

Motion

Question Paper 6

Level	IGCSE
Subject	Physics
ExamBoard	CIE
Topic	General Physics
Sub-Topic	Motion
Paper Type	(Extended) Theory Paper
Booklet	Question Paper 6

Time Allowed: 52 minutes

Score: /43

Percentage: /100

1 Fig. 1.1 shows the axes for a speed-time graph.

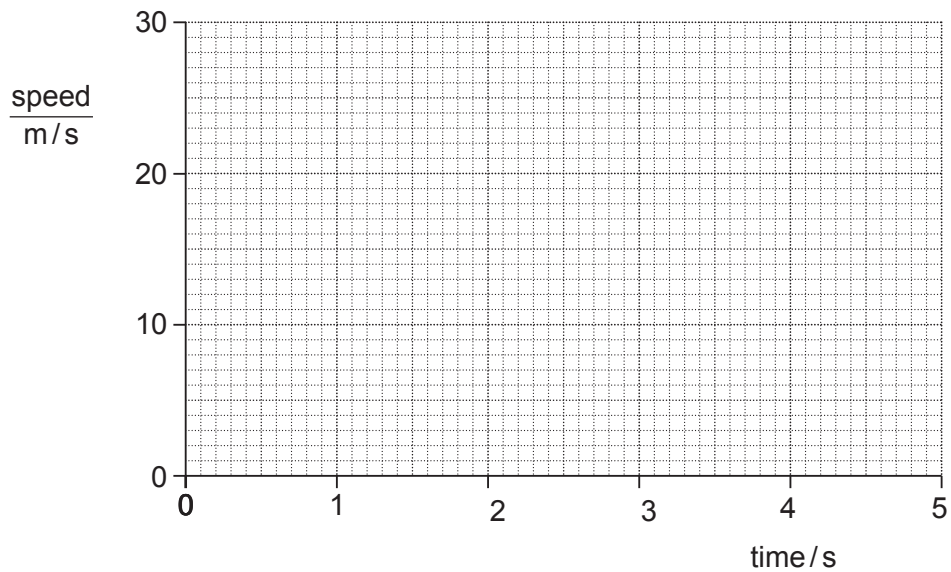


Fig. 1.1

- (a) An object A falls freely from rest with the acceleration due to gravity ($g = 10 \text{ m/s}^2$). It is not affected by air resistance.

On Fig. 1.1, draw the graph of the motion of object A. [1]

- (b) Using your graph, or an alternative method, calculate the distance fallen in the first 2 s by object A in part (a).

distance fallen = [2]

- (c) A second object B falls through the air from rest, but is affected by air resistance. It reaches a terminal velocity of 14 m/s.

On Fig. 1.1, draw a possible graph for object B, including the region where it is travelling at terminal velocity. [1]

- (d) (i) Suggest a possible difference between objects A and B that could lead to B reaching a terminal velocity.

.....
.....
..... [1]

- (ii) Explain, in terms of the forces on B, why B reaches a terminal velocity.

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

- (e) Object A experiences a gravitational force of 2.0 N.

- (i) State the value of the weight of A.

weight = [1]

- (ii) Calculate the mass of A.

mass = [1]

- (f) Object A is floating in equilibrium on a liquid.

State the value of the upward force of the liquid on A.

upward force = [1]

[Total: 10]

- 2 (a) A truck of mass 12 kg is rolling down a very slight incline as shown in Fig. 1.1.

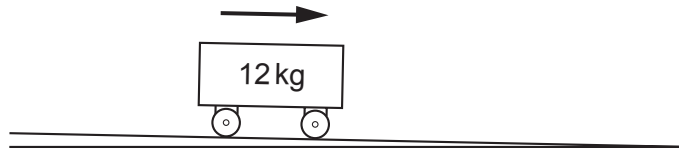


Fig. 1.1

The truck travels at constant speed.

Explain why, although the truck is on an incline, it nevertheless does not accelerate.

.....
..... [1]

- (b) The slope of the incline is increased. As a result of this, the truck now accelerates.

(i) Explain why there is now acceleration.

.....
..... [1]

(ii) Write down an equation linking the resultant force on the truck and the acceleration of the truck.

[1]

(iii) The truck's acceleration is 2.0 m/s^2 .

Calculate the resultant force on the truck.

resultant force = [2]

(c) The friction force up the slope in (b)(iii) was 14.0 N.

By suitable lubrication, the friction force is now almost totally removed.

(i) Calculate the new acceleration of the truck.

acceleration = [3]

(ii) The lubricated truck travels down the incline, starting from rest at the top of the incline. It takes 2.5 s to reach the bottom of the incline.

