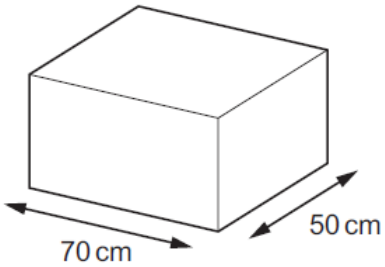
Forces – 2020 IGCSE 0625

1. Nov/2020/Paper_13/No.7

A large box has a weight of 700 N. The box is placed on the floor.

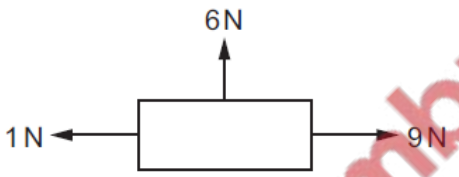


What is the pressure on the floor due to the box?

A $0.20\,N/m^2$ **B** $10\,N/m^2$ **C** $245\,N/m^2$ **D** $2000\,N/m^2$

2. Nov/2020/Paper_21/No.8

The diagram shows three forces acting on an object.



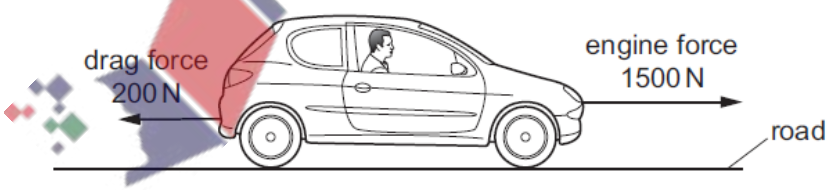
What is the value of the resultant force acting on the object?

A 2 N **B** 10 N **C** 14 N **D** 16 N

3. Nov/2020/Paper_23/No.7

The diagram shows a car moving along a road.

The force due to the engine is 1500 N and the total drag force is 200 N.



What is the motion of the car?

A constant speed

B decreasing speed

C increasing speed

D reversing

4. Nov/2020/Paper_31/No.3(a)

Fig. 3.1 shows three horizontal forces acting on a car as it moves along a straight road.

The horizontal forces act along the same straight line.

Fig. 3.1

(a) (i) Calculate the size of the resultant horizontal force on the car and state its direction.

size of resultant force = ... N

direction of resultant force .....

[3]

(ii) The driver presses the brake pedal and the car slows down.
As the car slows down, the kinetic energy of the car decreases by 100 kJ.

Describe and explain what happens to this 100 kJ of energy.

.....

..... [2]

5. Nov/2020/Paper_32/No.1

Fig. 1.1 shows a box attached to a parachute. The box and the parachute are falling through the air.

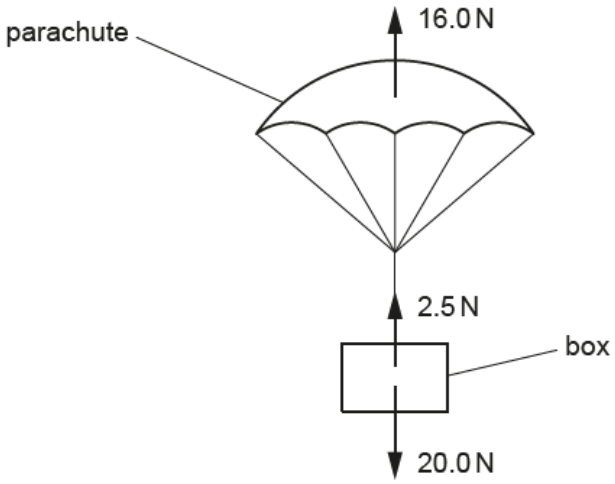


Fig. 1.1

(a) Fig. 1.1 shows **three** vertical forces acting on the box and the parachute.

(i) Calculate the resultant vertical force and state its direction.

resultant vertical force = ... N

direction .....

[3]

(ii) Suggest and explain what happens to the size of the upward vertical force on the parachute if the area of the parachute used is increased.

suggestion .....

explanation .....

.....

[2]

(b) Fig. 1.2 shows the speed–time graph for the box **before** the parachute is opened.

