

Statics

Questions B

1 A block of mass 3Kg is initially at rest on a rough horizontal plane. The coefficient of friction between the block and the plane is 0.6. Calculate the pushing force required to cause it to accelerate along the surface at:
a) 8ms^{-2} b) 0.1ms^{-2}

2 A block of mass 12kg rests on a rough horizontal surface. The coefficient of friction between the block and the plane is 0.4. Calculate the frictional force when a horizontal force of 65N acts on the block. If the block moves, find the acceleration.

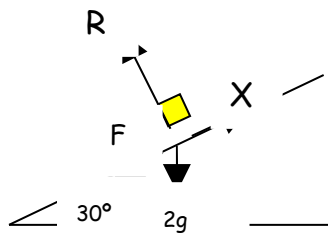
3 A block of mass 7kg rests on a rough horizontal surface. The coefficient of friction between the block and the plane is 0.15. A light string is attached to the box in order to pull the box across the floor. If the string makes an angle of 45° with the horizontal find the value that the tension in the string must exceed in order to bring about motion.

4 Referring to question 3 what value of tension would be required to give the block an acceleration of 3ms^{-2} .

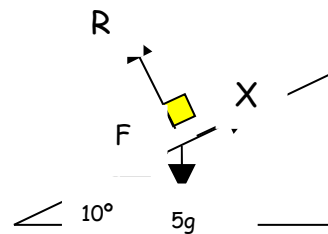
5 A block of mass 4.5kg rests on a rough horizontal surface. The coefficient of friction between the block and the plane is 0.25. State whether or not the block will slide when the surface is moved horizontally with an acceleration of of:
a) 0.9ms^{-2} . b) 2ms^{-2} . c) 3.5ms^{-2} .

6 For each of the following diagrams below the value of $\mu = 0.3$. In each case calculate the magnitude of the force X if the body is just on the point of moving.

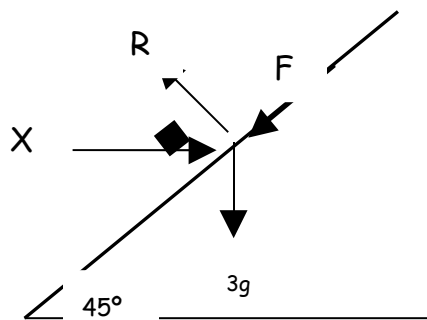
a)



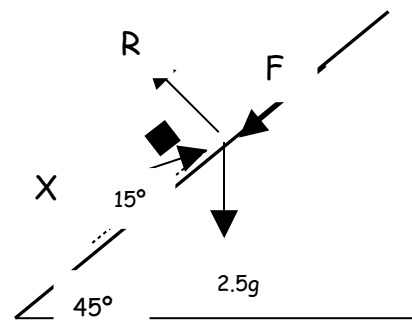
b)



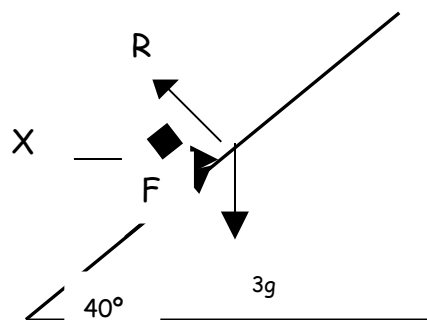
c)



d)



e)



7 A body of mass 6.5kg is placed on an incline plane at an angle of 35° to the horizontal. The coefficient of friction between the box and the plane is 0.2 . A horizontal force of 25N is applied to the body. Find the frictional force and the value of the acceleration. State the direction of motion.

- 8 A body of mass 4kg is released from rest on a rough surface that is inclined at an angle of 40° to the horizontal. If after 2 seconds the body has a velocity of 4.9ms^{-1} down the surface, find the coefficient of friction between the body and the surface.
- 9 A horizontal force of 0.9N is just sufficient to prevent a brick of mass 750g from sliding down a rough plane inclined at an angle of 20° . Calculate the coefficient of friction between the plane and the brick.
- 10 A box of mass 5kg is placed on an incline plane at an angle of 35° to the horizontal. The coefficient of friction between the box and the plane is 0.45. Find the horizontal force that must be applied so that:
- the box is just prevented from sliding down the plane
 - the box is just at the point of moving up the plane
 - the box moves up the plane with an acceleration of 1.25ms^{-2} .