5.3) Friction

Worked example

A particle of mass 10kg is pulled along a rough horizontal surface by a horizontal force of magnitude 40N. The coefficient of friction between the particle and the floor is 0.4. Calculate:

(a) the magnitude of frictional force

(b) the acceleration of the particle.

Your turn

A particle of mass 5kg is pulled along a rough horizontal surface by a horizontal force of magnitude 20N. The coefficient of friction between the particle and the floor is 0.2. Calculate:

(a) the magnitude of frictional force

(b) the acceleration of the particle.

a) $9.8\ N$ (2 sf)

b) $2.0\ ms^{-2}$ (2 sf)

Worked example

A block of mass $10\ kg$ lies on rough horizontal ground.
The coefficient of friction between the block and the ground is 0.4.
A horizontal force P is applied to the block.
Find the magnitude of the frictional force acting on the block and the acceleration of the block when the magnitude of P is:
a) $30\ N$
b) $39.2\ N$
c) $90\ N$

Your turn

A block of mass $5\ kg$ lies on rough horizontal ground.
The coefficient of friction between the block and the ground is 0.4.
A horizontal force P is applied to the block.
Find the magnitude of the frictional force acting on the block and the acceleration of the block when the magnitude of P is:
a) $10\ N$
b) $19.6\ N$
c) $30\ N$

a) $10\ N$; $0\ ms^{-2}$; Block at rest in equilibrium
b) $19.6\ N$; $0\ ms^{-2}$; Block at rest in limiting equilibrium
c) $19.6\ N$; $2.1\ ms^{-2}$ in the direction of P