Topical Past Paper Questions Worksheets

IGCSE Physics (0625) Paper 4

Exam Series: Feb/Mar 2017 – Oct/Nov 2023

Format Type A:
Answers to all questions are provided as an appendix

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Introduction

Each Topical Past Paper Questions Compilation contains a comprehensive collection of hundreds of questions and corresponding answer schemes, presented in worksheet format. The questions are carefully arranged according to their respective chapters and topics, which align with the latest IGCSE or AS/A Level subject content. Here are the key features of these resources:

1. The workbook covers a wide range of topics, which are organized according to the latest syllabus content for Cambridge IGCSE or AS/A Level exams.
2. Each topic includes numerous questions, allowing students to practice and reinforce their understanding of key concepts and skills.
3. The questions are accompanied by detailed answer schemes, which provide clear explanations and guidance for students to improve their performance.
4. The workbook's format is user-friendly, with worksheets that are easy to read and navigate.
5. This workbook is an ideal resource for students who want to familiarize themselves with the types of questions that may appear in their exams and to develop their problem-solving and analytical skills.

Overall, Topical Past Paper Questions Workbooks are a valuable tool for students preparing for IGCSE or AS/A level exams, providing them with the opportunity to practice and refine their knowledge and skills in a structured and comprehensive manner. To provide a clearer description of this book's specifications, here are some key details:

- Title: Cambridge IGCSE Physics (0625) Paper 4 Topical Past Papers
- Subtitle: Exam Practice Worksheets With Answer Scheme
- Examination board: Cambridge Assessment International Education (CAIE)
- Subject code: 0625
- Years covered: Feb/Mar 2017 – Oct/Nov 2023
- Paper: 4 [extended]
- Number of pages: 879
- Number of questions: 494

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Contents

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Chapter 1

Motion, forces and energy

1.1 Physical quantities and measurement techniques

1. 0625_w22_qp_42 Q: 2

(a) A pendulum swings with a time period of approximately one second.

Describe how to use a stop-watch to determine the time period of the pendulum.

....

....

....

.... [3]

(b) Complete Table 2.1 by writing in each space of the right-hand column which **one** of the following devices is used to measure the quantity in the left-hand column.

digital balance measuring cylinder metre rule

micrometer screw gauge stop-watch thermocouple

Table 2.1

quantity	device
volume of water in a glass	
width of a small swimming pool	
thickness of a piece of aluminium foil	

[3]

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2. 0625_s17_qp_42 Q: 1

(a) **(i)** Speed is a scalar quantity and velocity is a vector quantity.

State how a *scalar* quantity differs from a *vector* quantity.

....

....[1]

(ii) Underline the **two** scalar quantities in the list below.

energy **force** **impulse** **momentum** **temperature** [1]

(b) A boat is moving at constant speed.

On Fig. 1.1, sketch a distance-time graph for the boat.

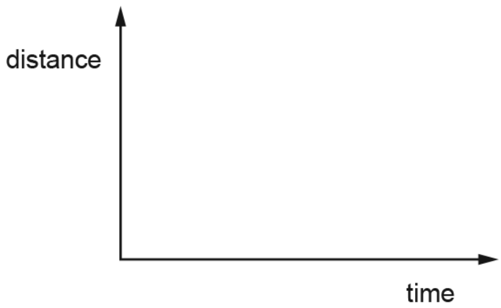

Fig. 1.1

[1]

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(c) The boat in **(b)** is moving due west at a speed of 6.5 m/s relative to the water. The water is moving due south at 3.5 m/s.

In the space below, draw a scale diagram to determine the size and direction of the resultant of these two velocities. State the scale used.

scale ....

size of resultant velocity = ...

direction of resultant ....
[4]

[Total: 7]

1.2 Motion

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3. 0625_m23_qp_42 Q: 1

(a) A boat crosses a river. The boat points at right angles to the river bank and it travels at a speed of 3.5 m / s relative to the water.

A river current acts at right angles to the direction the boat points. The river current has a speed of 2.5 m / s.

By drawing a scale diagram or by calculation, determine the speed and direction of the boat relative to the river bank.

speed = ...

direction relative to the river bank = ...

[4]

(b) Speed is a scalar quantity and velocity is a vector quantity.

State the names of **one** other scalar quantity and **one** other vector quantity.

scalar quantity ....

vector quantity ....

[2]

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4. 0625_s23_qp_41 Q: 1

Fig. 1.1 shows a straight section of a river where the water is flowing from right to left at a speed of 0.54 m/s.

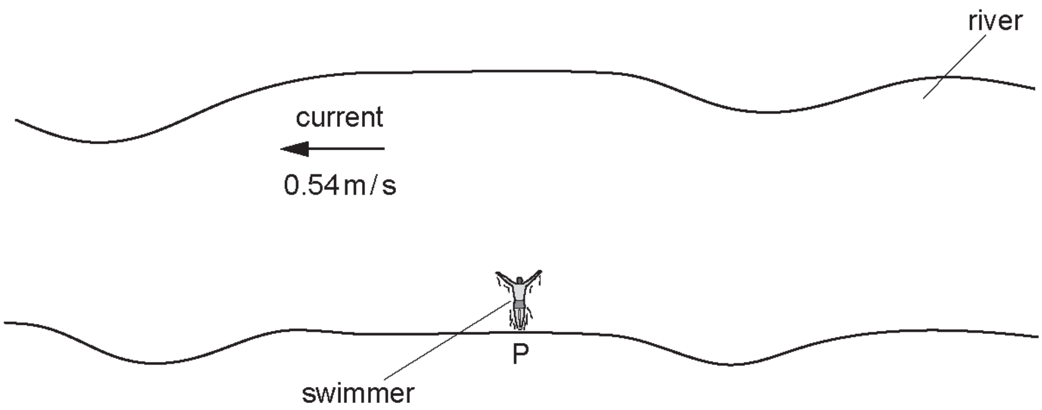

Fig. 1.1 (not to scale)

A swimmer starts at point P and swims at a constant speed of 0.72 m/s relative to the water and at right angles to the current.

(a) **(i)** Determine, relative to the river bank, both the magnitude and direction of the swimmer's velocity.

magnitude of velocity = ...

direction of velocity ....
[4]

(ii) After 1.5 minutes, the swimmer reaches point Q.

Calculate the distance between P and Q.

distance = ... [3]

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(b) When the swimmer is crossing the river, his actions produce a constant forward force on his body.

Explain why he moves at a constant speed.

....

....

....

.... [2]

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5. 0625_m22_qp_42 Q: 1

A ball rolls down a ramp and onto a horizontal surface. The first section of the horizontal surface is smooth. The second section of the horizontal surface is rough. Fig. 1.1 shows a speed–time graph for the ball.

