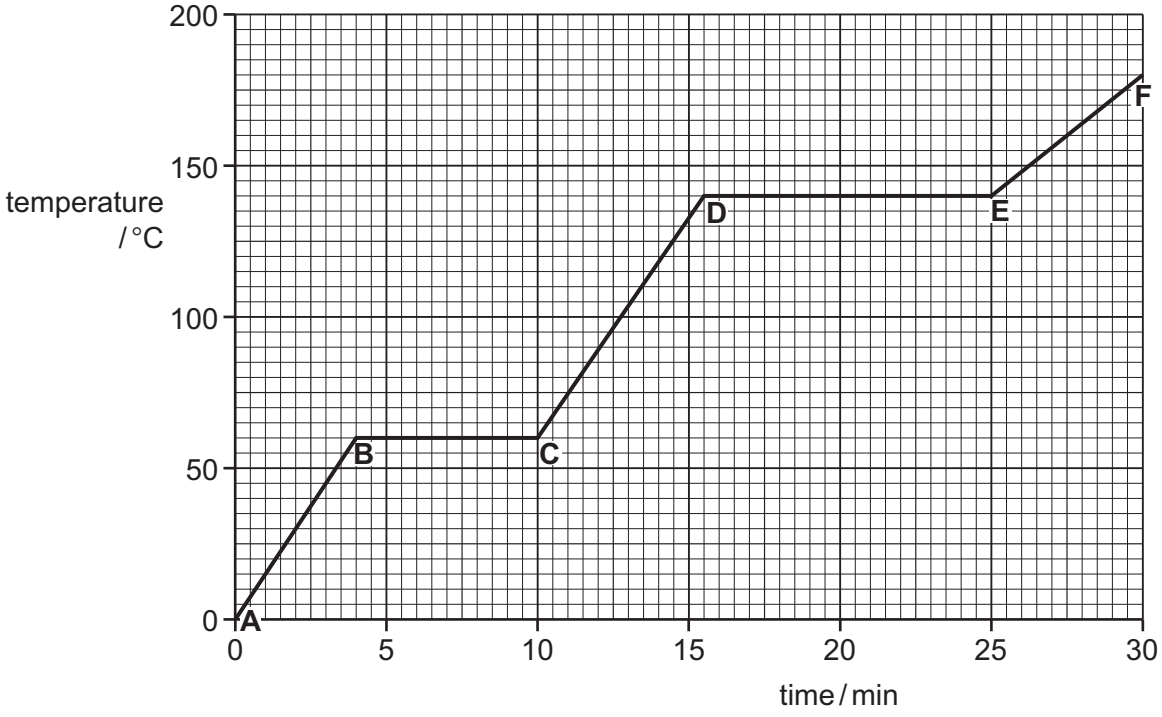


Fig. 4.1

(i) Describe the effect of the thermal energy input in section AB of the graph.

..... [1]

(ii) Describe the effect of the thermal energy input in section BC of the graph.

..... [1]

(iii) Determine the temperature at which the substance boils.

..... [1]

(iv) Deduce the state of matter of the substance in section EF of the graph.

..... [1]

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(b) Evaporation is the name of a process that causes puddles of water to dry gradually.

(i) Describe the process of evaporation. Use your ideas about particles.

.....

.....

.....

.....

..... [3]

(ii) Describe another effect that evaporation has on the remaining water in the puddle.

..... [1]

[Total: 8]

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5 **(a)** Table 5.1 shows whether some energy resources are renewable and whether they cause air pollution when being used to generate electrical power.

For each energy resource, complete Table 5.1 by writing **yes** or **no** in each space. The solar energy resource has been done for you.

Table 5.1

energy resource	is it renewable?	does it cause air pollution?
solar	yes	no
fossil fuels		
wind		
nuclear fuel		
tidal		

[4]

(b) A solar cell is one way of using the solar energy resource.

Solar cells use visible light from the Sun to generate electrical power.

(i) State the property that allows visible light to travel through space from the Sun to a solar cell.

..... [1]

(ii) A frequency of visible light for a solar cell is 6.0×10^{14} Hz.

The speed of visible light is 3.0×10^{8} m/s.

Calculate the wavelength of this visible light.

wavelength = ... m [3]

(c) State **one** region of the electromagnetic spectrum which has a frequency lower than that of visible light. Describe a use of this region.

region .....

use of the region .....
[2]

[Total: 10]

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6 Fig. 6.1 shows the path of a ray of visible light travelling from the top of an object and passing through a converging lens.

