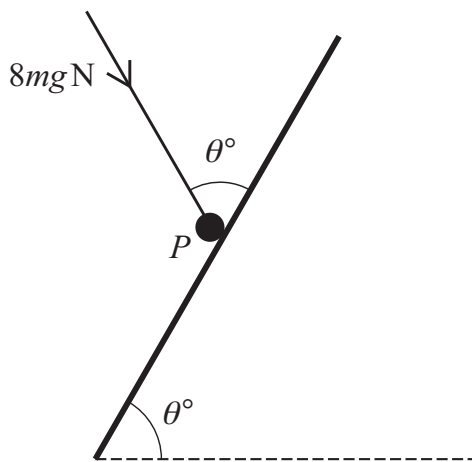


1 A car of mass 900 kg is moving along a straight horizontal road against a constant resistance to motion of 350 N. At an instant when the car is moving at 15 m s^{-1} its acceleration is 0.25 m s^{-2} .

(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]

5



A particle P of mass m kg is in equilibrium on a rough plane inclined at an angle θ° to the horizontal. The equilibrium of P is maintained by a force of magnitude $8mg$ N making an angle θ° with a line of greatest slope (see diagram). The coefficient of friction between P and the plane is 0.5 and P is on the point of slipping down the plane.

Find the value of θ .

[6]

[illegible]

A diagram showing a rectangular block labeled A resting on a horizontal surface. A cable is attached to the top right corner of the block. One end of the cable extends upwards and to the left, where a force of 6 N is applied at an angle of 20° above a horizontal dashed line. The other end of the cable extends downwards and to the right, ending at a ball labeled B , which is positioned at an angle of 15° below the horizontal surface.

The contact between B and the surface is smooth and the contact between A and the surface is rough.

[2]

This image shows a full page of a handwriting practice worksheet. It consists of multiple rows of horizontal dashed lines spaced evenly apart, providing a guide for letter height and placement. The background is plain white, and there are no other markings or text on the page.

(b) Find the coefficient of friction between A and the surface.

[6]

Handwriting practice lines (dotted lines) for the letter '4'.

Additional page

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

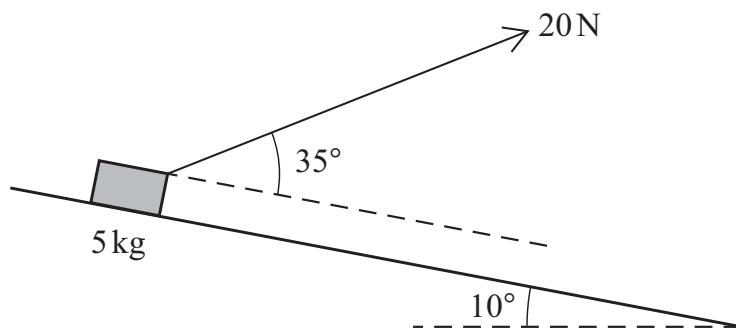
[illegible]

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- 2

[5]

This image shows a full page of a handwriting practice worksheet. It consists of multiple rows of horizontal dashed lines spaced evenly down the page, providing a guide for letter height and placement. The background is plain white, and there are no margins or additional markings.



A block of mass 5 kg is being pulled straight down a line of greatest slope of a rough plane by a force of magnitude 20 N. The plane is inclined at an angle of 10° to the horizontal and the 20 N force acts at an angle of 35° above the line of greatest slope of the plane (see diagram). The coefficient of friction between the block and the plane is 0.4. The speed of the block when it passes a point O is 2 ms^{-1} .

Find the speed of the block when it has moved 3 m down the plane from O . [6]

[6]

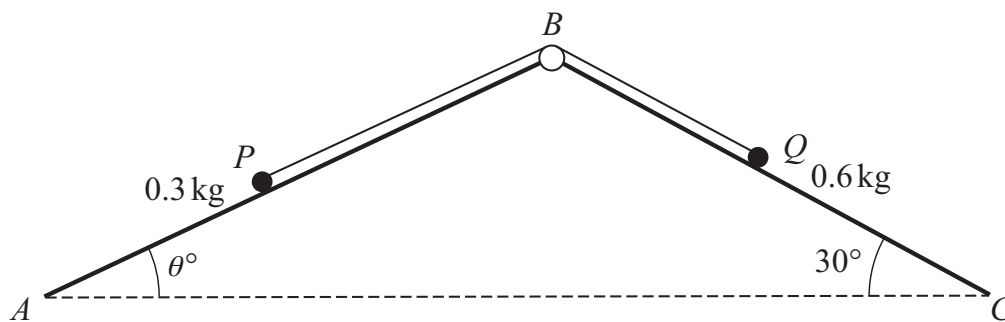
This image shows a full page of a handwriting practice worksheet. It consists of multiple sets of three horizontal dashed lines, providing a guide for letter height and placement. The lines are evenly spaced across the entire page, which is otherwise blank.

- 1** A block of mass 12 kg is being pulled by a rope up a rough plane. The plane is inclined at an angle of 20° above the horizontal. The rope pulling the block is parallel to a line of greatest slope of the plane. The coefficient of friction between the block and the plane is 0.4. The acceleration of the block is 2 m s^{-2} .

[4]

[illegible]

6



Two particles, P and Q , of masses 0.3 kg and 0.6 kg respectively, are attached to the ends of a light inextensible string. The string passes over a smooth pulley fixed at a point B where the inclined planes AB and BC meet. P lies on the smooth plane AB which is inclined at an angle θ° to the horizontal where $\sin \theta^\circ = 0.4$. Q lies on the plane BC which is inclined at 30° to the horizontal. The string is taut and the particles can move on lines of greatest slope of the two planes (see diagram). The particles are released from rest.

- (a)** It is given that the plane BC is smooth.

Find the tension in the string and the acceleration of Q .

[5]

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. At the bottom center, there is a small, faint circular logo or watermark. The overall appearance is that of a clean, unused piece of stationery.

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- (b)** It is given instead that the plane BC is rough. The work done against the frictional force when Q moves 2 m down the plane is 1.8 J. You should assume that P does **not** reach the pulley and that Q does **not** reach C .

Use an energy method to find the speed of Q when it has moved 2 m down the plane. [4]

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 is no handwriting or other markings on the paper.