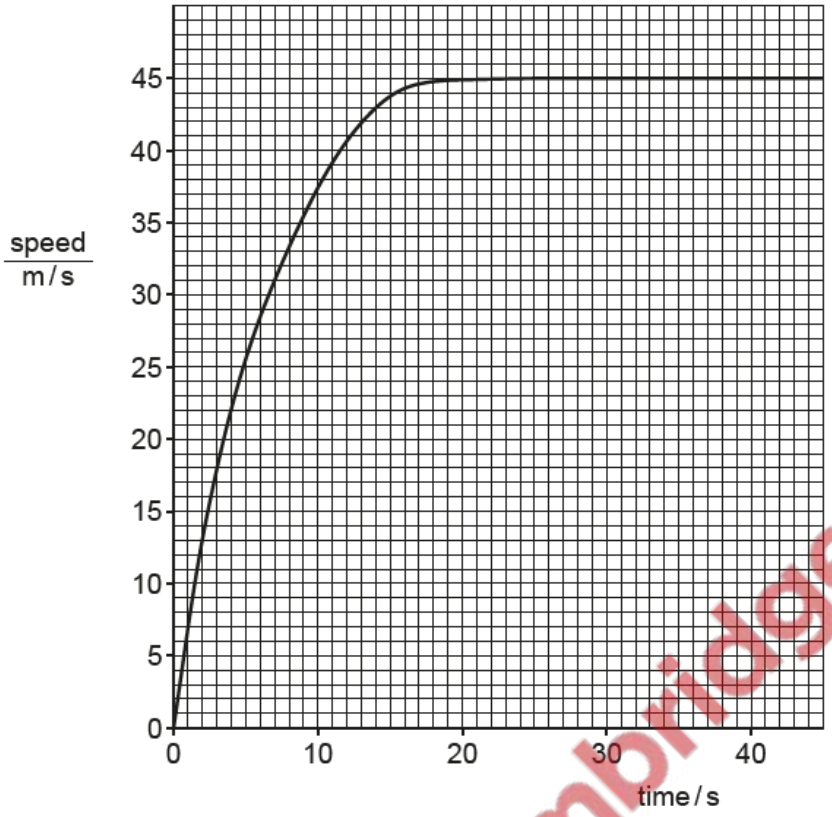


Fig. 1.2

(i) Determine the time when the speed of the box is 30 m/s.

time = ... s [1]

(ii) Deduce the size of the resultant vertical force on the box when the time is 35 s. Explain your answer.

size of resultant vertical force .....

explanation .....

.....

[2]

(iii) Calculate the distance the box moves between time = 30 s and time = 40 s.

distance = ... m [3]

[Total: 11]

6. Nov/2020/Paper_33/No.1

(a) Fig. 1.1 shows a lorry moving on a straight road. The arrows represent the horizontal forces acting on the lorry. These forces act along the same straight line.

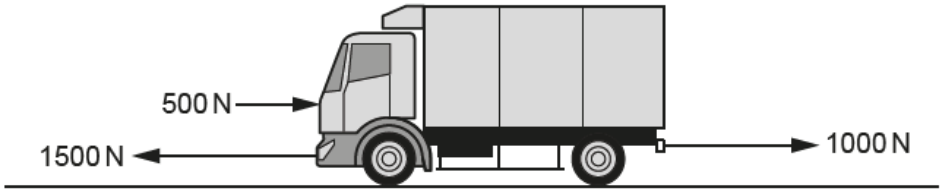


Fig. 1.1

(i) Calculate the size of the resultant horizontal force on the lorry.

size of resultant force = ... N [2]

(ii) Describe the effect of a horizontal resultant force of zero on the speed of the lorry.

Put a tick (✓) in **one** box.

- ☐ speed increases to a higher constant speed
- ☐ speed stays the same
- ☐ speed decreases to a lower constant speed
- ☐ speed decreases to zero

[1]

(b) The speed of the motorcycle in Fig. 1.2 is 20 m / s.

Fig. 1.2

The rider reacts to a sudden change in the traffic ahead.
He stops as quickly as possible by applying the brakes.
The total stopping distance is made up of the distance travelled while the rider is reacting and the distance travelled when the brakes are applied.

Fig. 1.3 shows information about stopping when the speed of the motorcycle is 20 m / s.

