5.2) Inclined planes

Worked example

A block of mass 15kg slides down a smooth slope angled at $10°$ to the horizontal.

(a) Calculate the magnitude of the normal reaction of the slope on the block.

(b) Find the acceleration of the block.

Your turn

A block of mass 10kg slides down a smooth slope angled at $15°$ to the horizontal.

(a) Calculate the magnitude of the normal reaction of the slope on the block.

(b) Find the acceleration of the block.

a) $95\ N$ (2 sf)

b) $2.5\ ms^{-2}$ (2 sf)

Worked example

A particle of mass m is pushed up a smooth slope, inclined at $60°$ by a force of magnitude $10g$ N acting at angle of $30°$ to the slope, causing the particle to accelerate up the slope at 0.25 ms^{-2}.

Show that the mass of the particle is $\left(\frac{20\sqrt{3}g}{1+2\sqrt{3}g}\right)$ kg

Your turn

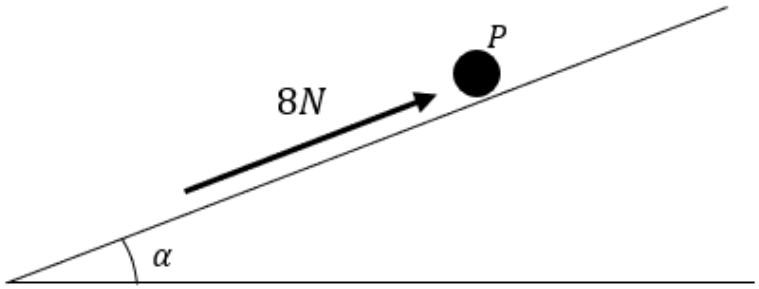
A particle of mass m is pushed up a smooth slope, inclined at $30°$ by a force of magnitude $5g$ N acting at angle of $60°$ to the slope, causing the particle to accelerate up the slope at 0.5 ms^{-2}.

Show that the mass of the particle is $\left(\frac{5g}{1+g}\right)$ kg

Shown

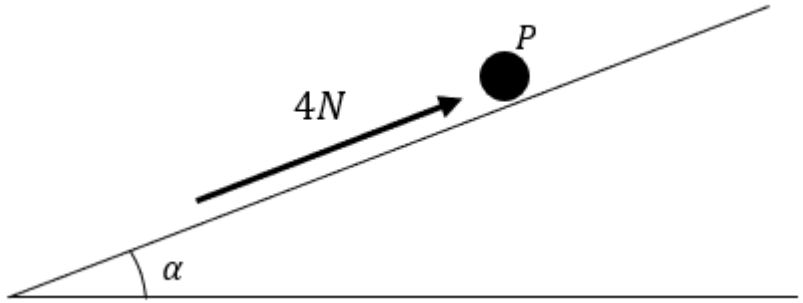
Worked example

A particle P of mass 4kg is moving on a smooth slope and is being acted on by a force of 8N that acts parallel to the slope, as shown.
The slop is inclined at an angle α to the horizontal, where $\tan\alpha = \frac{5}{12}$.
Work out the acceleration of the particle.



Your turn

A particle P of mass 2kg is moving on a smooth slope and is being acted on by a force of 4N that acts parallel to the slope, as shown.
The slop is inclined at an angle α to the horizontal, where $\tan\alpha = \frac{3}{4}$.
Work out the acceleration of the particle.



$3.9\ ms^{-2}$ down the slope