

1 A car of mass 900 kg is moving along a straight horizontal road against a constant resistance to motion of 350 N. At an instant when the car is moving at 15 m s^{-1} its acceleration is 0.25 m s^{-2} .

(a) Find the driving force of the car’s engine at this instant. [2]

(b) Find the power of the car’s engine at this instant. [2]

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Two particles, P and Q , of masses 3 kg and 5 kg respectively, are at rest on a smooth horizontal plane. P is projected at a speed of 4 ms^{-1} directly towards Q . After P and Q collide, P has speed 1 ms^{-1} .

(a) Find the two possible speeds of Q after the collision. [3]

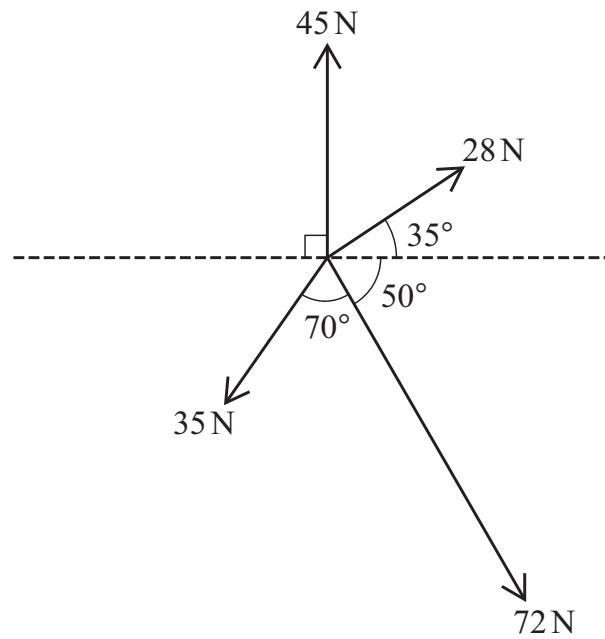
This image shows a full page of white paper with horizontal dashed lines, typical of primary-ruled notebook paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

It is given that λ J of kinetic energy, where $\lambda > 0$, is lost during the collision.

- (b)**

[illegible]

3

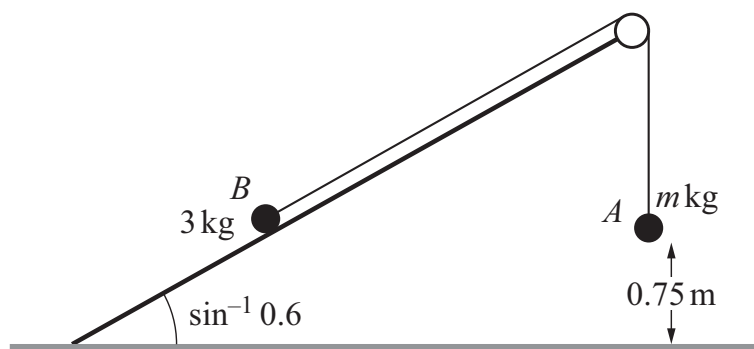


Coplanar forces of magnitudes 45 N, 28 N, 72 N and 35 N act at a point in the directions shown in the diagram.

Find, in either order, the magnitude and direction of the resultant force.

[6]

Handwriting practice lines (dotted lines on a grid background).



Two particles, A and B , of masses m kg and 3 kg respectively, are connected by a light inextensible string. Particle B is on a fixed plane which is at an angle of $\sin^{-1} 0.6$ to the horizontal ground. The string passes over a fixed smooth pulley at the top of the plane. Particle A hangs vertically below the pulley and is 0.75 m above the ground (see diagram).

The system is released from rest. In the subsequent motion B moves up a line of greatest slope of the plane and does not reach the pulley. As B moves up the plane there is a constant resistance to its motion of magnitude $\frac{10}{3}$ N. The speed of A immediately before it hits the ground is 2 m s^{-1} .

Use an energy method to find the value of m .

[6]

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(a)

[2]

[illegible]

(b)

[5]

[illegible]

[2]

A diagram showing a particle P in equilibrium. Five forces act on it: a 20 N force acting up and to the left at 20° to the horizontal; a 30 N force acting up and to the right at 30° to the horizontal; a 15 N force acting down and to the right at 45° to the horizontal; a 25 N force acting vertically downwards; and an unknown force acting vertically upwards. A horizontal dashed line represents the reference for the angles.

Four coplanar forces of magnitudes 20 N, 30 N, 15 N and 25 N act at a point P in the directions shown in Fig. 7.1. The forces act in a vertical plane. The resultant of these forces has magnitude S N and acts at an angle α° below the horizontal as shown in Fig. 7.2.

- [6]

[illegible]

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A small ring of mass 0.6 kg is threaded on a rough straight horizontal wire. The four forces shown in Fig. 7.1 act on the ring and are in the same vertical plane as the wire. The ring starts from rest and takes 3 s to travel a distance of 2 m along the wire.

- (b)** Find the coefficient of friction between the ring and the wire. [5]

Handwriting practice sheet with 20 horizontal dotted lines for tracing and writing.

Additional page

If you use the following page to complete the answer to any question, the question number must be clearly shown.

[illegible]