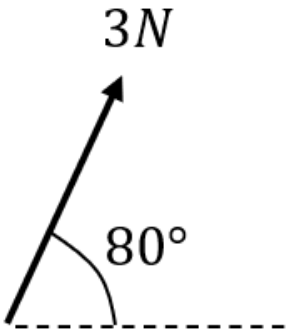
5.1) Resolving forces

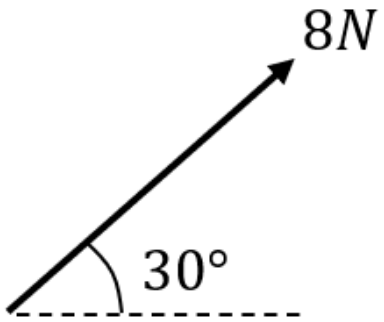
Worked example

Convert each force to the form $a\boldsymbol{i} + b\boldsymbol{j}$, where $\boldsymbol{i}$ and $\boldsymbol{j}$ are the positive x and y directions respectively.



Your turn

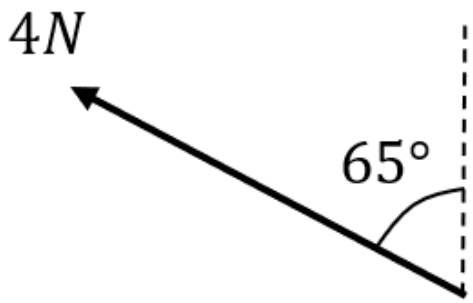
Convert each force to the form $a\boldsymbol{i} + b\boldsymbol{j}$, where $\boldsymbol{i}$ and $\boldsymbol{j}$ are the positive x and y directions respectively.



$4\sqrt{3}\,\boldsymbol{i} + 4\boldsymbol{j}$

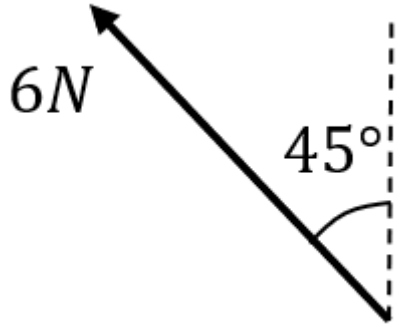
Worked example

Convert each force to the form $a\boldsymbol{i} + b\boldsymbol{j}$, where $\boldsymbol{i}$ and $\boldsymbol{j}$ are the positive x and y directions respectively.



Your turn

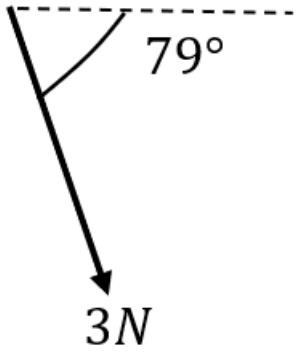
Convert each force to the form $a\boldsymbol{i} + b\boldsymbol{j}$, where $\boldsymbol{i}$ and $\boldsymbol{j}$ are the positive x and y directions respectively.



$-3\sqrt{2}\,\boldsymbol{i} + 3\sqrt{2}\boldsymbol{j}$

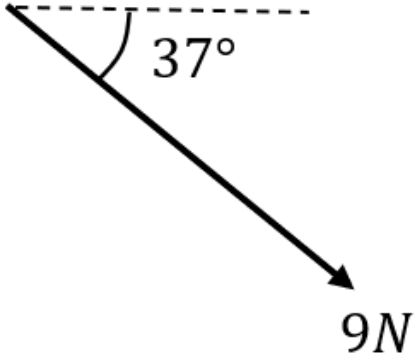
Worked example

Convert each force to the form $a\boldsymbol{i} + b\boldsymbol{j}$, where $\boldsymbol{i}$ and $\boldsymbol{j}$ are the positive x and y directions respectively.



Your turn

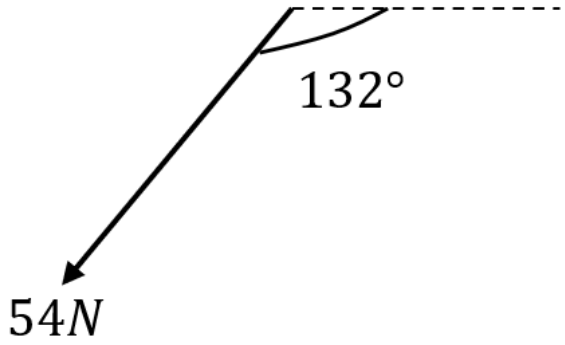
Convert each force to the form $a\boldsymbol{i} + b\boldsymbol{j}$, where $\boldsymbol{i}$ and $\boldsymbol{j}$ are the positive x and y directions respectively.



$7.19\boldsymbol{i} - 5.42\boldsymbol{j}$ (3 sf)

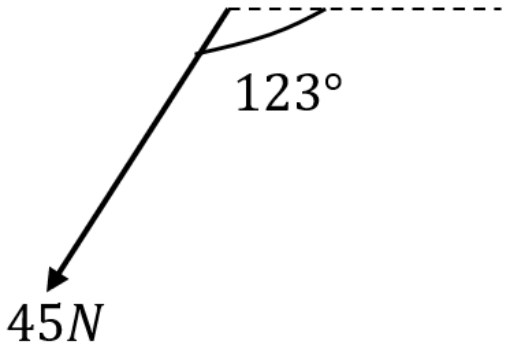
Worked example

Convert each force to the form $a\boldsymbol{i} + b\boldsymbol{j}$, where $\boldsymbol{i}$ and $\boldsymbol{j}$ are the positive x and y directions respectively.



