8.4) Working with vectors
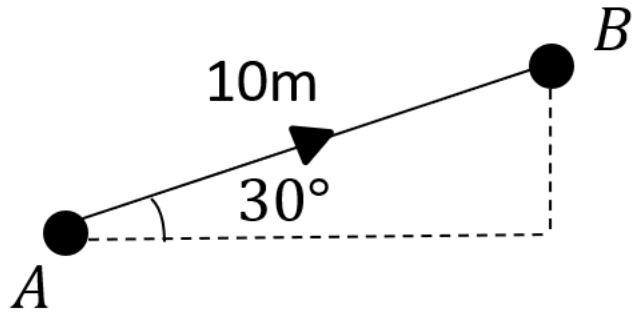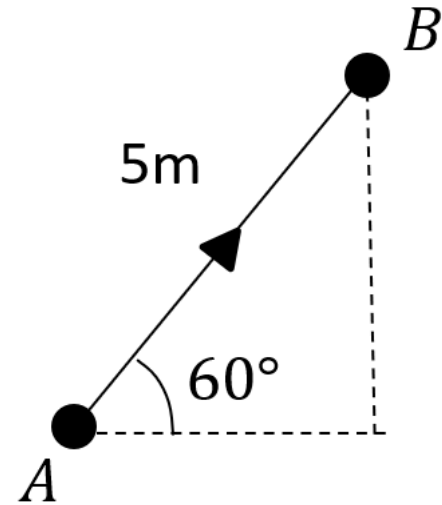
Worked example

Convert from scalar to vector form:

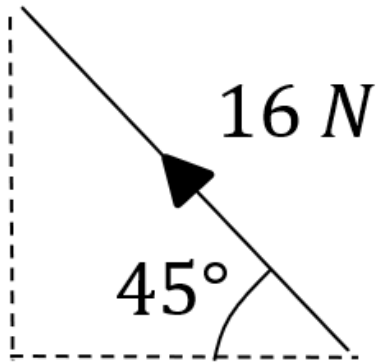# Your turn

Convert from scalar to vector form:

Displacement (from A) $= \begin{pmatrix} 5\cos 60° \\ 5\sin 60° \end{pmatrix} = \begin{pmatrix} 2.5 \\ 4.33 \end{pmatrix} m$

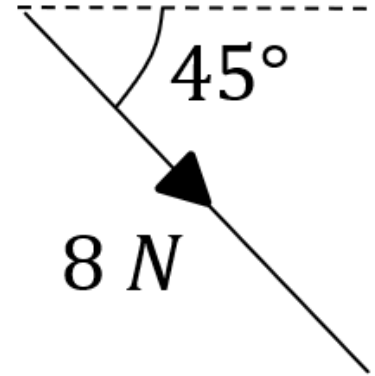| Worked example	Your turn
Convert from scalar to vector form:	Convert from scalar to vector form:

$$\text{Force vector } = \begin{pmatrix} 8\cos 45° \\ -8\sin 45° \end{pmatrix} = \begin{pmatrix} 4\sqrt{2} \\ -4\sqrt{2} \end{pmatrix} N$$

Worked example	Your turn
Convert from vector to scalar form:	Convert from vector to scalar form:
$$\text{Velocity} = \begin{pmatrix} -3 \\ 4 \end{pmatrix} \, ms^{-1}$$	$$\text{Velocity} = \begin{pmatrix} 5 \\ -12 \end{pmatrix} \, ms^{-1}$$
	$$\text{Speed} = 13 \, ms^{-1}$$

Worked example	Your turn
Convert from vector to scalar form: $\qquad$ Acceleration $= (3\boldsymbol{i} - 4\boldsymbol{j}) \, ms^{-2}$	Convert from vector to scalar form: $\qquad$ Acceleration $= (-6\boldsymbol{i} + 8\boldsymbol{j}) \, ms^{-2}$ $\qquad$ Magnitude of the acceleration $= 10 \, ms^{-1}$

Worked example	Your turn
The velocity of a particle is given by $$v = 2\boldsymbol{i} + 7\boldsymbol{j}\ ms^{-1}.$$ Find: a) The speed of the particle b) The angle the direction of motion of the particle makes with the unit vector $\boldsymbol{i}$ c) The angle the direction of motion of the particle makes with the unit vector $\boldsymbol{j}$	The velocity of a particle is given by $$v = 3\boldsymbol{i} + 5\boldsymbol{j}\ ms^{-1}.$$ Find: a) The speed of the particle b) The angle the direction of motion of the particle makes with the unit vector $\boldsymbol{i}$ c) The angle the direction of motion of the particle makes with the unit vector $\boldsymbol{j}$ a) $5.83\ ms^{-1}$ (2 dp) b) $59.04°$ (2 dp) c) $30.96°$ (2 dp)

Worked example	Your turn
The velocity of a particle is given by $$v = 3\boldsymbol{i} - 5\boldsymbol{j}\ ms^{-1}.$$ Find: a) The speed of the particle b) The angle the direction of motion of the particle makes with the unit vector $\boldsymbol{i}$ c) The angle the direction of motion of the particle makes with the unit vector $\boldsymbol{j}$	The velocity of a particle is given by $$v = 2\boldsymbol{i} - 7\boldsymbol{j}\ ms^{-1}.$$ Find: a) The speed of the particle b) The angle the direction of motion of the particle makes with the unit vector $\boldsymbol{i}$ c) The angle the direction of motion of the particle makes with the unit vector $\boldsymbol{j}$ a) $7.28\ ms^{-1}$ (2 dp) b) $74.05°$ (2 dp) c) $164.05°$ (2 dp)

Worked example	Your turn
A man walks from A to B and then from B to C. His displacement from A to B is $5\boldsymbol{i} - 6\boldsymbol{j}$ m. His displacement from B to C is $4\boldsymbol{i} + 12\boldsymbol{j}$ m. a) What is the magnitude of the displacement from A to C? b) What is the total distance the man has walked in getting from A to C.	A man walks from A to B and then from B to C. His displacement from A to B is $6\boldsymbol{i} + 4\boldsymbol{j}$ m. His displacement from B to C is $5\boldsymbol{i} - 12\boldsymbol{j}$ m. a) What is the magnitude of the displacement from A to C? b) What is the total distance the man has walked in getting from A to C. a) $13.60\ km$ (2 dp) b) $20.21\ km$ (2 dp)