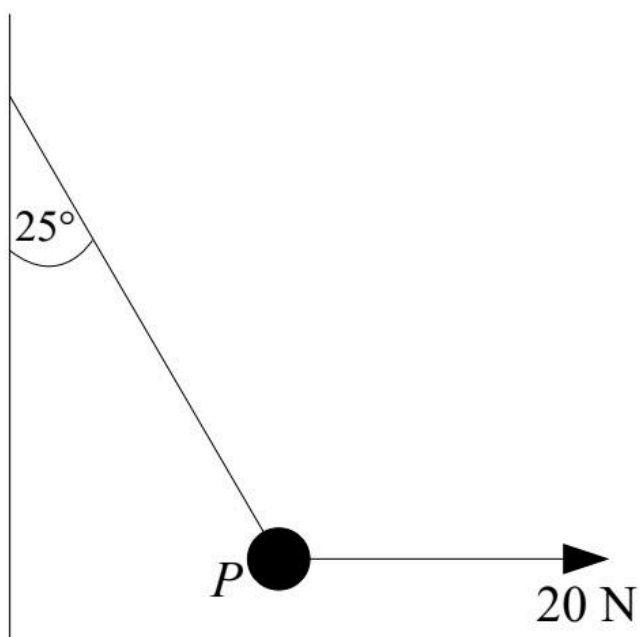


- 1** A particle P is attached to a wall by a light inextensible string. A horizontal force of 20 N is applied to P. The particle is in equilibrium with the string taut making a 25° angle with the vertical as shown in the diagram.



- (a) Find the tension in the string

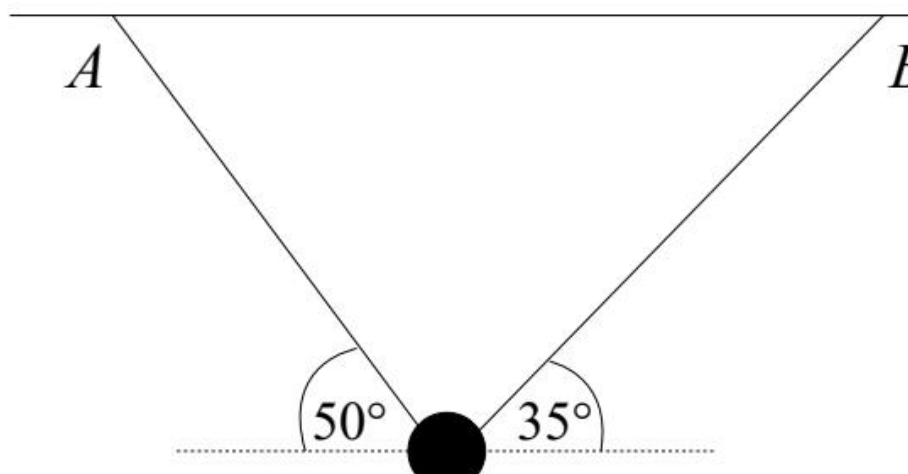
(2)

(b) Find the weight of P

(3)

(Total for question 1 is 5 marks)

- 2 A particle P, of mass 10 kg, is held in equilibrium attached to two light inextensible strings. String A is at an angle of 50° to the horizontal. String B is at an angle of 35° to the horizontal as shown in the diagram.



- (a) Find the tension in string A

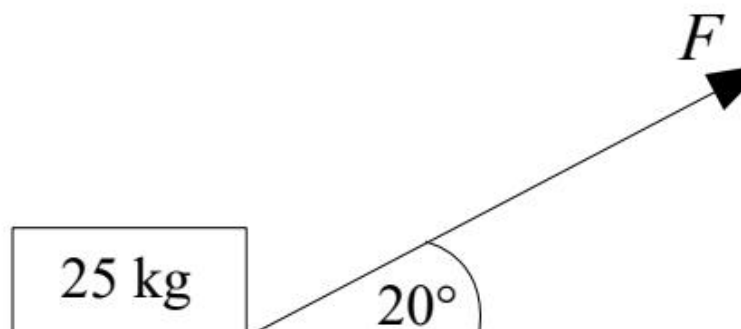
(5)

