

1 The diameter of a copper wire is thought to be approximately 0.3 mm.

Which instrument should be used to obtain a more accurate measurement of the diameter of the wire?

- A measuring tape
- B metre rule
- C micrometer
- D ruler

2 Which is a unit of acceleration?

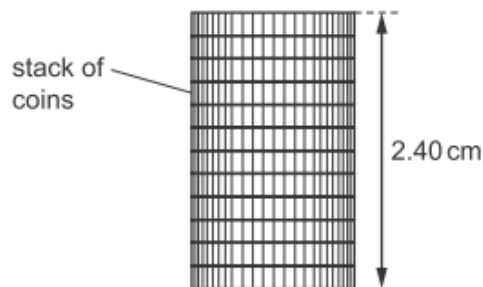
- A g/cm^3
- B m/s
- C m/s^2
- D N/m

3 An object is released from rest and falls to Earth. During its fall, the object is affected by air resistance. The air resistance eventually reaches a constant value.

Which description about successive stages of the motion of the object is correct?

- A constant acceleration, then constant deceleration
- B constant deceleration, then zero acceleration
- C decreasing acceleration, then constant deceleration
- D decreasing acceleration, then zero acceleration

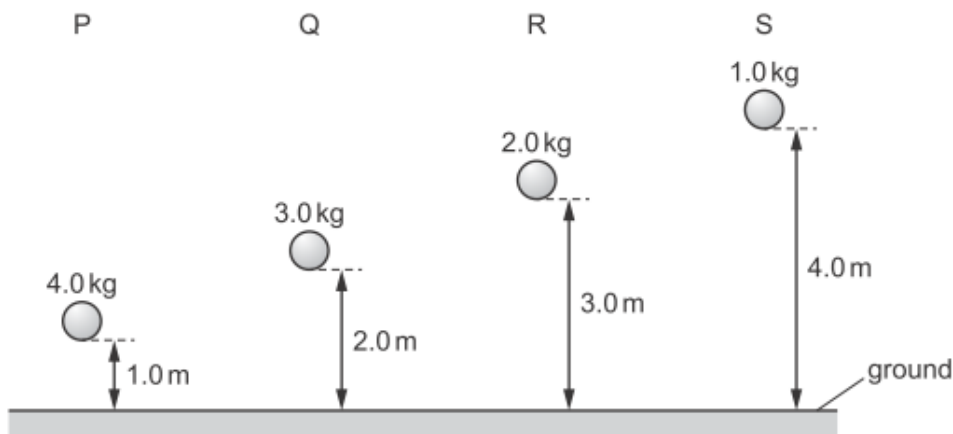
The diagram shows the height of a stack of identical coins.



What is the thickness of one coin?

- A 0.20 mm
- B 2.0 mm
- C 0.24 cm
- D 2.0 cm

Four balls with different masses are dropped from the heights shown.



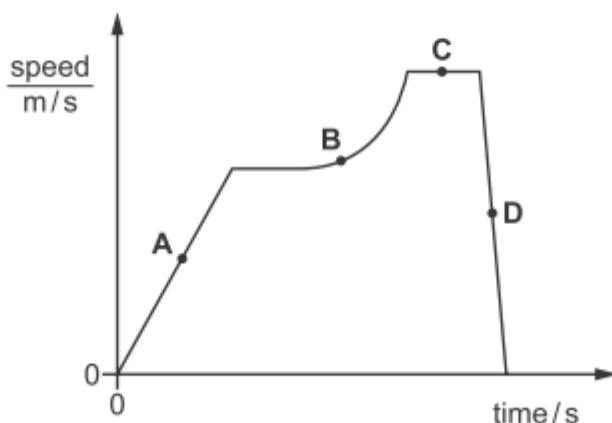
Air resistance may be ignored.

Which statement about the balls is correct?

- A Ball P has the greatest acceleration.
- B Balls Q and R take the same time to fall to the ground.
- C The acceleration of ball R is half the acceleration of ball P.
- D Ball S has the greatest average speed.

