

Forces - Scalars/Vectors

Question Paper 1

Level	IGCSE
Subject	Physics
ExamBoard	CIE
Topic	General Physics
Sub-Topic	Forces Sclaras/Vectors
Paper Type	(Extended) Theory Paper
Booklet	Question Paper 1

Time Allowed: 40 minutes

Score: /33

Percentage: /100

1 (a) (i) Mass is a scalar quantity.

State another scalar quantity.

.....

(ii) Force is a vector quantity.

State another vector quantity.

.....

[2]

(b) A boat is floating on still water.

The mass of the boat is 290 000 kg. A resultant force of 50 kN acts on the boat.

Calculate the acceleration of the boat.

acceleration = [3]

(c) Fig. 2.1, not to scale, shows the view from above of the boat, now on a fast-flowing river. The boat accelerates.

Two forces are shown acting on the boat. The resultant of these forces is at right angles to the river banks.

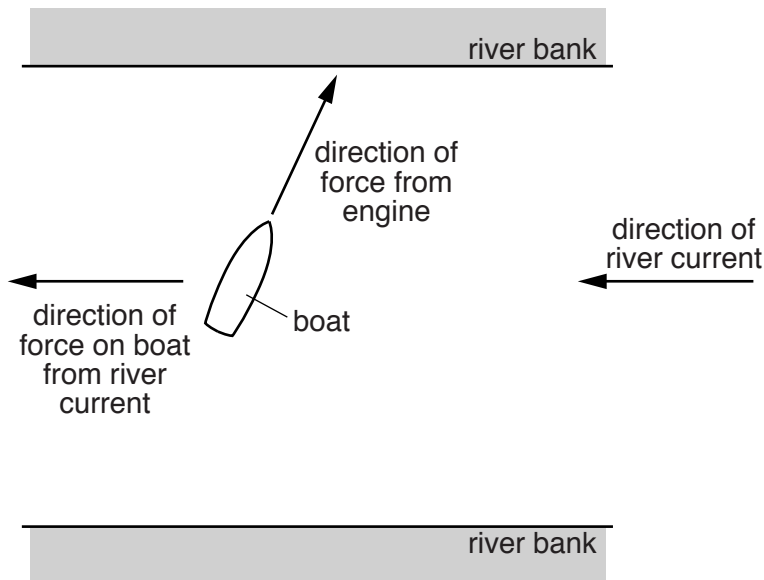


Fig. 2.1 (not to scale)

Fig. 2.2 is an incomplete vector diagram of the forces acting on the boat.

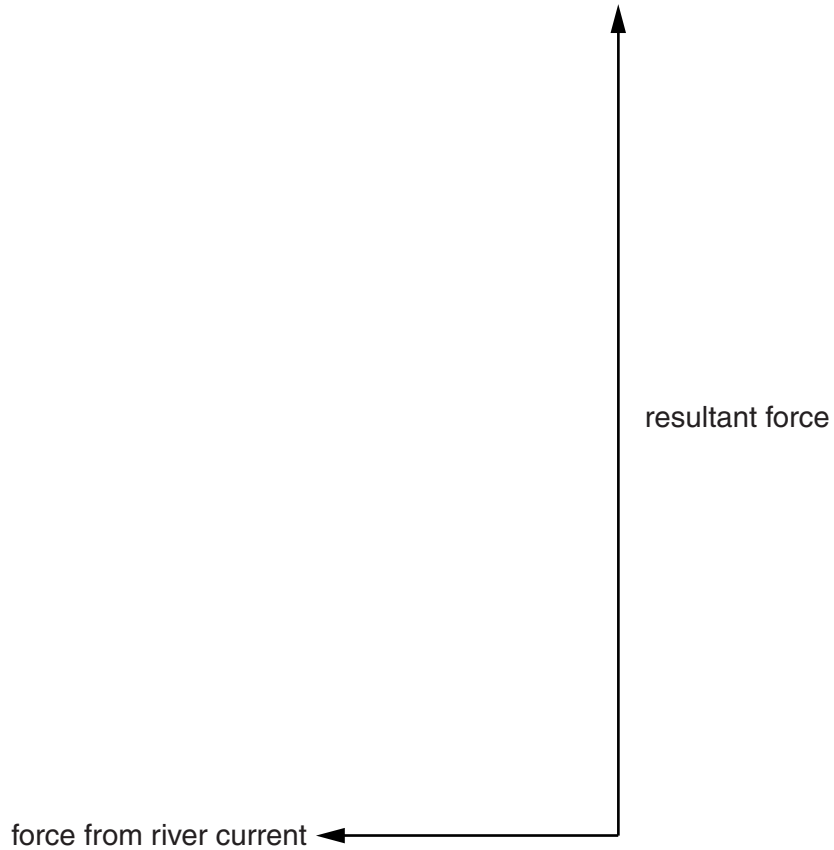


Fig. 2.2

The force from the river current is 80 kN.