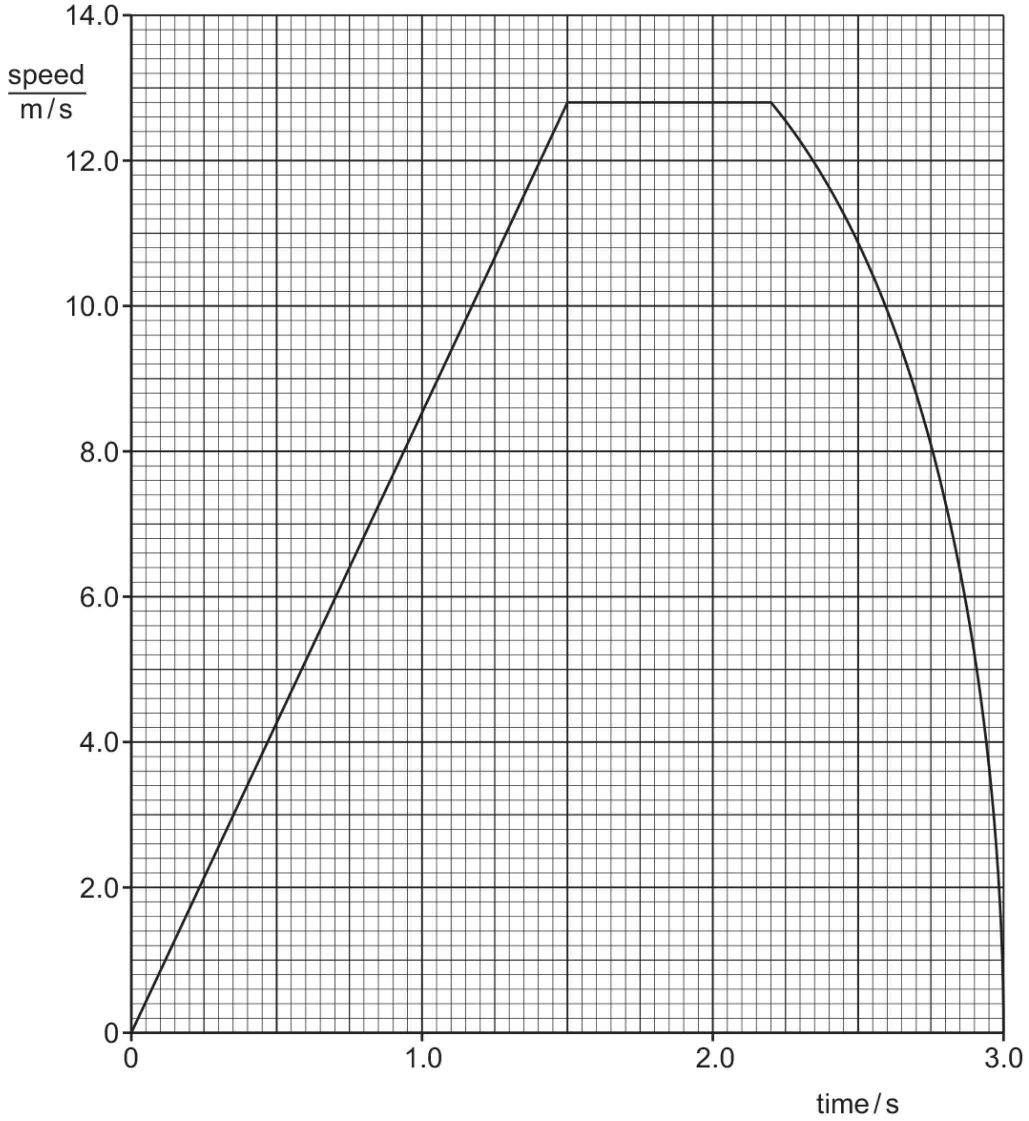

Fig. 1.1

(a) State the time when the ball reaches the start of the rough section of the horizontal surface.

time = ... [1]

(b) Explain how Fig. 1.1 shows that there is **no** resultant force on the ball when it rolls along the smooth section of the horizontal surface.

....

.... [2]

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(c) Using Fig. 1.1, determine the acceleration of the ball as it rolls down the ramp.

acceleration = ... [3]

(d) The ball starts from rest at the top of the ramp.

Show that the length of the ramp is 9.6 m.

[2]

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6. 0625_w21_qp_42 Q: 1

Fig. 1.1 shows a space rocket accelerating away from a launch pad.

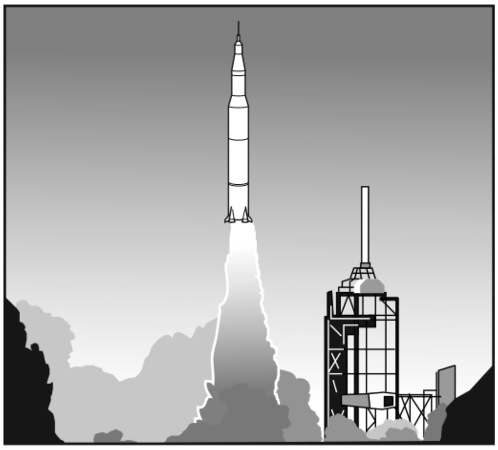

Fig. 1.1

Fig. 1.2 is a speed–time graph for the first 30 s of the rocket's flight.

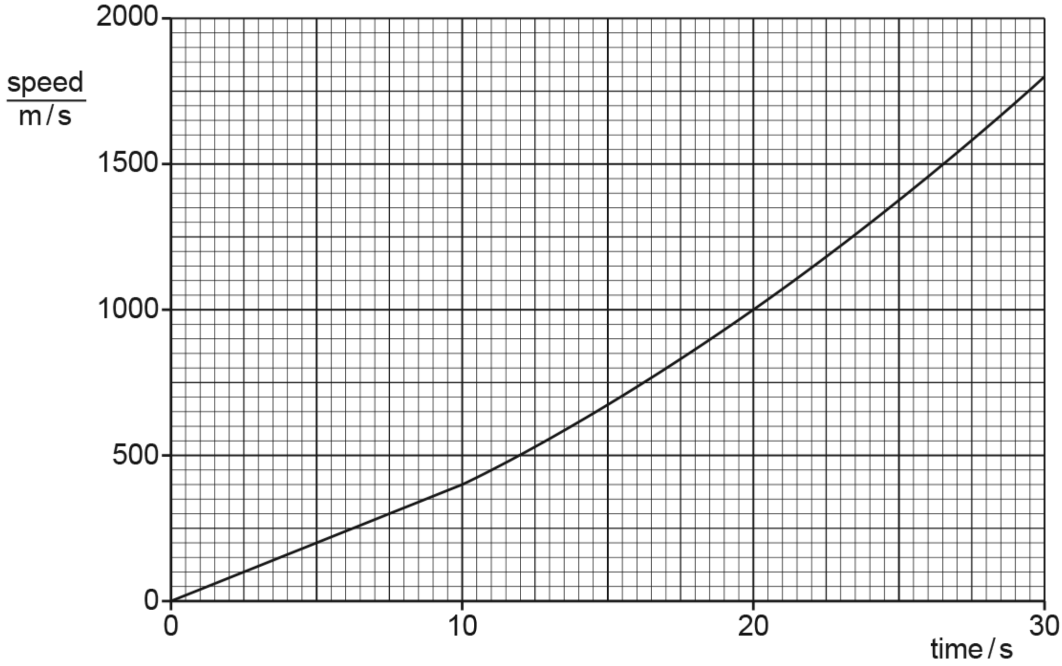

Fig. 1.2

(a) Describe how the acceleration of the rocket changes between time = 10 s and time = 30 s.

.... [1]

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(b) By drawing a tangent to the graph, determine the acceleration of the rocket at time = 25 s.

acceleration = ... [2]

(c) Determine the distance travelled by the rocket between time = 0 and time = 10 s.

distance = ... [2]

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7. 0625_m20_qp_42 Q: 1

A rocket is launched vertically upwards from the ground. The rocket travels with uniform acceleration from rest. After 8.0 s, the speed of the rocket is 120 m/s.

(a) Calculate the acceleration of the rocket.

acceleration = ... [2]

(b) **(i)** On Fig. 1.1, draw the graph for the motion of the rocket in the first 8.0 s.

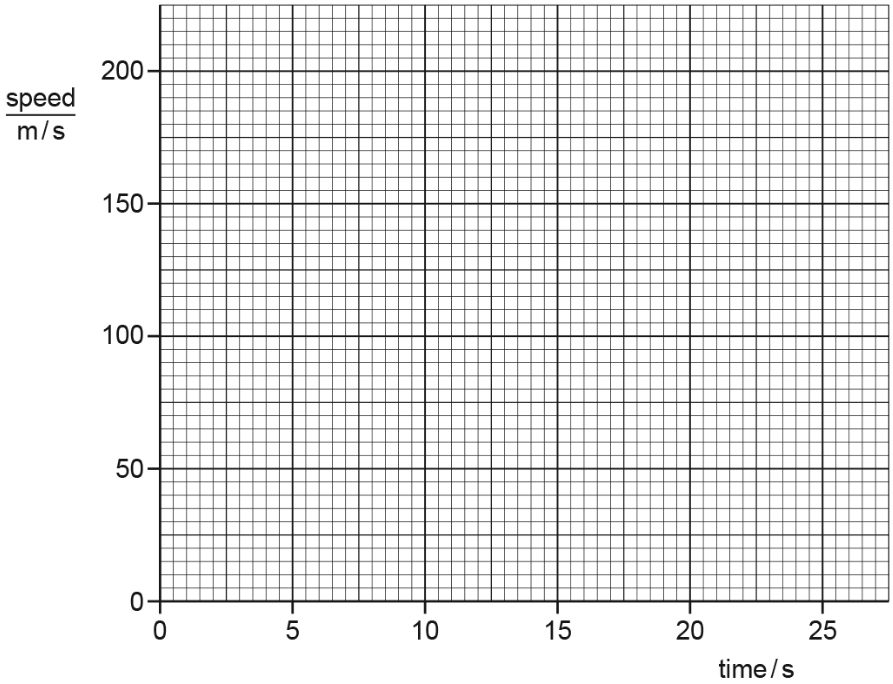

Fig. 1.1

[1]

(ii) Use the graph to determine the height of the rocket at 8.0 s.

height = ... [2]

(iii) From time = 8.0 s to time = 20.0 s, the rocket rises with increasing speed but with decreasing acceleration.