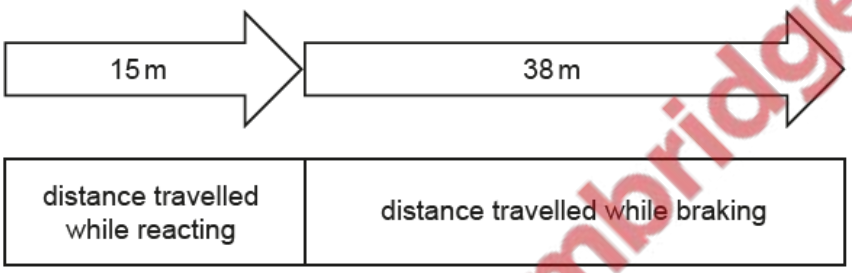


Fig. 1.3

(i) Calculate the total stopping distance when the speed of the motorcycle is 20 m / s.

total stopping distance = ... m [1]

(ii) Suggest **one** factor that could increase the total stopping distance.

..... [1]

[Total: 5]

7. Nov/2020/Paper_41/No.2

A vertical tube contains a liquid. A metal ball is held at rest by a thread just below the surface of the liquid, as shown in Fig. 2.1.

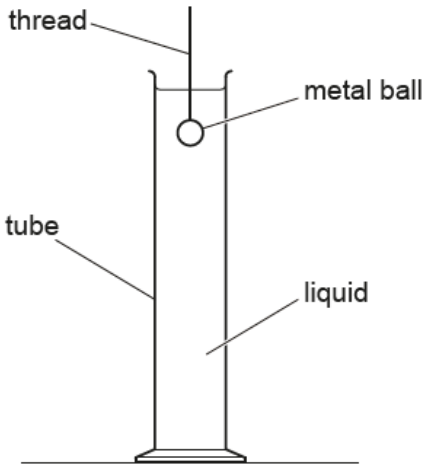


Fig. 2.1 (not to scale)

The diameter of the tube is much greater than the diameter of the ball. The ball is released and it accelerates downwards uniformly for a short period of time.

(a) Describe what happens to the velocity of the ball in the short period of time as it accelerates downwards uniformly.

.....

..... [2]

(b) The ball reaches terminal velocity.

Describe and explain the motion of the ball from when it is released until it reaches terminal velocity.

.....

.....

.....

..... [3]

(c) The metal ball has a mass of 2.1 g. It falls a distance of 0.80 m between being released and reaching the bottom of the tube.

(i) Calculate the gravitational potential energy transferred from the ball as it falls.

gravitational potential energy transferred = ... [2]

(ii) When the ball reaches the bottom of the tube, it has a speed of 1.2 m/s. Calculate the kinetic energy of the ball at the bottom of the tube.

kinetic energy = ... [3]

(iii) Explain why the value calculated in **(c)(i)** is different from that calculated in **(c)(ii)**.

.....

..... [1]

[Total: 11]

8. Nov/2020/Paper_42/No.1

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

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

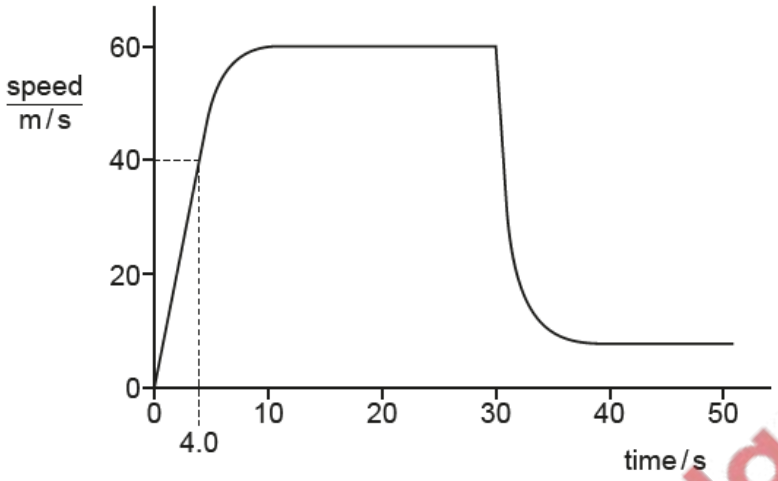


Fig. 1.1

(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 4.0 s of her fall.

average speed = ... [2]

[Total: 8]

9. Nov/2020/Paper_43/No.1(c)

(c) Fig. 1.4 shows a metal ball at rest in a tube of liquid.