- (i) Determine the scale that has been used in the vector diagram.

scale is

- (ii) On Fig. 2.2, complete the vector diagram to determine the magnitude and direction of the force from the engine. Measure the angle between the direction of the current and the force from the engine.

magnitude of force from engine =

angle =

[4]

[Total: 9]

- 2 (a) Fig. 4.1 shows a top view of a tourist vehicle in a game park and two elephants pushing against the vehicle. The two forces indicated are at right angles to each other.

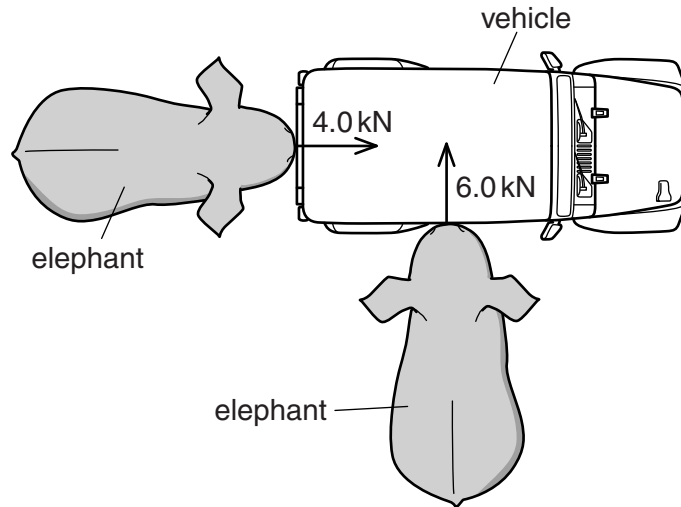


Fig. 4.1

In the space below, draw a scale vector diagram to determine the magnitude of the resultant force. Label the two forces applied and the resultant, and clearly state the scale you use.

magnitude of resultant force =[3]

- (b) Fig. 4.2 shows another elephant pushing horizontally against a vehicle with a force of 11 kN at a distance 1.8 m above the ground. Point M is the centre of mass of the vehicle.

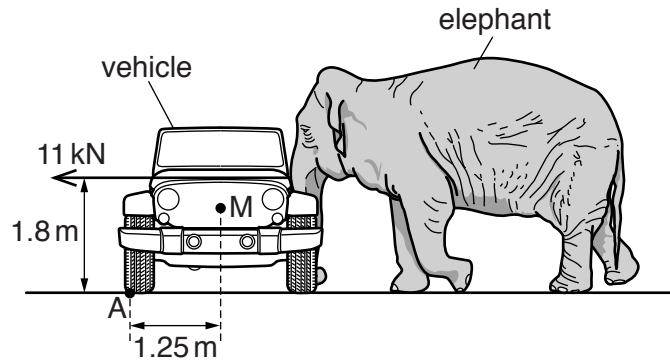


Fig. 4.2

- (i) Calculate the moment about point A of the force exerted by the elephant.

moment =[2]

- (ii) The mass of the vehicle is 1900 kg, and it does not slide when pushed by the elephant.

Determine whether the elephant tips the vehicle over. Show your working.

calculation

conclusion[2]

[Total: 7]

3 On a windy day, a parachutist of mass 85 kg jumps from an aeroplane.

Fig. 3.1 shows the parachutist falling through the air at a constant vertical velocity of 8.4 m/s downwards.