An object is travelling in a straight line. The diagram is the speed-time graph for the object.

At which labelled point is the object accelerating at a changing rate?



Which statement about the masses and weights of objects on the Earth is correct?

- A A balance can only be used to compare weights, not masses.
- B Heavy objects always have more mass than light ones.
- C Large objects always have more mass than small ones.
- D Mass is a force but weight is not.

An object in a space probe above the Earth weighs 3.5N. The gravitational field strength at the height of the space probe is 7.0N/kg.

The gravitational field strength on the Earth's surface is 10N/kg.

What are the mass and the weight of the object on the Earth's surface?

	mass/kg	weight/N
A	0.50	3.5
B	0.50	5.0
C	2.0	3.5
D	2.0	20

A skydiver jumps from a stationary helicopter and reaches a steady vertical speed. She then opens her parachute.

Which statement about the falling skydiver is correct?

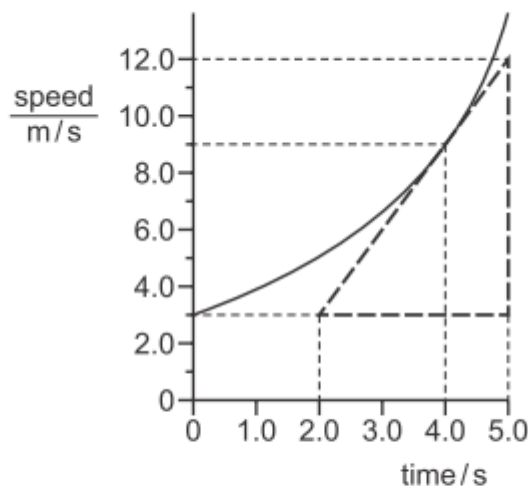
- A** As her parachute opens, her acceleration is upwards.
- B** As she falls at a steady speed with her parachute open, her weight is zero.
- C** When she accelerates, the resultant force on her is zero.
- D** When she falls at a steady speed, air resistance is zero.

A parachutist is falling through the air at terminal velocity.

Which statement about the parachutist is correct?

- A** Every force acting on the parachutist is equal to zero and his acceleration is equal to zero.
- B** Every force acting on the parachutist is equal to zero and his velocity is equal to zero.
- C** The resultant force acting on the parachutist is equal to zero and his acceleration is equal to zero.
- D** The resultant force acting on the parachutist is equal to zero and his velocity is equal to zero.

The curved line on the graph shows the motion of a car.



What is the acceleration of the car at the time of 4.0 s?

- A** 0.33 m/s^2
- B** 0.44 m/s^2
- C** 2.3 m/s^2
- D** 3.0 m/s^2

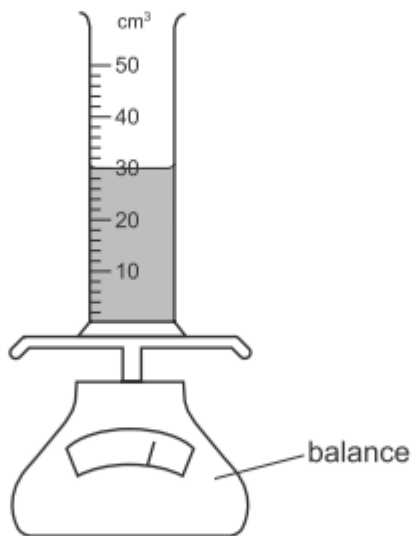
The gravitational field strength on the Moon is 1.6 N/kg.

An astronaut has a mass of 75 kg.

What is the weight of the astronaut on the Moon?

- A** 47 N **B** 75 N **C** 120 N **D** 750 N

A measuring cylinder contains 30 cm³ of a liquid.



Some more of the liquid is added until the liquid level reaches the 50 cm³ mark.

The reading on the balance increases by 30 g.

What is the density of the liquid?