From time = 20.0 s to time = 25.0 s, the rocket has a constant speed of less than 200 m/s.

On Fig. 1.1, draw the graph for this motion. [3]

[Total: 8]

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8. 0625_s20_qp_42 Q: 1

Fig. 1.1 shows the speed–time graph of a person on a journey.

On the journey, he walks and then waits for a bus. He then travels by bus. He gets off the bus and waits for two minutes. He then walks again. His journey takes 74 minutes.

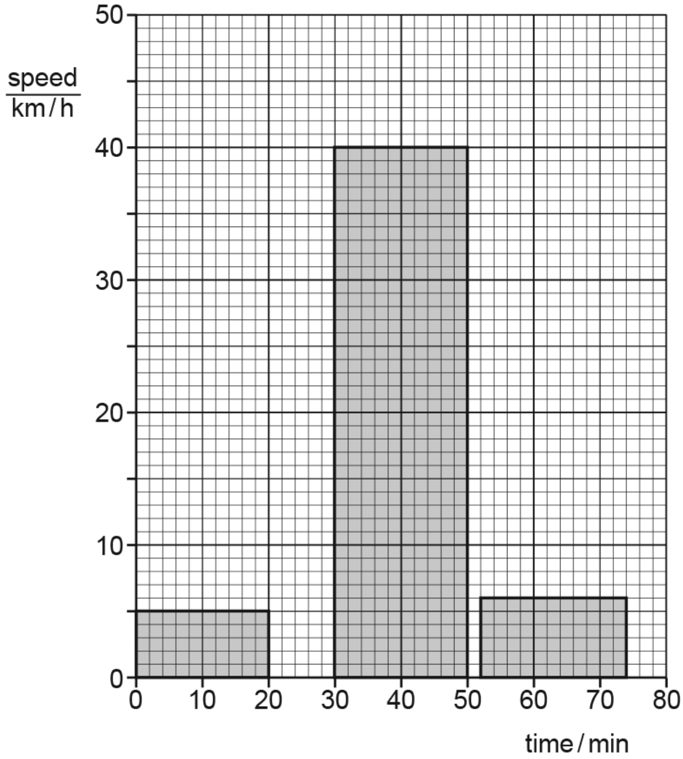

Fig. 1.1

(a) For the whole journey calculate:

(i) the distance travelled

distance = ... [3]

(ii) the average speed.

average speed = ... [2]

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(b) State and explain which feature of a speed–time graph shows acceleration.

....

.... [2]

(c) State and explain the acceleration of the person at time = 40 minutes.

....

.... [2]

[Total: 9]

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9. 0625_s20_qp_43 Q: 1

(a) Define *acceleration*.

....

.... [1]

(b) Fig. 1.1 shows two speed–time graphs, A and B, and two distance–time graphs, C and D.

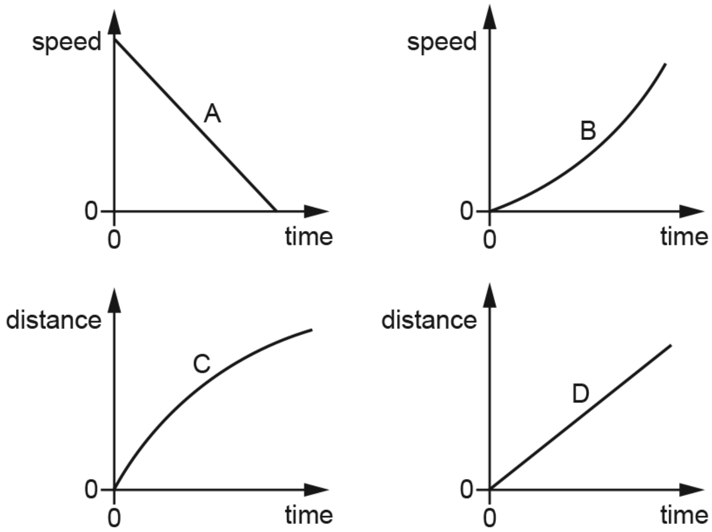

Fig. 1.1

Describe the motion shown by:

(i) graph A ....

.... [2]

(ii) graph B ....

.... [2]

(iii) graph C ....

.... [1]

(iv) graph D. ....

.... [1]

[Total: 7]

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10. 0625_m19_qp_42 Q: 1

(a) Define *acceleration*.

.... [1]

(b) Fig. 1.1 shows the distance-time graph for the journey of a cyclist.

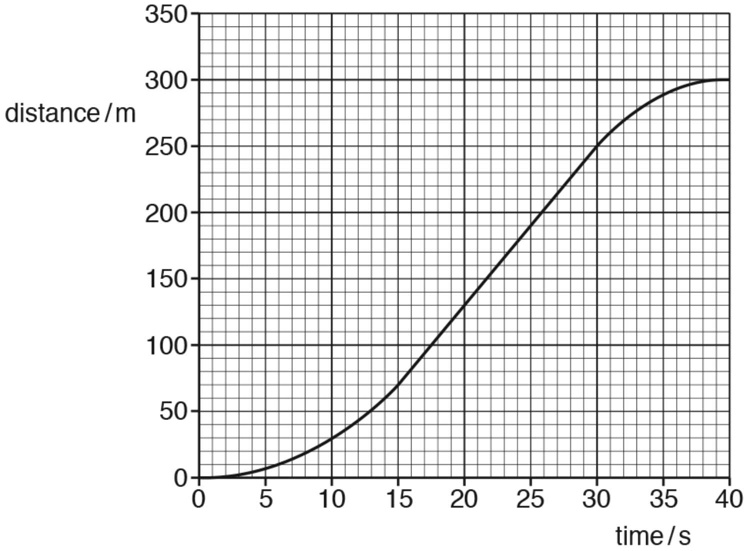

Fig. 1.1

(i) Describe the motion of the cyclist in the time between:

1. time = 0 and time = 15 s

....

2. time = 15 s and time = 30 s

....

3. time = 30 s and time = 40 s.

....
[3]

(ii) Calculate, for the 40 s journey:

1. the average speed

average speed = ... [2]

2. the maximum speed.

maximum speed = ... [2]

[Total: 8]

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11. 0625_s19_qp_42 Q: 1

A bus is travelling between points A and D. There are bus stops at A, B, C and D but the bus does not stop at B and C. Fig. 1.1 is a speed-time graph for the bus.

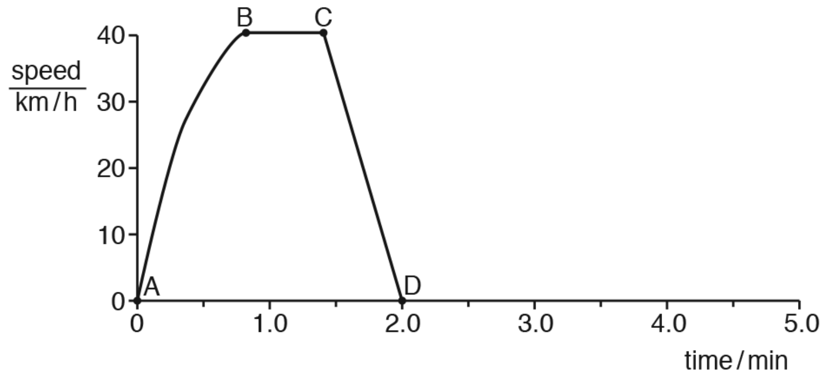

Fig. 1.1

(a) Describe the motion of the bus between each of the bus stops. Select the appropriate description from the list below.

constant acceleration **decreasing acceleration**

increasing acceleration **moving backwards at constant speed**

moving forwards at constant speed **stationary**

1. between A and B ....

2. between B and C ....

3. between C and D ....

[3]

(b) The average speed of the bus between A and D is 23 km / h.

Calculate the distance between A and D.

distance = ... [3]

(c) The bus stops at D for 1 min and then travels at a constant acceleration for 30 seconds.