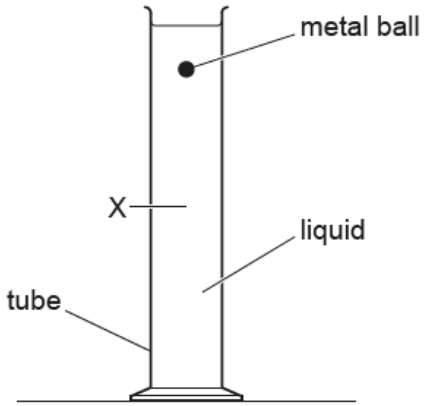


Fig. 1.4

The ball is released and reaches terminal velocity at point X.

Explain the motion of the ball as it falls from rest until it reaches point X.

Use ideas of force and acceleration in your answer.

.....

.....

.....

.....

..... [3]

10. Nov/2020/Paper_43/No.3

(a) **(i)** Speed is a scalar quantity.

State **one** other scalar quantity.

..... [1]

(ii) Velocity is a vector quantity.

State **one** other vector quantity.

..... [1]

(b) Fig. 3.1 shows a model car travelling at constant speed on a flat circular track.

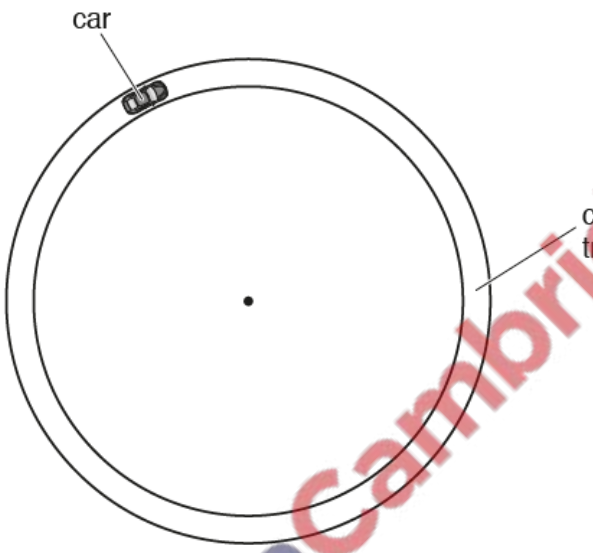


Fig. 3.1

The speed of the car is 0.30 m/s. In one complete revolution around the track, the car travels 3.9 m.

(i) Calculate the time taken for the car to complete one revolution around the track.

time = ... [2]

(ii) On Fig. 3.1, draw and label with the letter F an arrow to show the resultant force acting on the car. [1]

(iii) The speed of the car increases and at point P on Fig. 3.2 the car does not stay on the track.

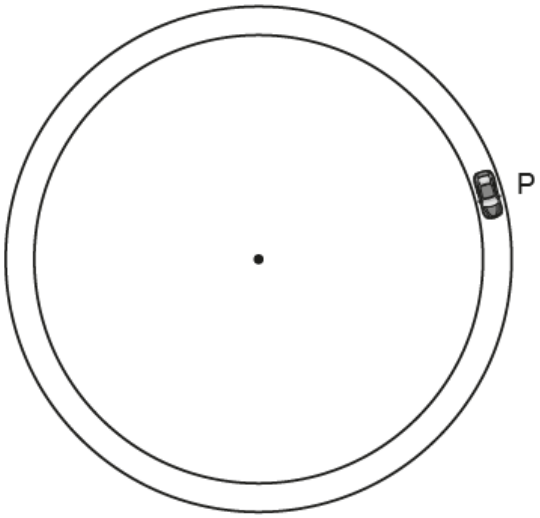


Fig. 3.2

1. Suggest, in terms of the force acting on the car, why the car does not stay on the track at point P.

.....

..... [1]

2. On Fig. 3.2, draw and label an arrow with the letter S to show the direction of motion of the car as it leaves the track at point P. [1]

[Total: 7]