- A** 0.60 g/cm³ **B** 0.67 g/cm³ **C** 1.5 g/cm³ **D** 1.7 g/cm³

A stone of mass 0.12 kg is fired from a catapult. The velocity of the stone changes from 0 to 5.0 m/s in 0.60 s.

What is the average resultant force acting on the stone while it is being fired?

- A** 1.0 N **B** 2.5 N **C** 3.6 N **D** 8.3 N

Which row shows the best choice of measuring instruments to obtain accurate values for the distances shown?

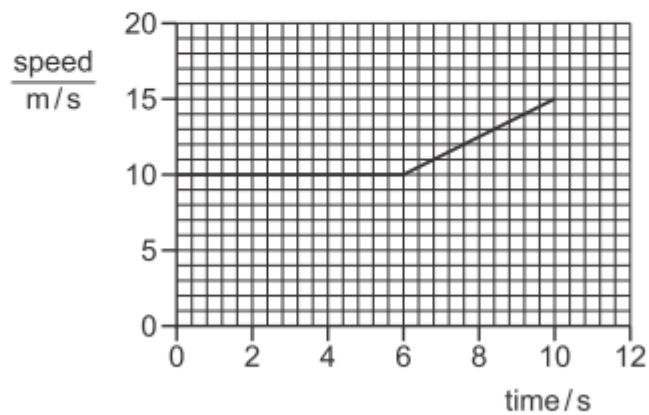
	diameter of wire	height of bench	length of laboratory
A	measuring tape	measuring tape	micrometer screw gauge
B	metre rule	micrometer screw gauge	measuring tape
C	micrometer screw gauge	measuring tape	metre rule
D	micrometer screw gauge	metre rule	measuring tape

An object is moving with uniform deceleration.

Which statement describes its motion?

- A Its rate of change of speed is decreasing.
- B Its speed is constant.
- C Its speed is decreasing.
- D Its speed is increasing.

The graph shows how the speed of a car varies during part of its journey.

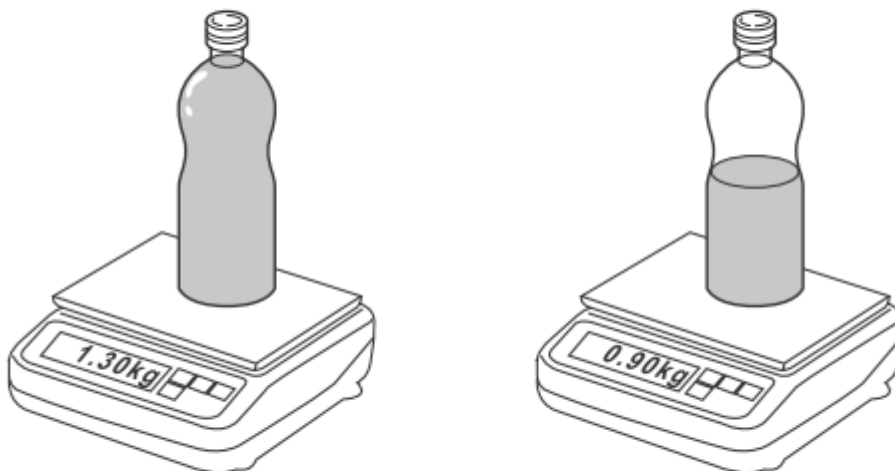


What is the value of the car's acceleration between 6 s and 10 s?

- A 0.50 m/s^2
- B 0.80 m/s^2
- C 1.25 m/s^2
- D 1.50 m/s^2

The mass of a full bottle of cooking oil is 1.30 kg.