Your turn

Convert each force to the form $a\boldsymbol{i} + b\boldsymbol{j}$, where $\boldsymbol{i}$ and $\boldsymbol{j}$ are the positive x and y directions respectively.



$-24.5\boldsymbol{i} - 37.7\boldsymbol{j}$

Worked example

A box of mass 10kg lies on a smooth horizontal floor.
A force of 8N is applied at an angle of $50°$ causing the box to accelerate horizontally along the floor.

(a) Work out the acceleration of the box.

(b) Calculate the normal reaction between the box and the floor.

Your turn

A box of mass 8kg lies on a smooth horizontal floor.
A force of 10N is applied at an angle of $30°$ causing the box to accelerate horizontally along the floor.

(a) Work out the acceleration of the box.

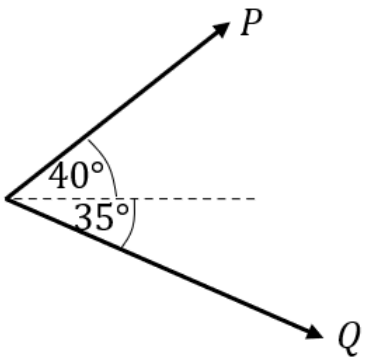
(b) Calculate the normal reaction between the box and the floor.

a) $\frac{5\sqrt{3}}{8}\ ms^{-2} = 1.1\ ms^{-2}$ (2 sf)

b) $73\ N$ (2 sf)

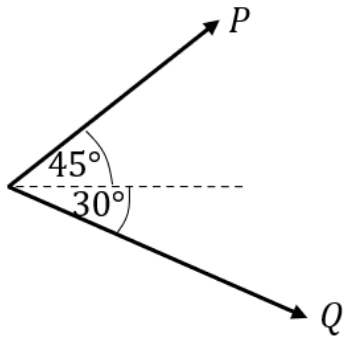
Worked example

Two forces P and Q act on a particle as shown.
P has a magnitude of 5N and Q has a magnitude of 4N.
Work out the magnitude and direction of the resultant force.



Your turn

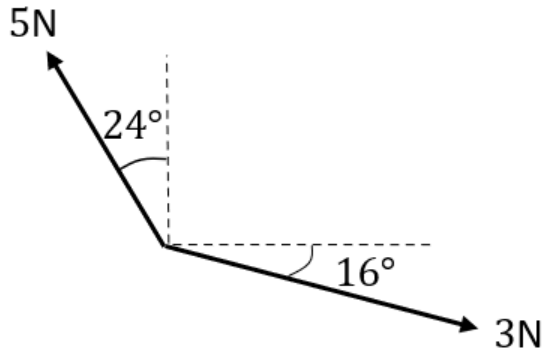
Two forces P and Q act on a particle as shown. P has a magnitude of 10N and Q has a magnitude of 8N.
Work out the magnitude and direction of the resultant force.



14.3 N (3 sf) acting at an angle of 12.4° (3 sf) above the horizontal.

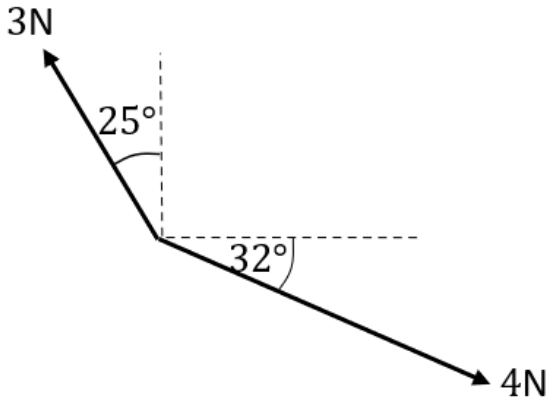
Worked example

Two forces act on a particle as shown.
Determine the magnitude and direction (anticlockwise from the positive x direction) of the resultant force.



Your turn

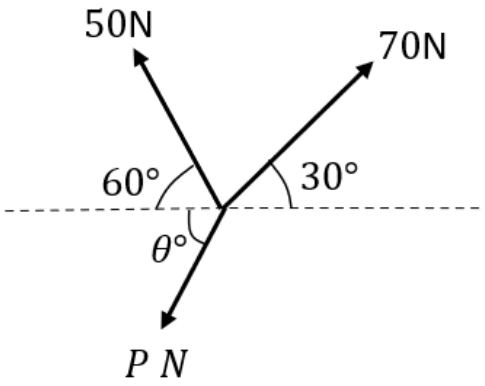
Two forces act on a particle as shown.
Determine the magnitude and direction (anticlockwise from the positive x direction) of the resultant force.



$2.21\ N$ (3 sf) acting at an angle of $15.8°$ (3 sf)

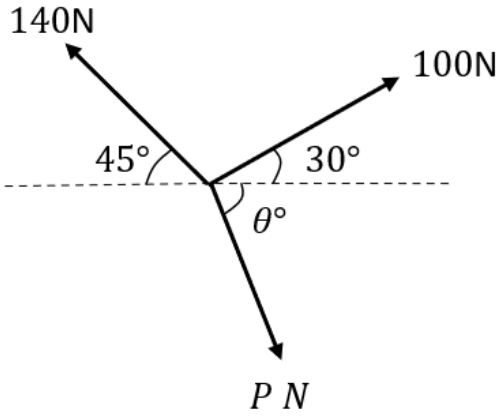
Worked example

Three forces act on a particle as shown.
Given that the particle is in equilibrium, calculate the magnitude of P



Your turn

Three forces act on a particle as shown.
Given that the particle is in equilibrium, calculate the magnitude of P



150 N (3 sf)