11.6) Modelling with vectors

Worked example

A girl walks 6 km due east from a fixed point O to A, and then 4 km due south from A to B. Find:

a) the total distance travelled
b) the position vector of B relative to O
c) $\left|\overrightarrow{OB}\right|$
d) The bearing of B from O.

Your turn

A girl walks 2 km due east from a fixed point O to A, and then 3 km due south from A to B. Find:

a) the total distance travelled
b) the position vector of B relative to O
c) $\left|\overrightarrow{OB}\right|$
d) The bearing of B from O.

a) $5\ km$
b) $(2\boldsymbol{i} - 3\boldsymbol{j})\ km$
c) $3.61\ km$ (3 sf)
d) $146°$ (3 sf)

Worked example

In an orienteering exercise, a cadet leaves the starting point O and walks 30 km on a bearing of $150°$ to reach A, the first checkpoint.
From A she walks 18 km on a bearing of $210°$ to the second checkpoint, at B.
From B she returns directly to O.
Find:

a) the position vector of A relative to O
b) $\left|\overrightarrow{OB}\right|$
c) the bearing of B from O
d) the position vector of B relative O.

Your turn

In an orienteering exercise, a cadet leaves the starting point O and walks 15 km on a bearing of $120°$ to reach A, the first checkpoint.
From A he walks 9 km on a bearing of $240°$ to the second checkpoint, at B.
From B he returns directly to O.
Find:

a) the position vector of A relative to O
b) $\left|\overrightarrow{OB}\right|$
c) the bearing of B from O
d) the position vector of B relative O.

a) $(13.0\boldsymbol{i} - 7.5\boldsymbol{j})\ km$ (1 dp)
b) $13.1\ km$ (3 sf)
c) $157°$ (3 sf)
d) $(5.2\boldsymbol{i} - 12.0\boldsymbol{j})\ km$