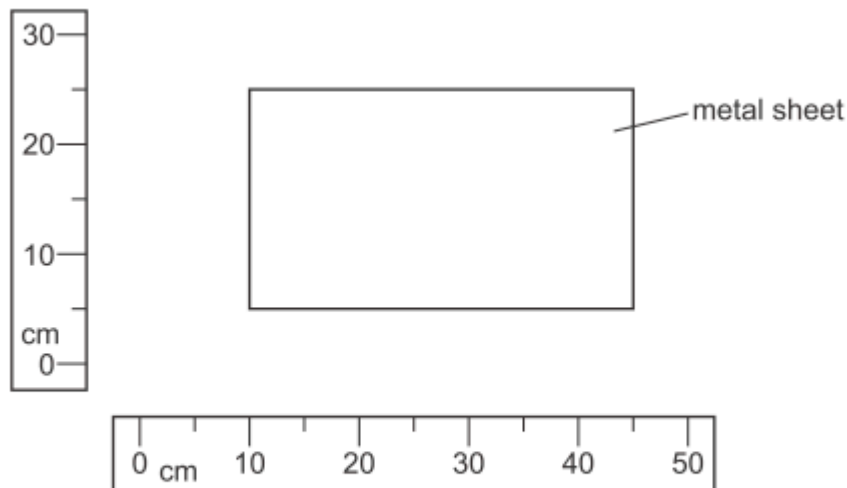
When exactly half of the oil has been used, the mass of the bottle plus the remaining oil is 0.90 kg.



What is the mass of the empty bottle?

- A 0.40 kg
- B 0.50 kg
- C 0.65 kg
- D 0.80 kg

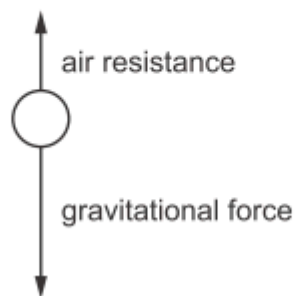
The diagram shows a rectangular metal sheet close to two rulers.



What is the area of the metal sheet?

- A** 700 cm^2 **B** 875 cm^2 **C** 900 cm^2 **D** 1125 cm^2

A ball falls from rest through the air towards the ground. The diagram shows two forces acting on the ball.



As the ball falls, the air resistance increases.

Which statement is correct?

- A** The acceleration of the ball decreases.
B The acceleration of the ball increases.
C The speed of the ball decreases.
D The gravitational force on the ball decreases.

Which statement about mass is correct?

- A** A mass of 10 kg weighs 1 N near the Earth's surface.
B Mass is a gravitational force.
C Mass increases when the gravitational field strength increases.
D The greater the mass of a body, the more it resists a change in its motion.

A student has a measuring cylinder containing water and also has a balance.

Which of these could she use to find the volume of a small metal sphere?

She has no other apparatus.

- A** either the measuring cylinder containing water or the balance
- B** the measuring cylinder containing water only
- C** the balance only
- D** neither the measuring cylinder nor the balance

A ball hits a bat with a velocity of 30 m/s, and leaves the bat travelling with a velocity of 20 m/s in the opposite direction. The ball is in contact with the bat for 0.10 s.

What is the magnitude of the acceleration of the ball whilst it is in contact with the bat?

- A** 1.0 m/s²
- B** 5.0 m/s²
- C** 100 m/s²
- D** 500 m/s²

A train begins a journey from a station and travels 60 km in a time of 20 minutes.

What is the average speed of the train?