On Fig. 1.1, sketch a possible graph for this additional motion. Label X when the bus starts to accelerate and label Y for 30 seconds later. [3]

[Total: 9]

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12. 0625_s19_qp_43 Q: 1

Fig. 1.1 shows a distance-time graph for a cyclist travelling between points P and V on a straight road.

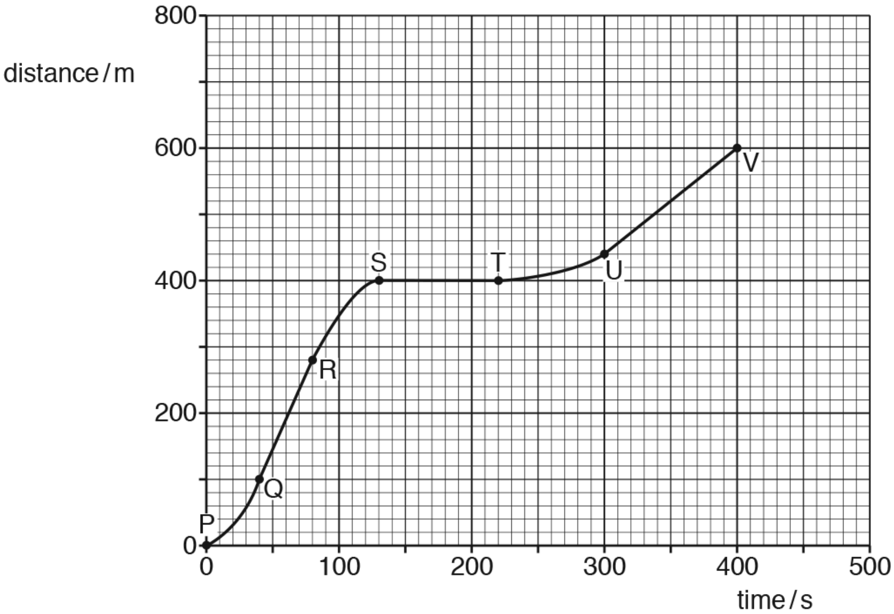

Fig. 1.1

(a) Describe the motion between:

Q and R ....

R and S ....

S and T. ....
[3]

(b) Calculate the speed between U and V.

speed = ... [2]

(c) After point V, the straight road continues down a steep hill. The cyclist travels down the steep hill. He does not apply the brakes and all resistive forces can be ignored.

On Fig. 1.1, sketch a possible motion for the cyclist after V. [1]

[Total: 6]

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13. 0625_m18_qp_42 Q: 1

(a) Define *acceleration*.

.... [1]

(b) Fig. 1.1 shows the speed-time axes for the graph of the motion of a car.

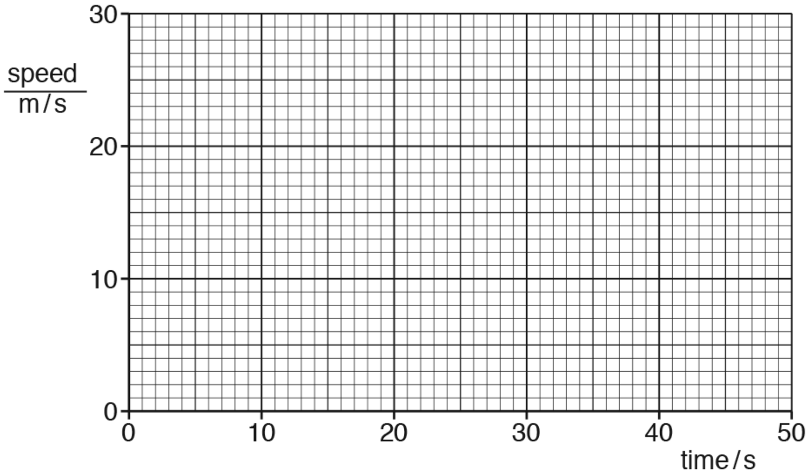

Fig. 1.1

(i) The car starts from rest.

From time = 0 to time = 15 s, the car has a constant acceleration to a speed of 28 m/s.

From time = 15 s to time = 32 s, the car has a constant speed of 28 m/s.

From time = 32 s, the car has a constant deceleration of 2.0 m/s^2 until it comes to rest.

On Fig. 1.1, draw the graph, using the space below for any calculations.

[5]

(ii) From time = 15 s to time = 32 s, the path of the car is part of a circle.

For this motion, state

1. the direction of the resultant force on the car,

....

2. what happens to the velocity of the car.

....
[2]

[Total: 8]

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14. 0625_s18_qp_41 Q: 1

Fig. 1.1 shows the speed-time graph for a vehicle accelerating from rest.

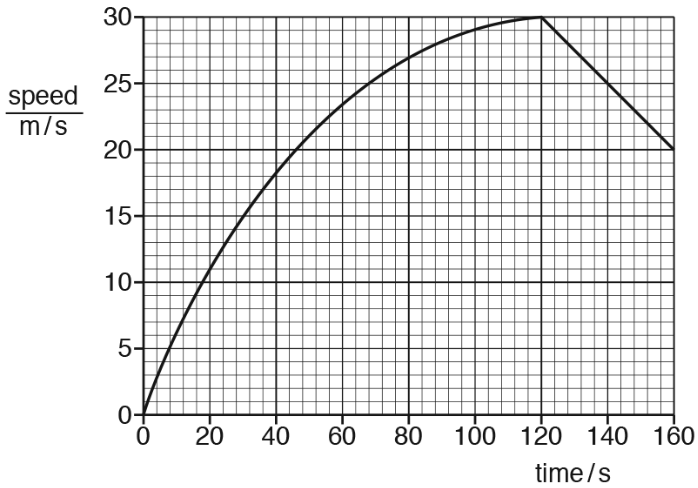

Fig. 1.1

(a) Calculate the acceleration of the vehicle at time = 30 s.

acceleration = ...[2]

(b) Without further calculation, state how the acceleration at time = 100 s compares to the acceleration at time = 10 s. Suggest, in terms of force, a reason why any change has taken place.

....

....

....[3]

(c) Determine the distance travelled by the vehicle between time = 120 s and time = 160 s.

distance = ...[3]

[Total: 8]

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15. 0625_s18_qp_42 Q: 1

(a) Fig. 1.1 shows the axes of a distance-time graph for an object moving in a straight line.

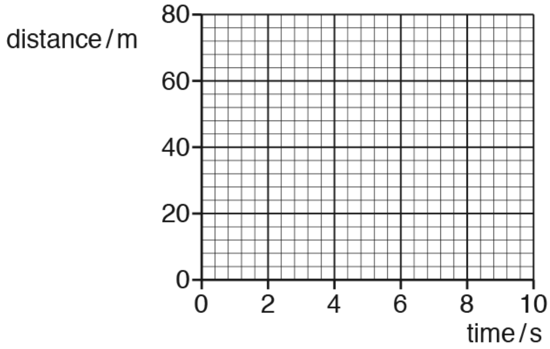

Fig. 1.1

(i) **1.** On Fig. 1.1, draw between time = 0 and time = 10 s, the graph for an object moving with a constant speed of 5.0 m / s. Start your graph at distance = 0 m.

2. State the property of the graph that represents speed.

.... [2]

(ii) Between time = 10 s and time = 20 s the object accelerates. The speed at time = 20 s is 9.0 m / s.

Calculate the average acceleration between time = 10 s and time = 20 s.

acceleration = ... [2]

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(b) Fig. 1.2 shows the axes of a speed-time graph for a different object.

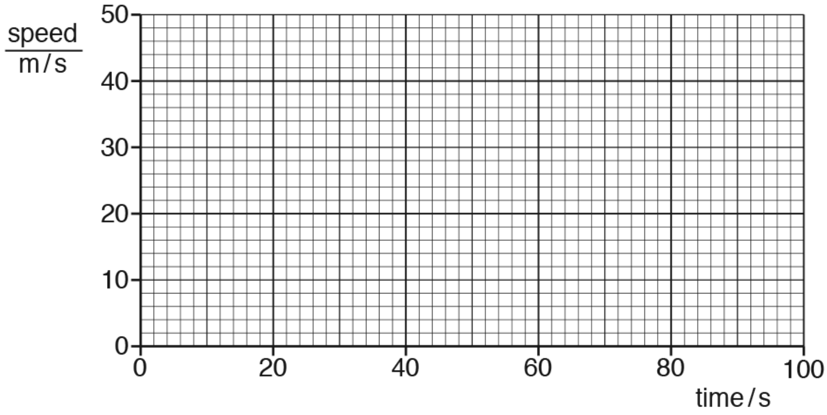

Fig. 1.2

(i) The object has an initial speed of 50 m/s and decelerates uniformly at 0.35 m/s^2 for 100 s.

