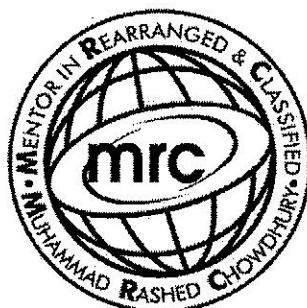


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Edexcel AS Mechanics M1

TOPIC-Inclined Plane



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*physics is fun
chemistry is juicy
mathematics is spicy*

5.

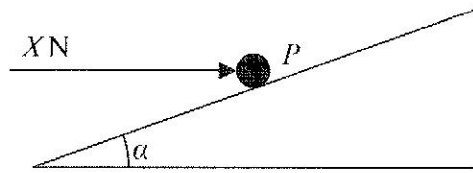
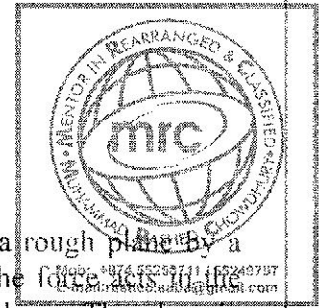


Figure 2



A particle P of mass 2 kg is pushed up a line of greatest slope of a rough plane by a horizontal force of magnitude X newtons, as shown in Figure 2. The force acts in the vertical plane which contains P and a line of greatest slope of the plane. The plane is

inclined to the horizontal at an angle α , where $\tan \alpha = \frac{3}{4}$

The coefficient of friction between P and the plane is 0.5

Given that the acceleration of P is 1.45 m s^{-2} , find the value of X .

(10)

A series of horizontal dashed lines for writing the solution.

W-1-15 Static



6.

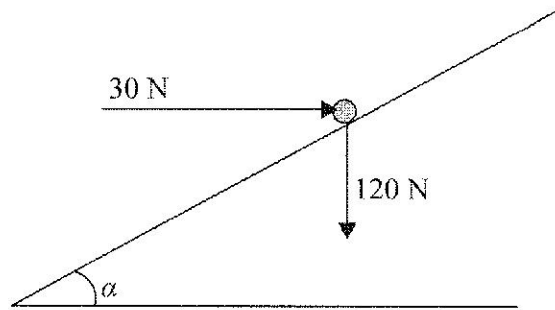


Figure 2

A particle of weight 120 N is placed on a fixed rough plane which is inclined at an angle α to the horizontal, where $\tan \alpha = \frac{3}{4}$.

The coefficient of friction between the particle and the plane is $\frac{1}{2}$.

The particle is held at rest in equilibrium by a horizontal force of magnitude 30 N, which acts in the vertical plane containing the line of greatest slope of the plane through the particle, as shown in Figure 2.

- (a) Show that the normal reaction between the particle and the plane has magnitude 114 N. (4)

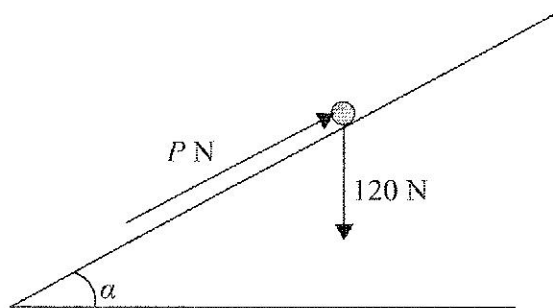


Figure 3

The horizontal force is removed and replaced by a force of magnitude P newtons acting up the slope along the line of greatest slope of the plane through the particle, as shown in Figure 3. The particle remains in equilibrium.

- (b) Find the greatest possible value of P . (8)
- (c) Find the magnitude and direction of the frictional force acting on the particle when $P = 30$. (3)



3.