- A** 3.0 m/s
- B** 5.0 m/s
- C** 50 m/s
- D** 60 m/s

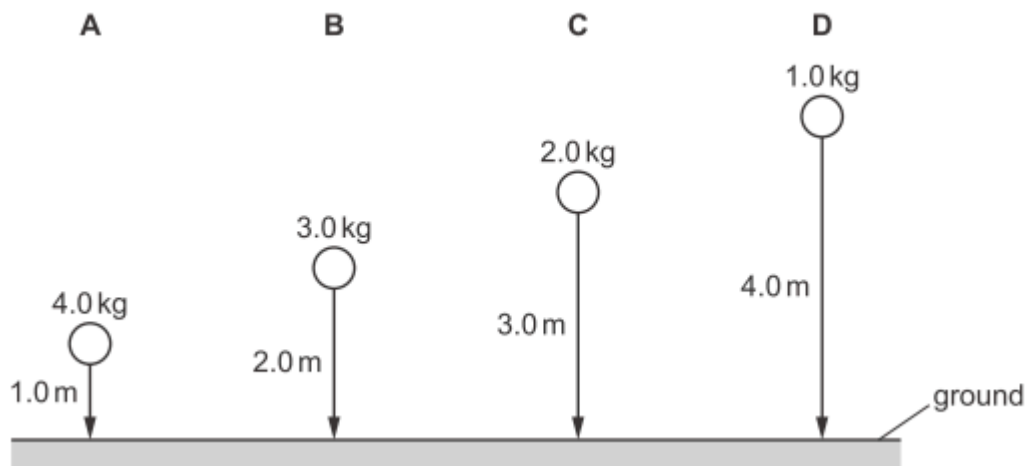
Which piece of apparatus is the most suitable for measuring the mass of a pencil sharpener?

- A** digital balance
- B** measuring cylinder
- C** newton meter
- D** ruler

Four balls with different masses are dropped from the heights shown.

Air resistance may be ignored.

Which ball has the smallest average speed?



A sky-diver jumps out of a hot-air balloon, which is 4000m above the ground. At time = 30 s, she opens her parachute.

Fig. 1.1 is the speed-time graph of her fall.

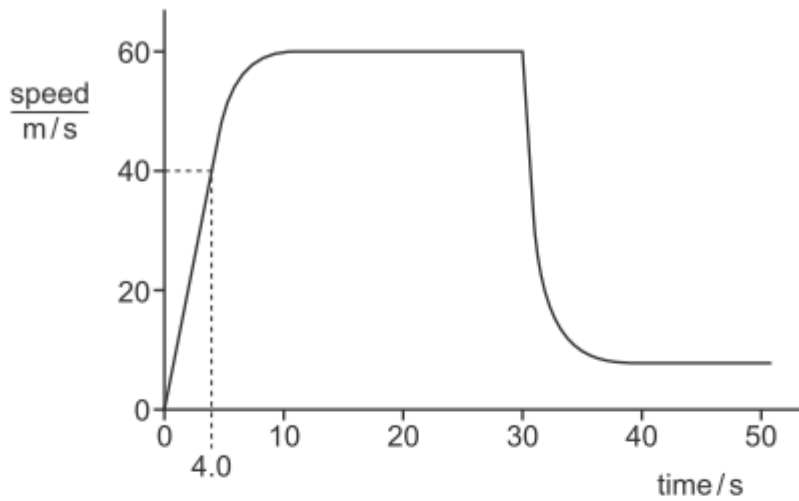


Fig. 1.1

- (a) (i) Label with the letter X the point on the graph where the sky-diver opens her parachute. [1]
- (ii) Label with the letters Y and Z the **two** parts of the graph where the sky-diver falls at terminal velocity. [1]
- (b) Describe, in terms of the forces acting on the sky-diver, her motion between leaving the balloon and opening her parachute.

.....

.....

.....

.....

.....

.....

..... [4]

- (c) Calculate the average speed of the sky-diver in the first 4.0s of her fall.

average speed = [2]

[Total: 8]

A lorry is travelling along a straight, horizontal road.

Fig. 1.1 is the distance-time graph for the lorry.