On Fig. 1.2, draw the graph to represent the motion of the object. [2]

(ii) Calculate the distance travelled by the object from time = 0 to time = 100 s.

distance = ...[3]

[Total: 9]

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16. 0625_s18_qp_43 Q: 1

There is no atmosphere on the Moon.

A space probe is launched from the surface of the Moon. Fig. 1.1 shows the speed-time graph of the space probe.

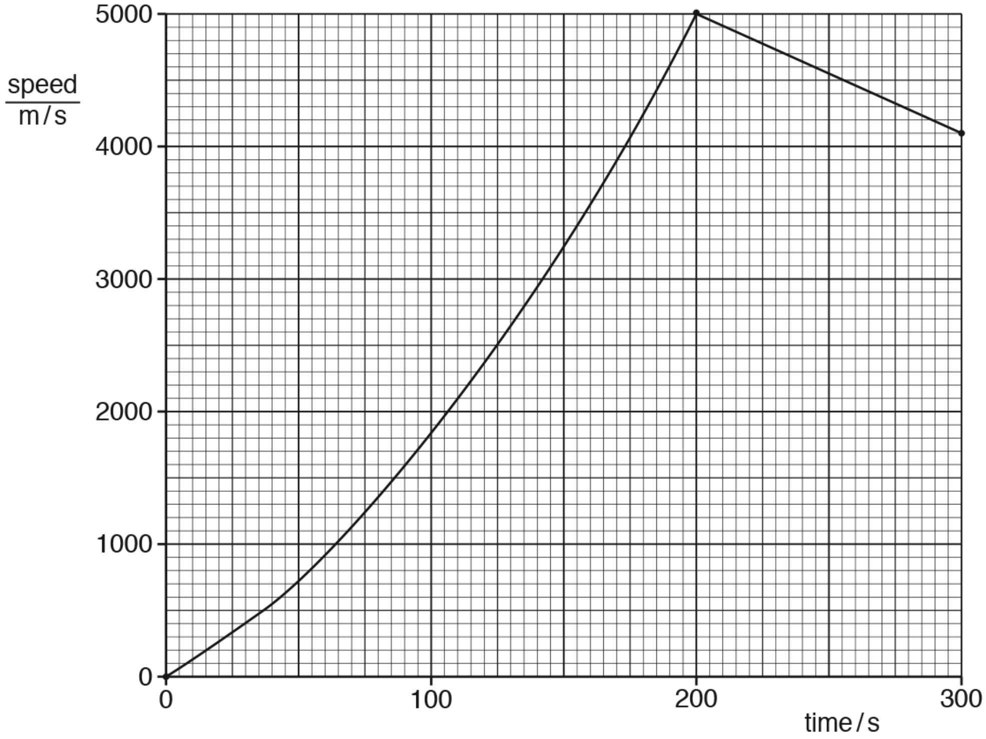

Fig. 1.1

(a) Determine the acceleration of the space probe at time = 0.

acceleration = ...[3]

(b) Between time = 0 and time = 150 s, the acceleration of the space probe changes.

(i) Without calculation, state how the graph shows this.

....

....[1]

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(ii) During this time, the thrust exerted on the space probe by the motor remains constant.

State one possible reason why the acceleration changes in the way shown by Fig. 1.1.

....

....[1]

(c) Calculate the distance travelled by the space probe from time = 200 s to time = 300 s.

distance = ...[3]

[Total: 8]

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17. 0625_w18_qp_43 Q: 1

Fig. 1.1 is the distance-time graph for a moving car.

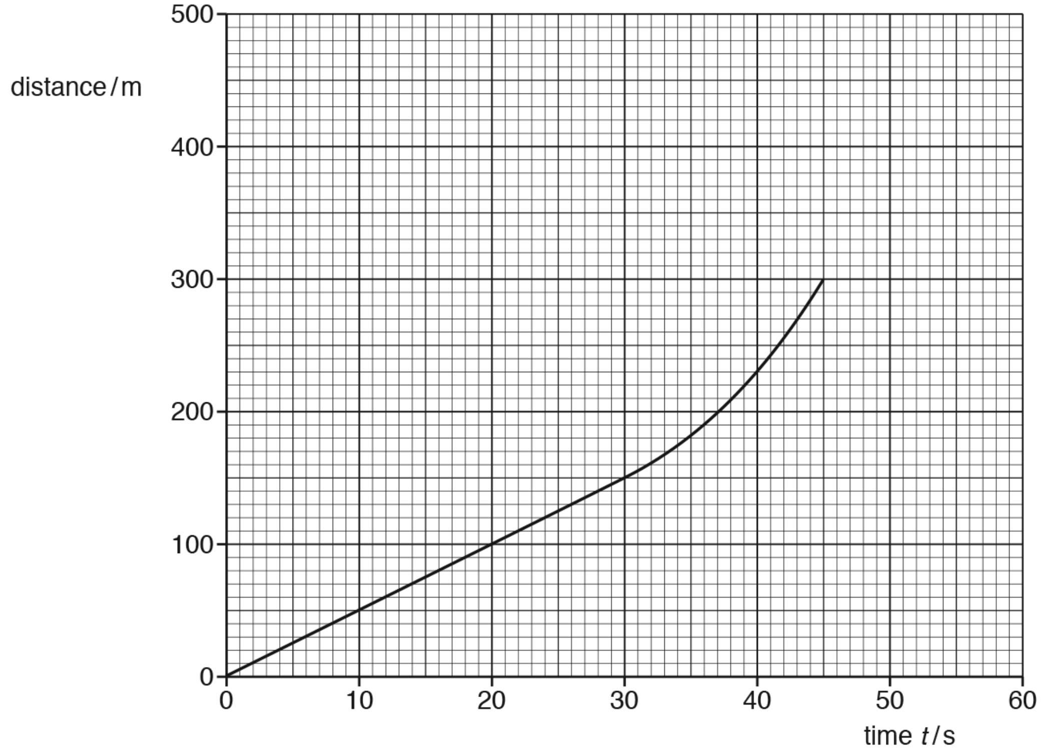

Fig. 1.1

(a) On Fig. 1.1, mark a point P where the acceleration of the car is zero. [1]

(b) Determine:

(i) the speed of the car at time $t = 15\,s$

speed = ...[2]

(ii) the average speed of the car between time $t = 30\,s$ and time $t = 45\,s$.

average speed = ...[2]

(c) At time $t = 45\,s$, the car starts to decelerate. At time $t = 55\,s$ and at a distance of 400 m from the starting point, the car stops. It then remains stationary for 5.0 s.

On Fig. 1.1, draw a possible continuation of the distance-time graph. [3]

[Total: 8]

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18. 0625_s17_qp_41 Q: 1

Fig. 1.1 is the speed-time graph for an ice skater.