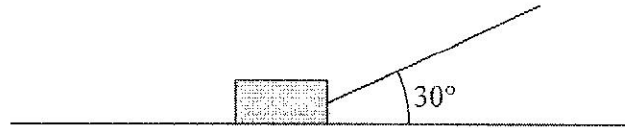
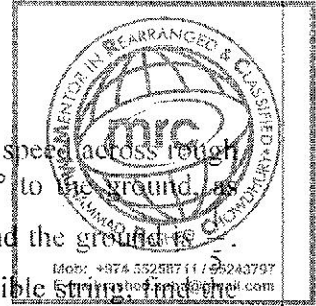


Figure 1

A boy is pulling a sledge of mass 8 kg in a straight line at a constant speed across rough horizontal ground by means of a rope. The rope is inclined at 30° to the ground, as shown in Figure 1. The coefficient of friction between the sledge and the ground is 0.2. By modelling the sledge as a particle and the rope as a light inextensible string, find the tension in the rope.



(8)

A series of horizontal lines provided for the student to write their solution to the problem.

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W-1-16 Dy - Inclined



6.

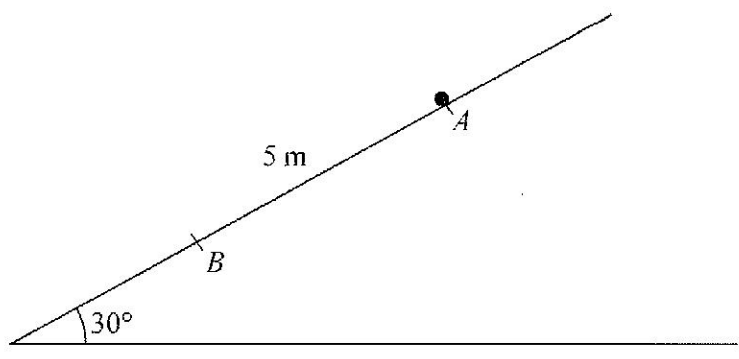


Figure 3

A particle P of mass 4 kg is held at rest at the point A on a rough plane which is inclined at 30° to the horizontal. The point B lies on the line of greatest slope of the plane that passes through A . The point B is 5 m down the plane from A , as shown in Figure 3. The coefficient of friction between the plane and P is 0.3

The particle is released from rest at A and slides down the plane.

- (a) Find the speed of P at the instant it reaches B . (7)

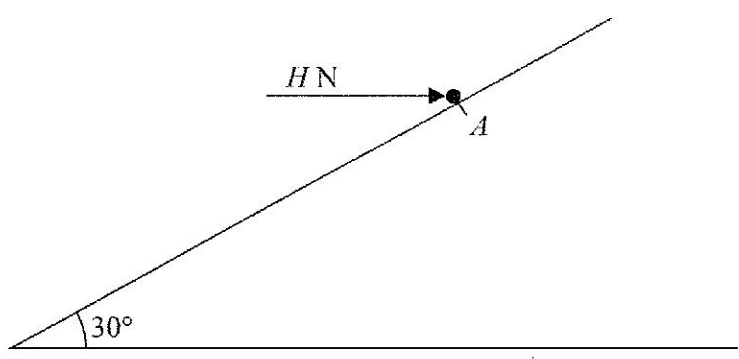


Figure 4

The particle is now returned to A and is held in equilibrium by a horizontal force of magnitude H newtons, as shown in Figure 4. The line of action of the force lies in the vertical plane containing the line of greatest slope of the plane through A . The particle is on the point of moving up the plane.

- (b) Find the value of H . (7)

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2.

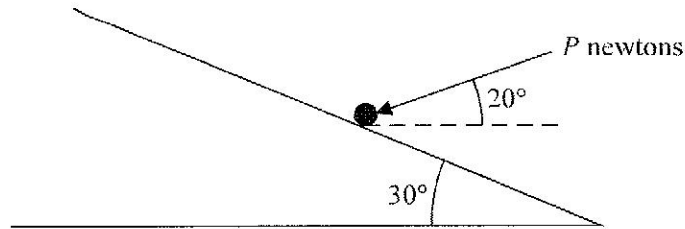


Figure 1

A particle of mass 2 kg lies on a rough plane. The plane is inclined to the horizontal at 30°.

The coefficient of friction between the particle and the plane is $\frac{1}{4}$. The particle is held

in equilibrium by a force of magnitude P newtons. The force makes an angle of 20° with the horizontal and acts in a vertical plane containing a line of greatest slope of the plane, as shown in Figure 1. Find the least possible value of P .

(10)

Handwritten solution area with horizontal lines for writing.

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6-18 St-Equi