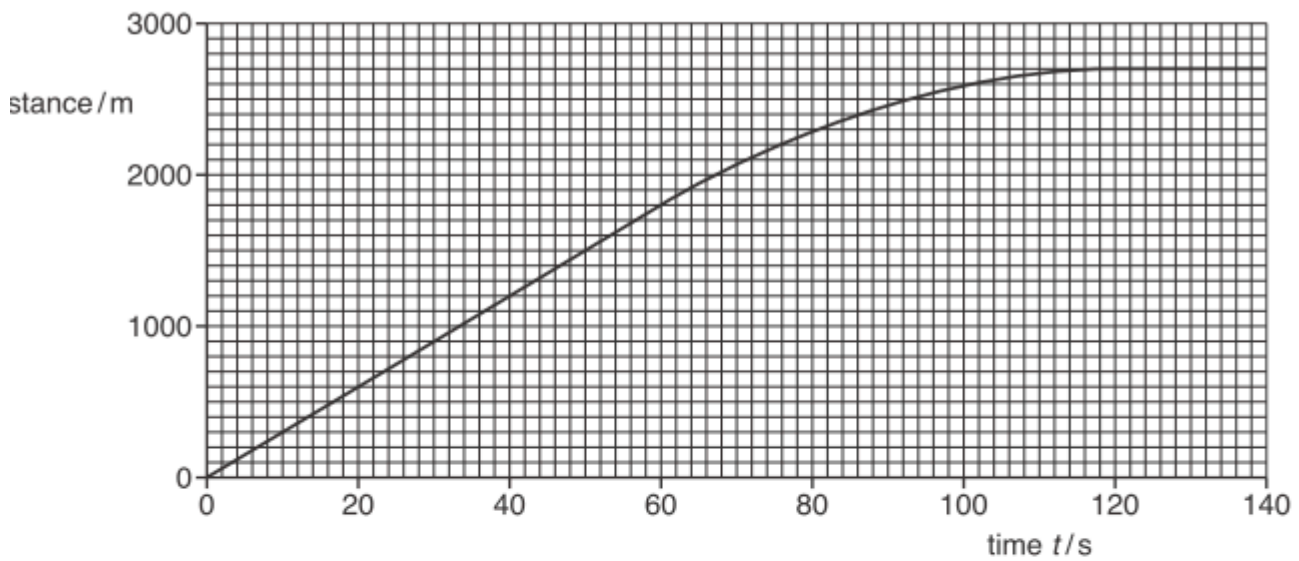


Fig. 1.1

(a) Using Fig. 1.1, determine:

(i) the speed of the lorry at time $t = 30$ s

speed =[2]

(ii) the average speed of the lorry between time $t = 60$ s and time $t = 120$ s.

average speed =[2]

(b) At time $t = 30$ s, the total resistive force acting on the lorry is 1.4×10^4 N.

(i) Using Fig. 1.1, determine the magnitude of the acceleration of the lorry at time $t = 30$ s.

acceleration =[1]

(ii) Determine the forward force on the lorry due to its engine at time $t = 30$ s.

forward force =[1]

(c) Describe the motion of the lorry between time $t = 60$ s and time $t = 130$ s.

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

[Total: 8]

(a) An object is moving in a straight line at constant speed. A resultant force begins to act upon the object.

State the ways in which the force may change the motion of the object.

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

(b) State **one** other effect a force could have on the object.

.....[1]

(c) The mass of a car is 1400 kg. The car, initially at rest, is moved along a level road by a resultant force of 3500 N. The car reaches a speed of 30 m/s.

(i) Calculate the average acceleration of the car.

acceleration =[2]

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.