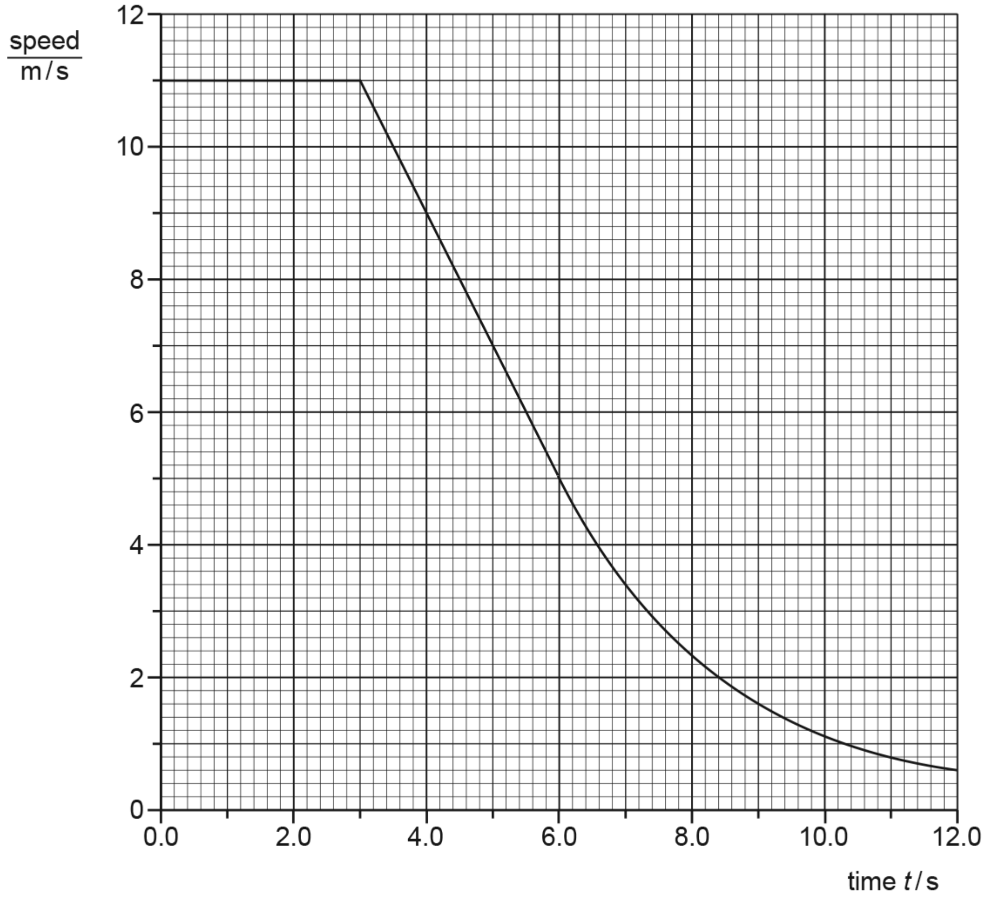

Fig. 1.1

(a) Explain what is meant by *deceleration*.

....[1]

(b) Use Fig. 1.1 to determine

(i) the distance travelled between times t = 3.0 s and t = 6.0 s,

distance = ...[2]

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(ii) the deceleration between times t = 3.0 s and t = 6.0 s.

deceleration = ...[2]

(c) **(i)** State what happens to the size of the deceleration after time t = 6.0 s.

....

....[1]

(ii) State what happens to the resultant force on the skater after time t = 6.0 s.

....

....[1]

[Total: 7]

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19. 0625_s17_qp_43 Q: 1

(a) Acceleration is a vector quantity.

Underline the **two** vector quantities in the list below.

energy **force** **frequency** **impulse** **mass** **refractive index**

[1]

(b) A car accelerates uniformly from rest at 2.2 m/s^2 for 3.0 s.

(i) Calculate the speed of the car at time t = 3.0 s.

speed = ...[2]

(ii) At time t = 3.0 s, it has travelled a distance of 9.9 m.

Calculate the average speed of the car during the first 3.0 s of the journey.

speed = ...[1]

(iii) On Fig. 1.1, sketch a distance-time graph for the first 3.0 s of the journey.

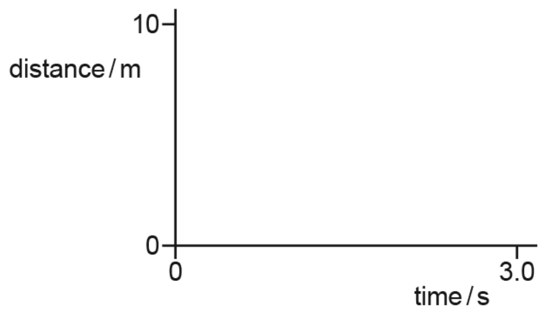

Fig. 1.1

[3]

[Total: 7]

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1.3 Mass and weight

20. 0625_s17_qp_41 Q: 3

Fig. 3.1 shows remote sensing equipment on the surface of a distant planet.

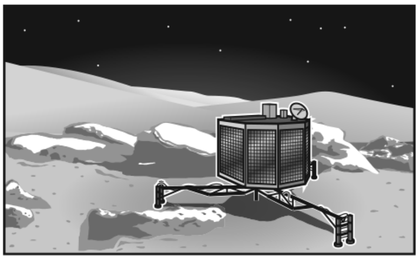

Fig. 3.1

(a) The mass of the equipment is 350 kg. The acceleration of free fall on the surface of this planet is 7.5 m/s^2.

(i) State what is meant by the term *weight*.

....

....[1]

(ii) Calculate the weight of the equipment on the planet.

weight = ...[2]

(b) The equipment releases a balloon from a point that is a small distance above the surface of the planet. The atmosphere at the surface of this planet has a density of 0.35 kg/m^3. The inflated balloon has a mass of 80 g and a volume of 0.30 m^3.

Make an appropriate calculation and then predict and explain the direction of any motion of the balloon. Show your working.

prediction ....

explanation ....

....

[4]

[Total: 7]

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1.4 Density

21. 0625_w23_qp_43 Q: 1

(a) Oil of density 0.80 g / cm^3 is poured gently onto the surface of water of density 1.0 g / cm^3. The oil and the water do **not** mix.

Describe and explain the final position of the oil relative to the water.

description ....

....

explanation ....

....
[2]

(b) An irregularly shaped solid object has a density of 2.7 g / cm^3.

(i) Describe a method to measure the volume of the irregularly shaped solid object.

....

....

.... [2]

(ii) The volume of the object is 83 cm^3.

Calculate the mass of the object.

mass = ... [3]

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22. 0625_s21_qp_42 Q: 1

(a) Fig. 1.1 shows a sealed weather balloon which is stationary in still air.

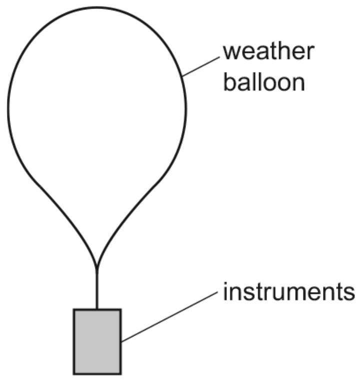

Fig. 1.1

State whether the overall density of the balloon and its instruments is greater than, less than, or the same as the density of the surrounding air.

.... [1]

(b) At night, the gas inside the balloon cools. The pressure of the air outside the balloon remains the same.

(i) State whether the balloon rises, falls or remains stationary.

.... [1]

(ii) Explain your answer.

....

....

.... [2]

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(c) An object is released from the balloon. It starts at rest and eventually reaches a constant speed.

(i) On the axes of Fig. 1.2, sketch a speed–time graph to show this motion.

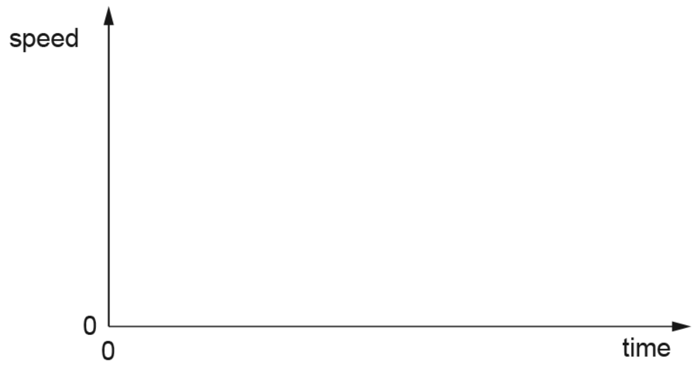

Fig. 1.2

[3]

(ii) State the values of the initial acceleration and the final acceleration of the object.

initial acceleration ....

final acceleration ....
[2]

[Total: 9]

---

23. 0625_s17_qp_43 Q: 3

A block of wood has a volume of 210 cm^3 and a mass of 180 g.

(a) Calculate the density of the block of wood.

density = ...[2]

(b) The block is held just above the surface of a liquid of density 0.88 g/cm^3.

Predict and explain what happens when the block is released.

....

....

....[2]

[Total: 4]

1.5 Forces

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24. 0625_s23_qp_41 Q: 2

Fig. 2.1 shows a motorcyclist accelerating along a straight horizontal section of track.

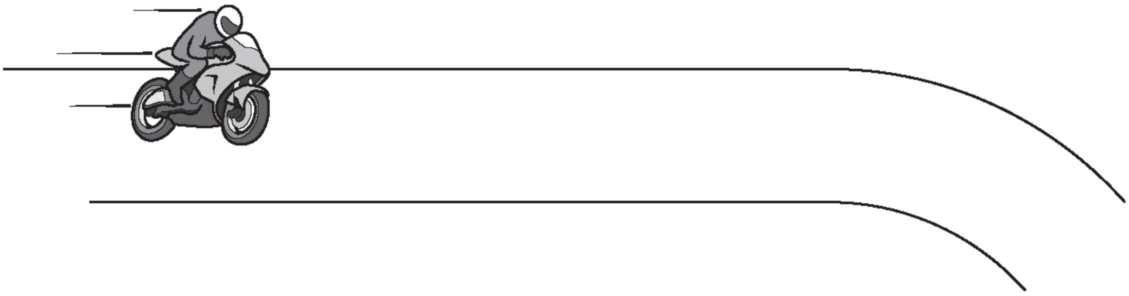

Fig. 2.1

The motorcyclist and motorcycle have a combined mass of 240 kg.

