Physics 20

Unit A: Motion in one and two dimensions

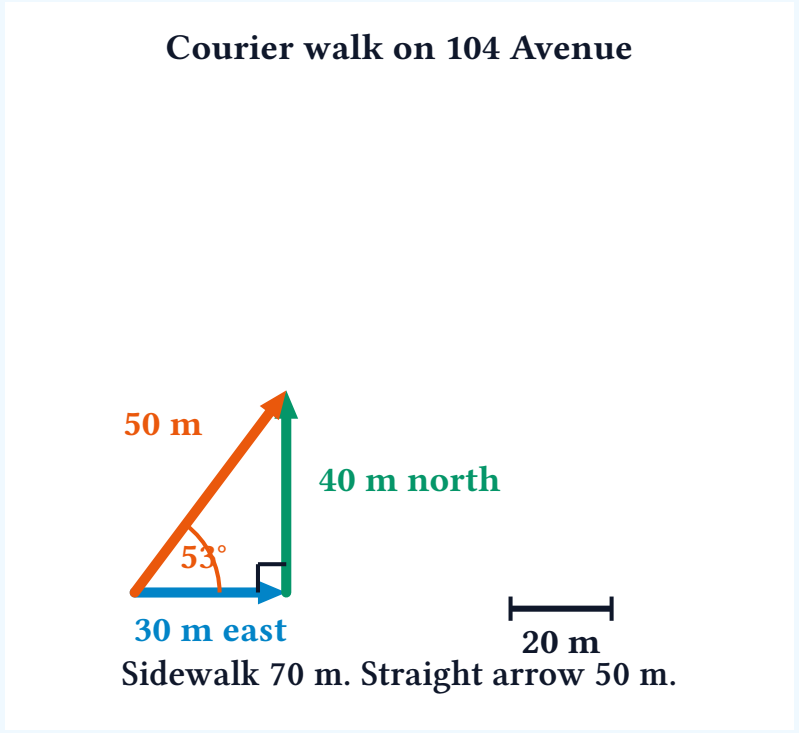
Scalars and vectors

A courier finishes 50 m from the start

- A courier in Edmonton walks 30 m east on 104 Avenue and then 40 m north to a warehouse door.
- The sidewalk path adds to 70 m, while the straight position change is 50 m north of east.

Magnitude and direction

- Pick a doorway as the start. Distance is how far the feet walked. Position is where you are from that doorway.
- A scalar is finished when you write the number and the unit. A vector still needs a direction, such as north of east.
- Displacement is written delta d. It means where you finished minus where you started, with a direction.



Key terms

position

Position is the location of an object relative to a chosen origin, stated with a distance and a direction. (d)

distance

Distance is the length of the path actually travelled, recorded as a magnitude and a unit.

displacement

Displacement is the straight change from the initial position to the final position, with direction included. (delta d)

scalar

A scalar is a quantity fully described by a magnitude and a unit.