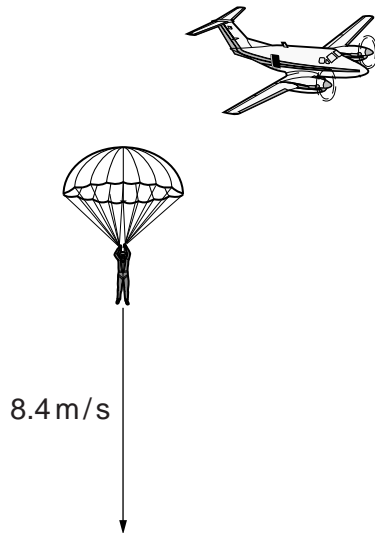


Fig. 3.1

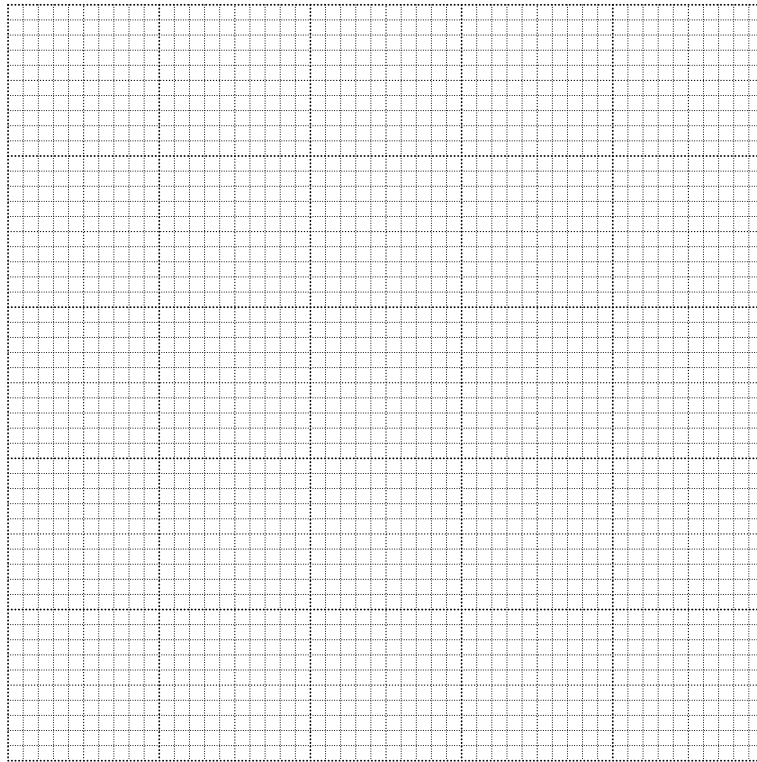
(a) Distinguish between *speed* and *velocity*.

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

(b) As the parachutist falls, the wind is moving him towards the right of the diagram, at a horizontal velocity of 6.3 m/s.

(i) On Fig. 3.1, draw an arrow to show the horizontal velocity of the parachutist. [1]

(ii) On the grid below, draw a vector diagram to determine graphically the size and direction of the resultant velocity of the parachutist.



size =

direction =

[4]

(iii) Calculate the kinetic energy of the parachutist.

kinetic energy = [3]

[Total: 9]

4 (a) (i) State one similarity and one difference between vector and scalar quantities.
 similarity
 difference [2]

(ii) Give an example of each quantity.
 vector quantity
 scalar quantity [2]

(b) Fig. 3.1 is an overhead view of two tractors pulling a tree trunk.

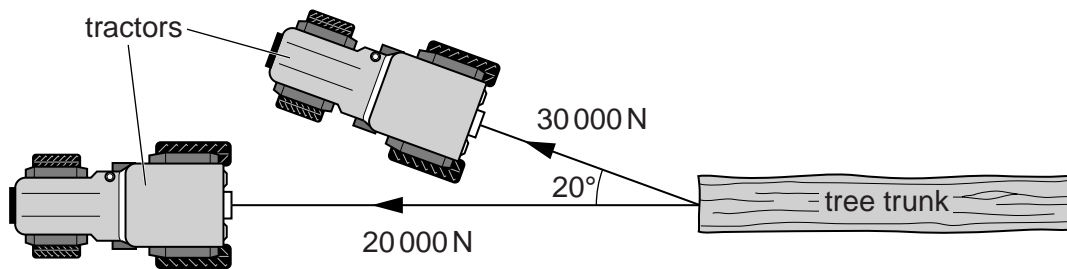


Fig. 3.1

The force exerted by each tractor is indicated in the diagram.

In the space below, carefully draw a scale diagram to determine the resultant force on the tree trunk. State the scale you use.

Write down the magnitude of the resultant force **and** the angle between the resultant force and one of the original forces.

magnitude of resultant force =

direction of resultant force =

[Total: 8] [4]