(a) On the straight horizontal section of the track, the motorcyclist accelerates from rest at 7.2 m/s^2.

(i) The motorcyclist reaches the end of the straight section of track in 5.3 s.

Calculate the speed of the motorcyclist at the end of the straight section.

speed = ... [2]

(ii) Calculate the resultant force on the motorcyclist and motorcycle on the straight section of track.

resultant force = ... [2]

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Appendix A

Answers

1. 0625_w22_ms_42 Q: 2

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>(a)</td><td>(use stop-watch to) time oscillations</td><td>B1</td></tr>
<tr><td></td><td>(use of fiduciary) aid to determine a complete cycle</td><td>B1</td></tr>
<tr><td></td><td>(use of) multiple oscillations AND division (to determine period)</td><td>B1</td></tr>
<tr><td>(b)</td><td><table><tr><td>quantity</td><td>device</td></tr><tr><td>volume of water in a glass</td><td>measuring cylinder</td></tr><tr><td>width of a small swimming pool</td><td>metre rule</td></tr><tr><td>thickness of a piece of aluminium foil</td><td>micrometer screw gauge</td></tr></table>1 mark for each correct response</td><td>B3</td></tr>
</table>

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2. 0625_s17_ms_42 Q: 1

(a)(i)	(a scalar) does **not** have direction	**B1**
(a)(ii)	energy **and** temperature	**B1**
(b)	straight line **and** non-zero gradient	**B1**
(c)	scale $\geqslant$ 1 cm: 1 m/s	**B1**
	two arrows/lines **and** correct resultant OR rectangle and correct diagonal (towards bottom left)	**B1**
	7.2→7.6 m/s	**B1**
	26.0° $\leqslant$ angle below E–W $\leqslant$ 30.5° OR 239.5° $\leqslant$ bearing $\leqslant$ 244°	**B1**
	Total:	**7**

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3. 0625_m23_ms_42 Q: 1

Question	Answer		Marks
(a)	speed = 4.3 m / s	speed = 4.3 m / s	**A2**
	correct vector triangle or rectangle drawn	use of Pythagoras' theorem e.g. $a^2 + b^2 = c^2$ OR (speed =) $\sqrt{(2.5^2 + 3.5^2)}$	(C1)
	direction = 54° or 55°	direction = 54° or 55°	**A2**
	resultant velocity vector (including arrow)	use of trigonometry to find angle e.g. tan Θ = 3.5 / 2.5	(C1)
(b)	a scalar quantity distance, time, mass, energy, temperature		**B1**
	a vector quantity force, weight, acceleration, momentum, electric field strength, gravitational field strength		**B1**

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4. 0625_s23_ms_41 Q: 1

Question	Answer	Marks
(a)(i)	(magnitude of velocity =) 0.90 m / s	**A2**
	use of Pythagoras' theorem e.g. $a^2 + b^2 = c^2$ OR (speed =) $\sqrt{(0.54^2 + 0.72^2)}$ **OR** correct vector triangle or rectangle drawn	C1
	(direction of velocity =) 53° (to riverbank)	**A2**
	use of trigonometry to find angle e.g. $\tan\theta = 0.72 / 0.54$ **OR** (only) angle with horizontal identified on the diagram	C1
(a)(ii)	(distance =) 81 m	**A3**
	$v = s / t$ **OR** (s =) vt **OR** (s =) 0.9(0) × 90	C1
	(time =) 1.5 × 60 (= 90) **OR** (time =) 90	C1
(b)	friction (of water backwards) **OR** resistance (on swimmer backwards)	**B1**
	(friction / resistance) balances forward force **OR** (there is) no resultant force	**B1**

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5. 0625_m22_ms_42 Q: 1

Question	Answer	Marks
(a)	2.2 s	B1
(b)	*Any two from:* • Line on graph is horizontal / gradient is zero • (therefore) no acceleration / speed is constant • (resultant) force causes / is proportional to acceleration	B2
(c)	8.5 ms^{-2}	A3
	(a =) Δv / t in any form OR gradient of graph OR 12.8 / 1.5 OR other suitable values from graph	(C1)
	(1.5, 12.8) both seen OR alternative suitable points on the line identified	(C1)
(d)	0.5 × 12.8 × 1.5 (= 9.56 / 9.6 m) OR 6.4 × 1.5 (= 9.6)	A2
	(length of ramp) = area under graph (between 0–1.5 s) OR <u>average</u> velocity × time	(C1)

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6. 0625_w21_ms_42 Q: 1

Question	Answer	Marks
(a)	(acceleration) increases	B1
(b)	tangent drawn at 25 s	M1
	78 to 82 m / s^2	A1
(c)	(distance =) area under graph (stated or correct area clearly shown on graph) OR (400 x 10) / 2 OR (b x h) ÷ 2	C1
	2000 m	A1

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7. 0625_m20_ms_42 Q: 1

(a)	(a=)Δv / Δt in any form OR (a=)Δv / Δt OR (a)=120 / 8	C1
	(a) = 15 m / s^2	A1
(b)(i)	straight line from (0,0) to (8,120)	B1
(b)(ii)	(h = A =) ½ × 120 × 8	C1
	(h=) 480 m	A1
(b)(iii)	rising <u>curve</u> from 8 s to 20 s	B1
	decreasing gradient from 8 s to 20 s	B1
	horizontal from 20 s to 25 s AND below 200 m / s, AND above 120 m / s	B1

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8. 0625_s20_ms_42 Q: 1

(a)(i)	s = vt in any form OR (s =) vt OR relates distance to area (under graph)	C1
	any **one** of: 5 × 20 / 60 OR 40 × 20 / 60 OR 6 × 22 / 60	C1
	(s = 1.667 + 13.333 + 2.2 =) 17 km	A1
(a)(ii)	average speed = candidate's (i) / time	C1
	(average speed = 17 × 60 / 74 =) 14 km / h	A1
(b)	gradient	B1
	(gradient =) change of speed / time	B1
(c)	0	B1
	(constant) gradient = 0 OR speed constant	B1

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9. 0625_s20_ms_43 Q: 1

(a)	rate of change of velocity OR change in speed per unit time / s	B1
(b)(i)	deceleration	C1
	constant deceleration	A1
(b)(ii)	acceleration	C1
	increasing acceleration	A1
(b)(iii)	decreasing speed / velocity OR deceleration	B1
(b)(iv)	constant speed	B1

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10. 0625_m19_ms_42 Q: 1

(a)	Rate of change of speed OR change of speed / time OR Δv / t OR (v – u) / t	B1
(b)(i)	**1** Acceleration OR increasing speed OR going faster	B1
	2 Constant speed OR steady speed	B1
	3 Deceleration OR decreasing speed OR slowing down	B1
(b)(ii)	**1** Total distance / total time OR 300/40	C1
	7.5 m / s	A1
	2 Change of distance / change of time OR (250 – 70) / (30 – 15) OR 180/15	C1
	12 m / s	A1

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11. 0625_s19_ms_42 Q: 1

(a)	(A and B) decreasing acceleration	**B1**
	(B and C) moving forwards at constant speed	**B1**
	(C and D) constant acceleration	**B1**
(b)	(average) speed = distance/time OR $v = s/t$ in any form OR (s =) (average) speed × time OR $v \times t$ OR area under graph stated or used	**C1**
	(s =) 23 × 2/60	**C1**
	0.77 km round candidates response to 2 sfs	**A1**
(c)	horizontal line starting at t = 2.0 min AND at speed = 0 for 1 minute	**B1**
	line of constant positive gradient starting at t >= 2.0 min NOT wrong labels X OR Y	**B1**
	for 30 seconds line continuously rising	**B1**