Calculate its speed as it reaches the bottom of the incline.

speed = [2]

(d) The incline is reduced to the original value and the lubricated truck is placed on it.

Describe the motion of the truck when it is released.

.....
.....
.....
..... [1]

[Total: 11]

3 A large plastic ball is dropped from the top of a tall building.

Fig. 1.1 shows the speed-time graph for the falling ball until it hits the ground.

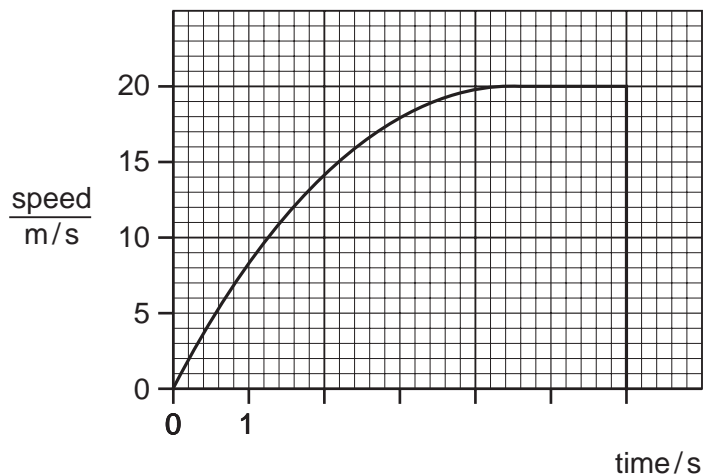


Fig. 1.1

(a) From the graph estimate,

(i) the time during which the ball is travelling with terminal velocity,

time = [1]

(ii) the time during which the ball is accelerating,

time = [1]

(iii) the distance fallen while the ball is travelling with terminal velocity,

distance = [2]

(iv) the height of the building.

height = [2]

(b) Explain, in terms of the forces acting on the ball, why

(i) the acceleration of the ball decreases,

.....
.....
.....
..... [3]

(ii) the ball reaches terminal velocity.

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

[Total: 11]

- 4 A bus travels from one bus stop to the next. The journey has three distinct parts. Stated in order they are
- uniform acceleration from rest for 8.0 s,
 - uniform speed for 12 s,
 - non-uniform deceleration for 5.0 s.

Fig. 1.1 shows only the deceleration of the bus.

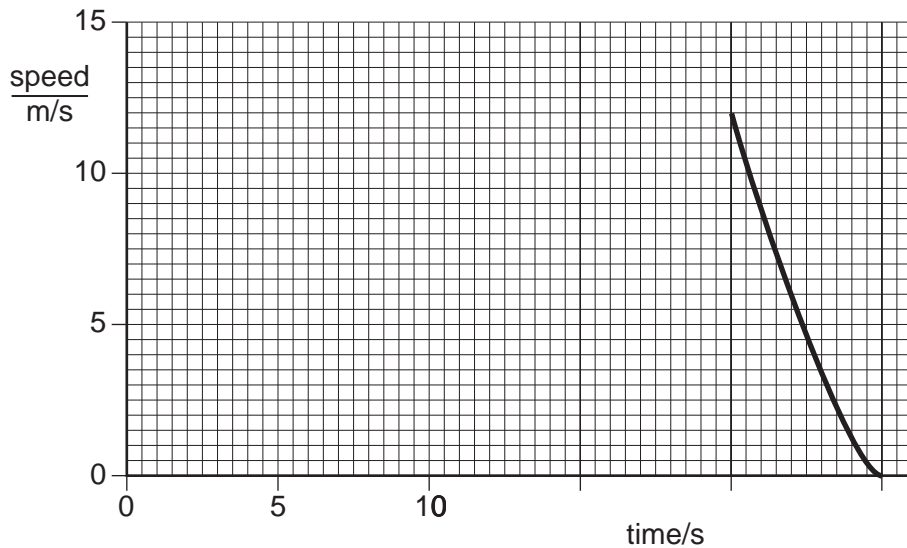


Fig. 1.1

- (a) On Fig. 1.1, complete the graph to show the first two parts of the journey. [3]

- (b) Calculate the acceleration of the bus 4.0 s after leaving the first bus stop.

acceleration =[2]

- (c) Use the graph to estimate the distance the bus travels between 20 s and 25 s.

estimated distance =[2]

- (d) On leaving the second bus stop, the uniform acceleration of the bus is 1.2 m/s^2 . The mass of the bus and passengers is 4000 kg.
Calculate the accelerating force that acts on the bus.

force =[2]

- (e) The acceleration of the bus from the second bus stop is less than that from the first bus stop.
Suggest two reasons for this.

1.

.....

2.

.....[2]

[Total : 11]