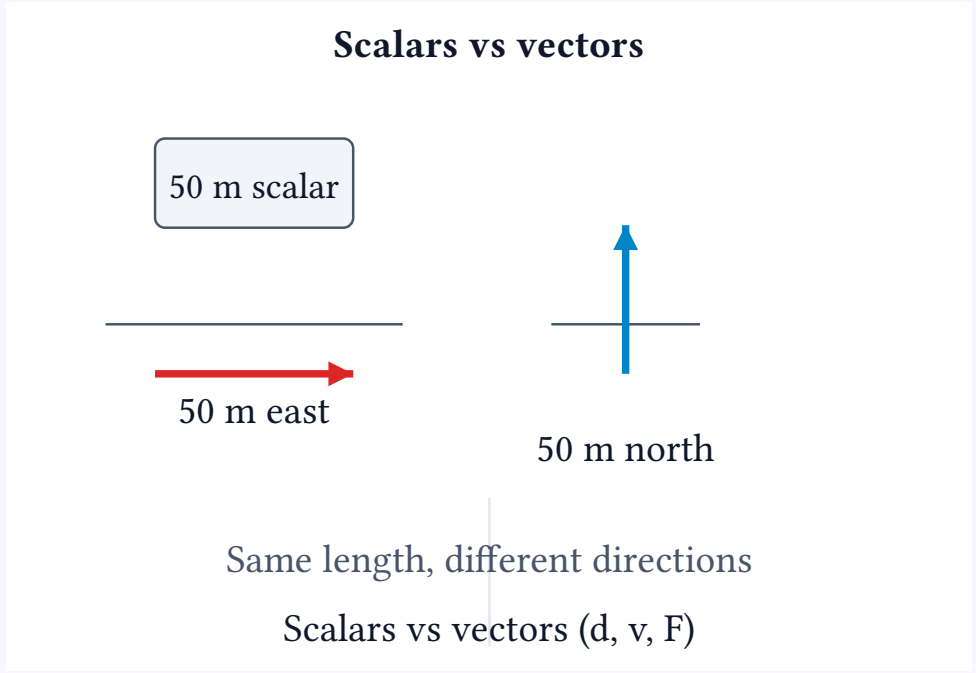
Key terms

vector

A vector is a quantity described by a magnitude, a unit, and a direction.

Scalars and vectors

- Distance, time, and speed are scalars. A number and a unit finish each one.
- Displacement, velocity, acceleration, and force each need a direction beside the number.
- Two 50 m arrows can point different ways. Same length, different vectors.



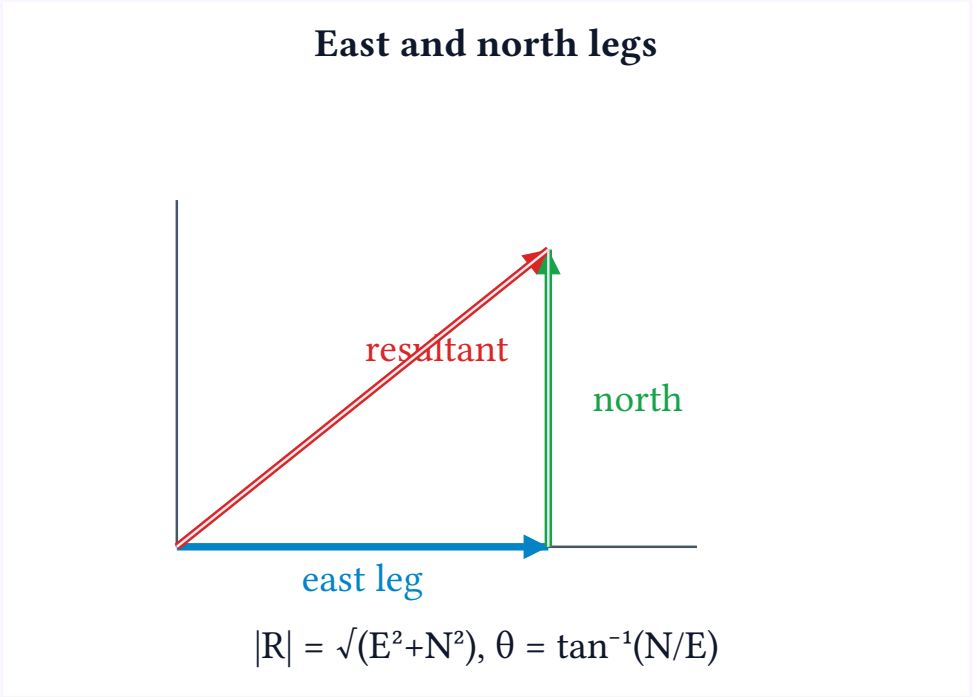
Scalars vs vectors (d, v, F)

A return to the doorway

- The courier later walks back to the original doorway along a 90 m route.
- Distance for the whole outing includes every metre of sidewalk.
- Displacement for the whole outing is 0 m because the final position matches the initial position.

East and north legs make one arrow

- Write the east leg and the north leg first. They stand in for the single arrow.
- Square each leg, add the squares, and take the square root. That length is the straight arrow.
- The angle is the tan inverse of the north leg divided by the east leg.



A drone’s two legs

- A survey drone flies 120 m west and then 50 m south.
- Find the distance and the displacement from the launch pad.
- Give the direction as an angle south of west.

Path and arrow

- A student walks 8.0 m north along a hallway and then 6.0 m east into a lab.
- State the distance and the displacement with direction.
- Name which result is a scalar and which result is a vector.