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12. 0625_s19_ms_43 Q: 1

(a)(i)	constant velocity / speed	**B1**
(a)(ii)	deceleration / negative acceleration	**B1**
(a)(iii)	Stationary	**B1**
(b)	v = gradient OR $\frac{\text{distance}}{\text{time}}$ OR $\underline{160}$ $\frac{160}{100}$ OR evidence of use of gradient	**C1**
	(v =) 1.6 m/s	**A1**
(c)	line curves upwards with increasing gradient NOT vertical	**B1**

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13. 0625_m18_ms_42 Q: 1

(a)	Rate of change of velocity OR change of velocity / time OR change of velocity over time OR (v – u)/t	**B1**
(b)(i)	Straight line from origin to (15, 28)	**B1**
	Horizontal line {from (15, 28)} to (32, 28)	**B1**
	a = (v – u) / t OR (t =) (v – u) / a OR (0 – 28) / 2.0	**C1**
	= 14 (s)	**C1**
	Straight line from (32, 28) to (46, 0)	**A1**
(b)(ii)	**1** Towards the centre of the circle / inwards	**B1**
	2 Velocity is (continually) changing its direction	**B1**

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14. 0625_s18_ms_41 Q: 1

(a)	Mention of gradient of graph at t = 30 s **OR** tangent drawn at t = 30 s and triangle drawn	**1**
	Acceleration in range 0.30 to 0.45 m / s^2	**1**
(b)	Acceleration less/at a slower rate	**1**
	Less driving force **OR** greater resistive force/friction/air resistance/drag	**1**
	Resultant force less	**1**
(c)	Area under graph	**1**
	Distance = (20 × 40) + (½ × 40 × 10) **OR** ½ × (30 + 20) × 40	**1**
	1000 m	**1**

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15. 0625_s18_ms_42 Q: 1

(a)(i)	**1** straight line from (0,0) to (10,50)	**1**
	2 gradient/slope	**1**
(a)(ii)	$a = \Delta v \div \Delta t$ in any form **OR** (a=) $\Delta v \div \Delta t$ **OR** (a =) (9–5) ÷ 10 **OR** 4 ÷ 10	**1**
	(a =) 0.40 m / s^2	**1**
(b)(i)	straight line down from any point on y-axis to any speed at 100 s	**1**
	from (0,50) to (100,15)	**1**
(b)(ii)	uses area <u>under</u> graph **OR** av speed × time **OR** $s=ut + \frac{1}{2}at^2$ **OR** $v^2=u^2 + 2as$	**1**
	100 × (50 + 15) ÷ 2 **OR** 100 × 15 + ½ (100 × 35) **OR** 5000 – ½ × 0.35 × 100^2	**1**
	3300 m	**1**

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16. 0625_s18_ms_43 Q: 1

(a)	tangent on graph **OR** gradient **OR** (a =) $\Delta v \div \Delta t$ or $(v - u) \div t$	**C1**
	accept gradient increases; **not** gradient decreases	**C1**
	values from tangent or line 13 to 14 m / s^2	**A1**
(b)(i)	gradient changes **OR** graph is curved	**B1**
(b)(ii)	mass of space rocket <u>decreases</u> **OR** gravitational field strength decreases	**B1**
(c)	area under graph **OR** (distance =) <u>average</u> speed × time	**C1**
	4550 × 100 **OR** (4100 + 5000) ÷ 2 × 100	**C1**
	4.5/4.55/4.6 × 10^5 m	**A1**

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17. 0625_w18_ms_43 Q: 1

(a)	P marked on line between t = 0 s and t = 30 s	B1
(b)(i)	(v =) gradient **or** 150 / 30 **or** appropriate division using other points	C1
	5.0 m / s	A1
(b)(ii)	(v =) x / t **or** (300 – 150) / (45 – 30) **or** 150 / 15	C1
	10 m / s	A1
(c)	gradient decreasing	B1
	smooth transition to horizontal **and** line not too thick	B1
	horizontal to (60 s, 400 m)	B1

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18. 0625_s17_ms_41 Q: 1

(a)	decrease of velocity / speed OR slows / slowing down	B1
(b)(i)	Area under graph OR ½ (u +v)t OR ½ × (11 + 5) × 3 OR ½(6 × 3) OR (3 × 5)	C1
	24 m	A1
(b)(ii)	(a =) Δv / Δt OR (v – u) / t OR (5 – 11) / (6 – 3)	C1
	2.0 m / s^2	A1
(c)(i)	(deceleration) decreases	B1
(c)(ii)	(Resultant force) decreases	B1
	Total:	7

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19. 0625_s17_ms_43 Q: 1

(a)	force **and** impulse underlined	B1
(b)(i)	(v =) at OR 2.2 × 3.0	C1
	6.6 m / s	A1
(b)(ii)	3.3 m / s	B1
(c)	curve/line starts at origin	B1
	initial gradient zero OR curve passing through (3.0, 9.9)	B1
	gradient increasing (with time)	B1
	Total:	7

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20. 0625_s17_ms_41 Q: 3

(a)(i)	(Weight is) force/pull of gravity (acting on an object)	**B1**
(a)(ii)	Mass × acceleration due to gravity OR *mg* OR 350 × 7.5	**C1**
	2600 N	**A1**
(b)	(*ρ* =) *m* / *V* in any form	**C1**
	0.27 (kg/m^3) OR 270 (g/m^3)	**A1**
	Balloon moves/floats up	**B1**
	(Floats when) density of balloon less than density of atmosphere OR (sinks when) density of balloon greater than atmosphere	**B1**
	OR (*ρ* =) *m* / *V* in any form	**(C1)**
	110 g	**(A1)**
	Balloon rises	**(B1)**
	(Floats when) mass/weight of balloon less than mass/weight of atmosphere (of same volume as balloon) (Sinks when) mass/weight of balloon greater than mass/weight of atmosphere (of same volume as balloon)	**(B1)**
	Total:	**7**

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21. 0625_w23_ms_43 Q: 1

Question	Answer	Marks
(a)	(oil) stays on surface / floats on the water	**B1**
	(oil has) lower density than water **OR** liquids of lower density float on liquids of higher density	**B1**
(b)(i)	measure (initial) volume of liquid / water AND immerse object **OR** immerse object in a known / measured volume of liquid / water	**B1**
	subtract initial / start volume from final / new volume **OR** calculate the difference in volume **OR** measure change in volume	**B1**
	OR (alternative answer)	
	fill displacement can / container with water **AND** immerse object	**(B1)**
	measure volume of displaced water	**(B1)**
(b)(ii)	220 g	**A3**
	ρ = *m* / *V* **OR** (*m* =) *ρV* **OR** 2.7 × 83	C1
	(*m* =) 2.7 × 83 **OR** 2.2×10^n	C1

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22. 0625_s21_ms_42 Q: 1

	Answer	Mark
(a)	same (as density of surrounding air)	**B1**
(b)(i)	falls	**B1**
(b)(ii)	volume decreases	**B1**
	density increases	**B1**
(c)(i)	starts at origin	**B1**
	finishes horizontal by eye	**B1**
	gradient decreasing smoothly to 0	**B1**
(c)(ii)	10 m / s^2 (down)	**B1**
	0 ignore any unit	**B1**

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23. 0625_s17_ms_43 Q: 3

(a)	$(\rho =)\frac{m}{V}$ OR 180 ÷ 210 OR 0.18 ÷ 210	**C1**
	0.86 g / cm^3	**A1**
(b)	floats OR words to the same effect	**B1**
	density of wood is less than density of liquid	**B1**
	Total:	**4**

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24. 0625_s23_ms_41 Q: 2

Question	Answer	Marks
(a)(i)	(speed =) 38 m / s	**A2**
	$a = \Delta v / \Delta t$ **OR** $(\Delta v =)\ a\Delta t$ **OR** $(\Delta v =)\ 7.2 \times 5.3$	C1
(a)(ii)	(resultant force =) 1 700 N	**A2**
	$F = ma$ **OR** $(F =)\ ma$ **OR** $(F =)\ 240 \times 7.2$	C1
(b)(i)	(vector) has direction (as well as magnitude) **OR** scalar does not have direction	**B1**

Question	Answer	Marks
(b)(ii)	(velocity) changes (as direction of motion changes) **OR** direction (of velocity) changes	**B1**
(b)(iii)	any **two** from: • because there is an acceleration / change in velocity / change in direction / change in momentum (which needs a resultant force) • motorcyclist accelerates / changes momentum (because velocity / direction changes) • (resultant) force is perpendicular to the motion (of the motorcycle) **OR** $a \propto F$	**B2**

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