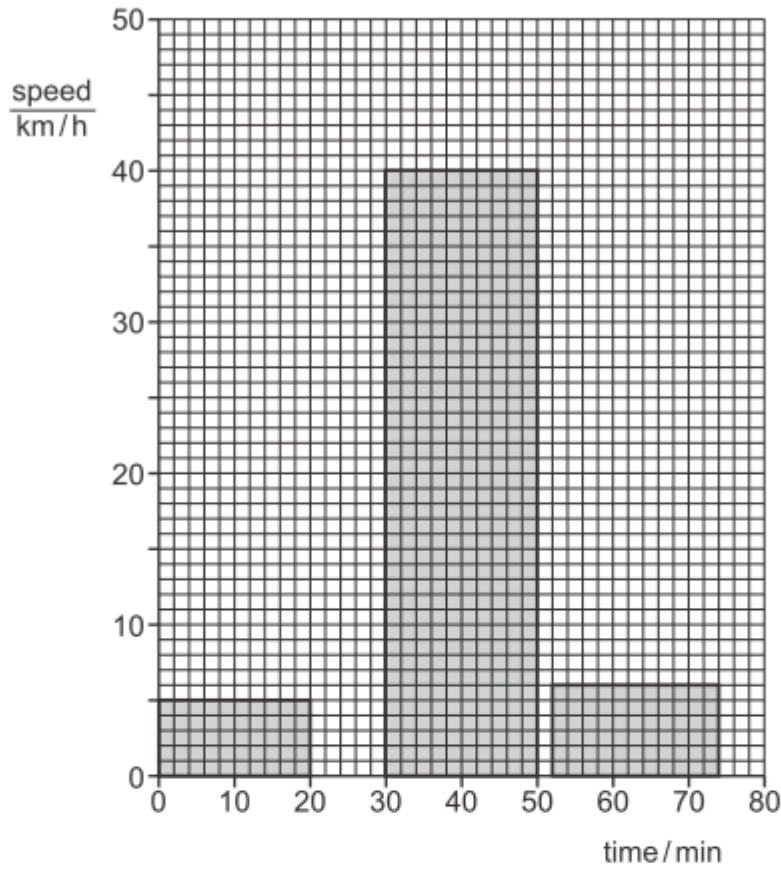


Fig. 1.1

(a) For the whole journey calculate:

(i) the distance travelled

distance = [3]

(ii) the average speed.

average speed = [2]

(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]

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.

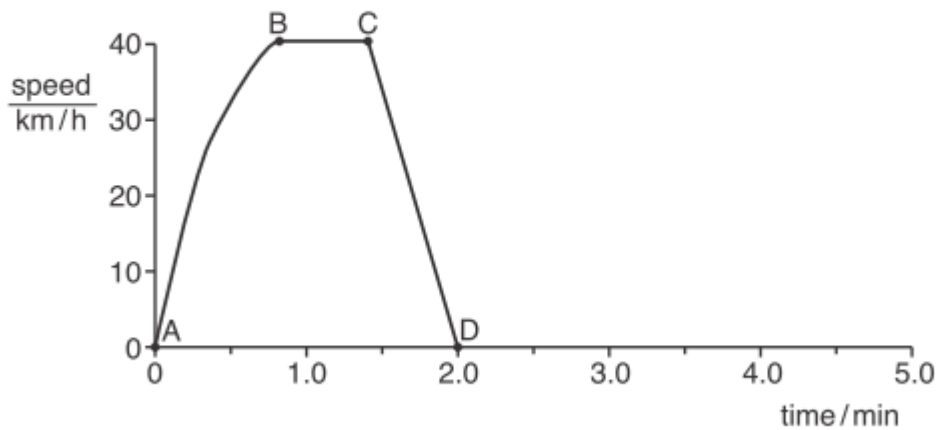


Fig. 1.1

(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]

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

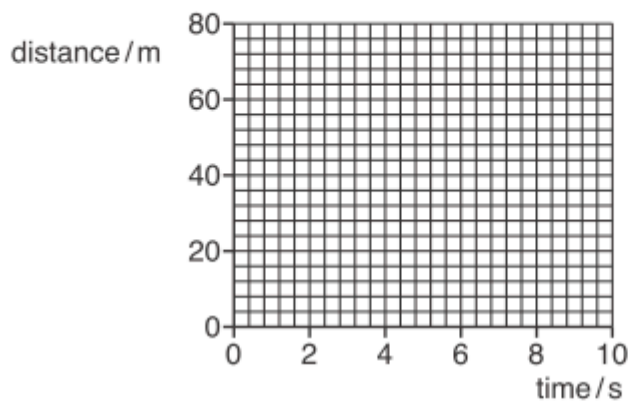


Fig. 1.1

- (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]