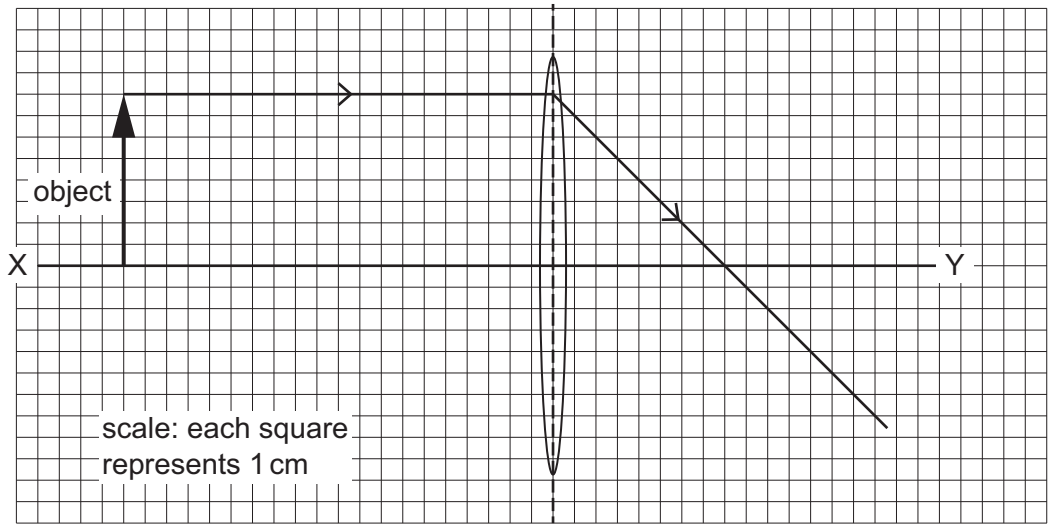


Fig. 6.1

(a) State what the line XY represents.

..... [1]

(b) Determine the focal length of the converging lens.

focal length = ... cm [1]

(c) On Fig. 6.1, draw another ray from the object. Continue the path of the ray through the lens until it crosses the path of the ray shown in Fig. 6.1. [2]

(d) On Fig. 6.1, draw an arrow to represent the image. Label it 'image'. [2]

[Total: 6]

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7 **(a)** A student is making a torch.

(i) The torch needs a potential difference (p.d) of 6.0 V. The electromotive force (e.m.f.) of each cell for the torch is 1.5 V.

State the number of cells that the torch needs.

number of cells = ... [1]

(ii) The student has the following components for the electrical part of the torch:

a 6.0 V lamp
a switch
several 1.5 V cells
connecting wire

Draw a circuit diagram to show how the components are connected in series to make the torch. Use standard circuit symbols.

[3]

(b) The p.d. across the lamp is 6.0 V.

The current in the lamp is 0.25 A

(i) Calculate the resistance of the lamp.

resistance = ... Ω [3]

(ii) Calculate the power of the lamp.

power = ...W [3]

[Total: 10]

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8 **(a)** A coal-fired power station is far from a city. The electricity generated by the power station is transmitted to the city at a high voltage.

State **two** advantages of high-voltage transmission of electricity.

1 .....

2 .....
[2]

(b) In the city, transformers reduce the high voltage.

Fig. 8.1 shows one of these transformers.

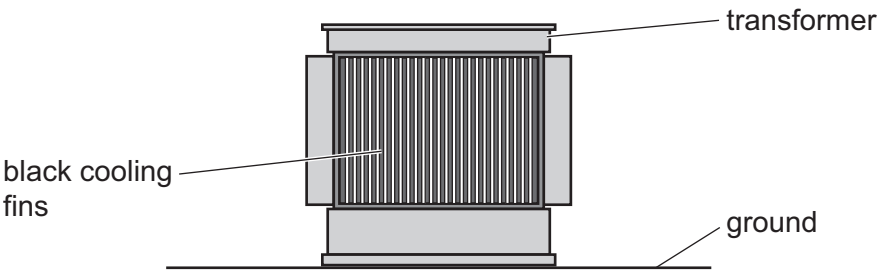


Fig. 8.1

Transformers become hot when they reduce the high voltage. There are black cooling fins on the casing which contains the transformer.

Explain why the fins are black.

.....

..... [2]

(c) Describe the construction and materials of a simple step-down transformer. You may draw a labelled diagram as part of your answer.

.....

.....

..... [3]

[Total: 7]

9 **(a)** Table 9.1 shows information about particles in an atom.

Complete the table.

Table 9.1

particle	charge on particle	location of particle
	positive	
neutron		in the nucleus
	negative	

[3]

(b) Fig. 9.1 represents three types of emission P, Q and R from a radioactive nucleus. The diagram shows whether each emission can penetrate paper and aluminium.

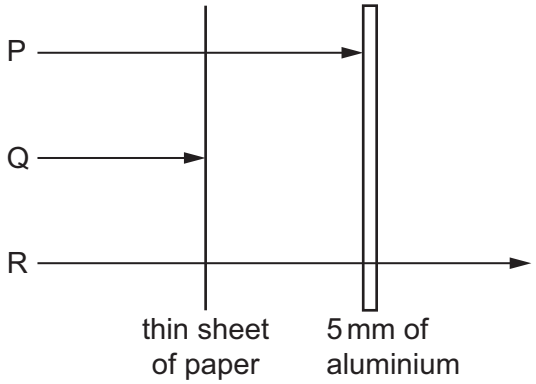


Fig. 9.1

Identify the types of emission labelled P, Q and R.

Type P is .....

Type Q is .....

Type R is .....

[3]

(c) State **two** precautions for storing radioactive materials safely.

1 .....

2 .....

[2]

[Total: 8]

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10 (a) Each box in the left column shows a description of a unit of time.

Each box in the right column shows the name of a unit of time.

Draw a line to connect each description to the appropriate unit.

description	**name**
The time taken for the Earth to rotate once on its axis.	one day
The time taken for the Earth to orbit the Sun once.	one week
The time taken for the Moon to orbit the Earth once.	one month
	one year

[3]

(b) (i) The Sun consists mostly of **two** elements.

State the names of the **two** elements.

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

(ii) The Sun radiates energy mostly in three regions of the electromagnetic spectrum. One of these regions is visible light.

State the name for each of the other **two** regions.

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

[Total: 7]

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