Corbettmaths

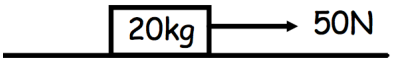
Friction - Horizontal Motion

Mechanics

Video Tutorial

Friction opposes the motion of an object across the surface of another when there is rough contact.

A block of mass 20kg is pulled in a straight line along a rough horizontal plane by a light, inextensible string.
The tension in the string is 50N
The value of the frictional force is 35N
The block moves with constant acceleration.



Find the acceleration of the block.

A sledge of mass 8kg is pulled in a straight line along a rough horizontal plane by a light, inextensible rope.
The tension in the rope is 90N
The force due to friction is 6N per kg of mass.
The sledge moves with constant acceleration.

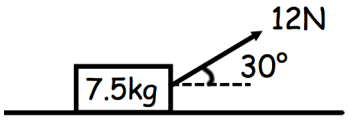


Find the acceleration of the sledge.

Friction - Horizontal Motion

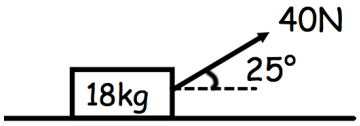
A box of mass 7.5kg is pulled along a rough horizontal surface by a force of 12N at an angle of 30° above the horizontal.
The box is moving with constant velocity.

(a) Work out the normal reaction between box and the surface
(b) Work out the force due to friction.



A box of mass 18kg is initially at rest on a rough horizontal surface.
The box is then pulled along the surface by a rope with force of 40N.
The rope makes an angle of 25° degrees to the horizontal.
The force due to friction is 1.5N per kg of mass

(a) Mark the other forces acting on the box.
(b) Calculate the acceleration of the box.

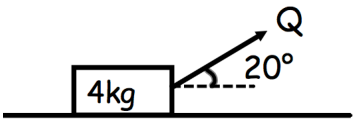


When the box is moving at 20m/s, the rope is released.

(c) Find the distance travelled by the sledge from the moment the rope is released until the sledge comes to rest.

A block of mass 4kg is initially at rest on a rough horizontal surface.
The block is then pulled along the surface by a rope that makes an angle of 20° degrees to the horizontal.

The value of the frictional force is 10N
The rope exerts a force of Q newtons on the block.



(a) Mark on the diagram all the other forces acting on the block.

The block moves with acceleration of $3m/s^2$

(b) Work out the value of Q