(b) Find the tension in string B

(3)

(Total for question 2 is 8 marks)

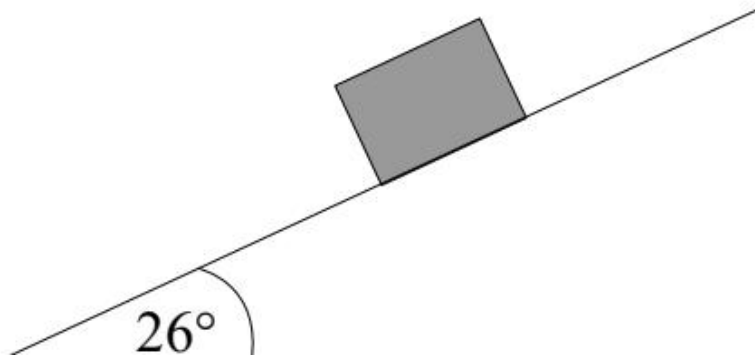
- 3 A block of mass 25 kg, is at rest on a rough horizontal floor. The coefficient of friction between the block and the floor is 0.4. A force of F N is pulling the block at an angle of 20° to the horizontal. The block is on the point of sliding.



Find the value of F .

(Total for question 3 is 8 marks)

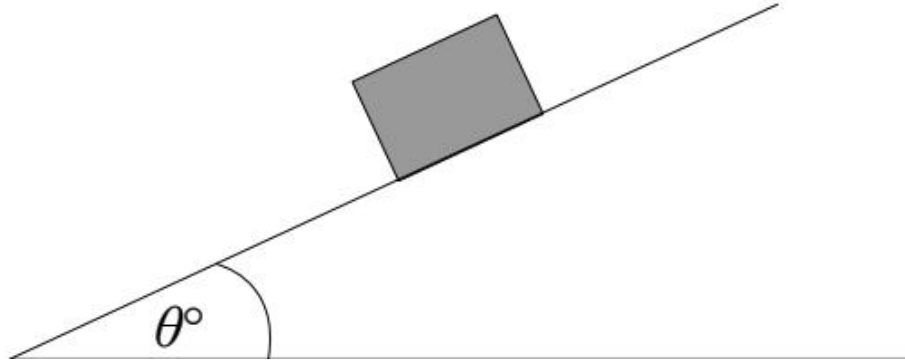
- 4 A block, of weight 10 N, is at rest on a rough plane inclined at an angle of 26° to the horizontal. The block is on the point of sliding down the plane.



Find the coefficient of friction between the block and the floor.

(Total for question 4 is 8 marks)

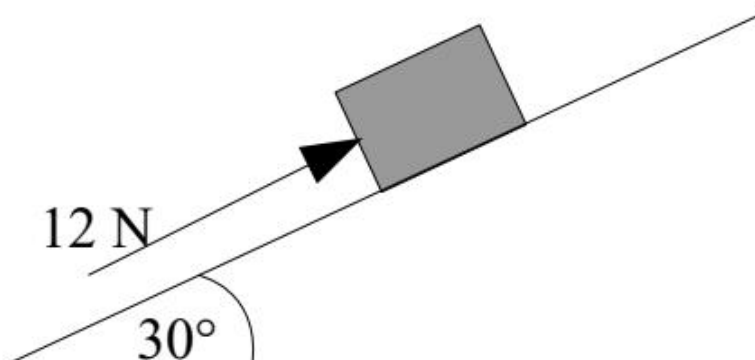
- 5 A block of mass 2kg is at rest on a rough plane inclined at an angle of θ° to the horizontal where $\tan \theta = 0.75$. The block is released from rest. The coefficient of friction between the block and the floor is 0.2.



Find the acceleration of the block.

(Total for question 5 is 9 marks)

- 6 A brick of weight 10 N lies on a rough plane inclined at an angle of 30° to the horizontal. A force of 12 newtons acts on the brick acting up the plane and the brick is in equilibrium on the point of slipping up the plane.



- (a) Find the coefficient of friction between the brick and the plane

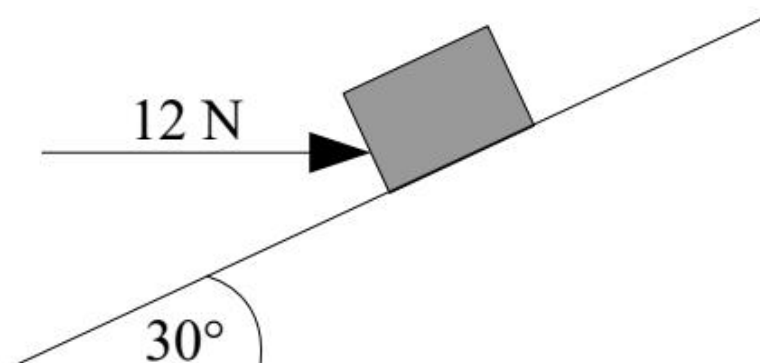
(6)

(b) The 12 N force is removed. Determine whether or not the brick moves

(3)

(Total for question 6 is 9 marks)

- 7 A brick of weight 10 N lies on a rough plane inclined at an angle of 30° to the horizontal. A horizontal force of 12 newtons acts on the brick and the brick is in equilibrium on the point of slipping up the plane.



- (a) Find the coefficient of friction between the brick and the plane

(7)

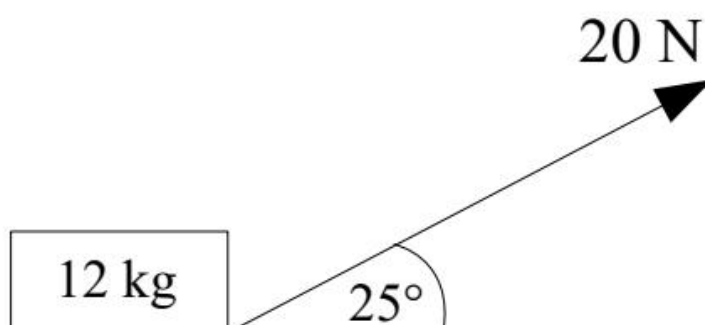
(b) The 12 N force is removed. Determine whether or not the brick moves

(4)

(Total for question 7 is 11 marks)

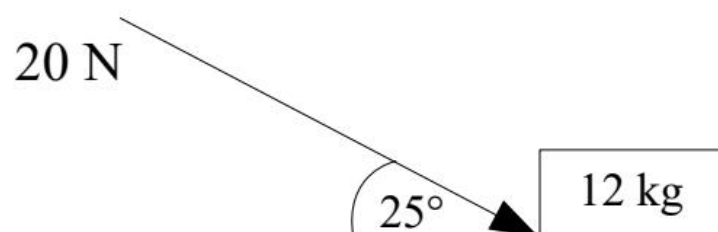
- 8** A box of mass 12 kg, is pulled along a rough horizontal floor by a force of 20 N at an angle of 25° to the horizontal. The box is modelled as a particle and the coefficient of friction between the box and the floor is 0.1

(a) Find the acceleration of the block.



(6)

- (b) The box is now being pushed along the same floor by a force at an angle of 25° to the horizontal.



Explain why the acceleration of the box will now be less than the acceleration in part (a).

(2)

(Total for question 8 is 8 marks)

- 9** A rough plane is inclined to the horizontal at angle α , where $\tan \alpha = \frac{5}{12}$. A block of mass m kg is placed on the plane and released from rest. The coefficient of friction between the block and the plane is $\frac{2}{5}$

(a) Find the acceleration of the block.

(6)

(b) A different block with mass $2m$ kg is placed on the same plane. Explain how the acceleration of this block would compare to your answer in part (a).

(2)

(Total for question 9 is 8 marks)

10 A rough plane is inclined to the horizontal at angle α . A block of mass m kg is placed on the plane remains at in equilibrium on the point of sliding down the plane. The coefficient of friction between the block and the plane is 0.15

(a) Find the value of α .

(5)

(b) The block is now projected with speed 0.4ms^{-1} down a line of greatest slope of the plane. Describe the motion of the block, giving a reason for your answer.

(2)

(Total for question 10 is 7 marks)
