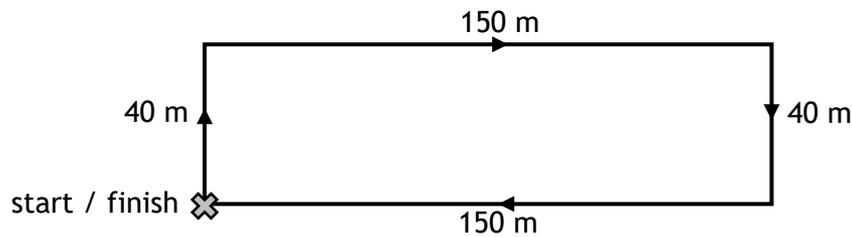# Area 1: Vectors & Scalars

Multiple Choice Questions 1 → 10

1. Identify the row that contains two scalars and one vector quantity.

   A   distance   acceleration   velocity
   B   speed   mass   acceleration
   C   distance   weight   force
   D   speed   weight   acceleration
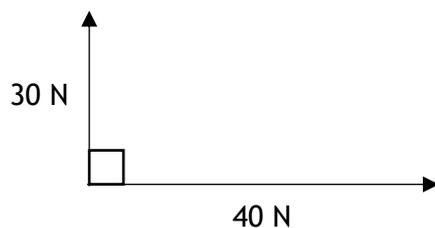   E   velocity   force   mass

2. A pupil follows the route shown in the diagram and arrives back at the starting point.

   Identify the row in the table that shows the total distance walked and the magnitude of the final displacement.

	total distance (m)	final displacement (m)
A	0	80
B	0	380
C	190	0
D	380	0
E	380	380

3. Two forces act on an object as shown.

   Calculate the magnitude of the resultant force.

   A   10 N
   B   30 N
   C   40 N
   D   50 N
   E   70 N

4. During training, an athlete sprints 30 m East and then 40 m West.
   Identify the row in the table which gives the distance travelled and the displacement from the starting point.

	distance travelled	final displacement
A	10 m	10 m East
B	10 m	10 m West
C	10 m	70 m East
D	70 m	10 m West
E	70 m	10 m East

5. A pupil walks from X to Y and then from Y to Z, as shown in the diagram.
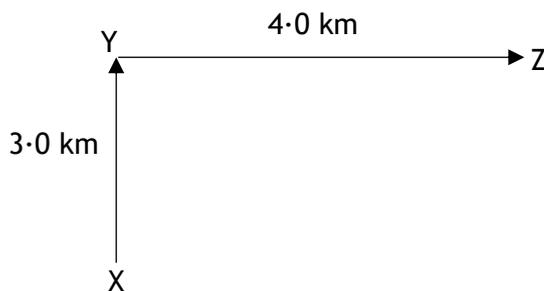
The walk takes the pupil 2 hours to complete.
Identify which row in the table shows the average speed and the average velocity for the pupil, during this walk.

|	average speed	average velocity
A	2·5 kmh^{-1}	2·5 kmh^{-1} at 053°
B	2·5 kmh^{-1} at 053°	2·5 kmh^{-1}
C	3·5 kmh^{-1}	2·5 kmh^{-1} at 053°
D	3·5 kmh^{-1} at 053°	3·5 kmh^{-1}
E	3·5 kmh^{-1}	3·5 kmh^{-1} at 053°

6. Identify which of the following quantities can be described fully by its magnitude.

   A   force
   B   displacement
   C   energy
   D   velocity
   E   acceleration

7. Identify which of the following quantities can be described by their magnitude **and** direction.

    A   mass
    B   time
    C   speed
    D   kinetic energy
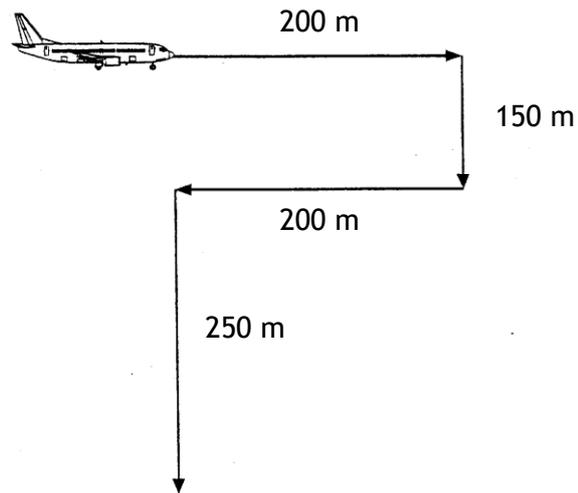   E   acceleration

8. Four tugs boats apply forces to an oil-rig as shown.

                40 kN

50 kN ←   □   → 40 kN

                30 kN
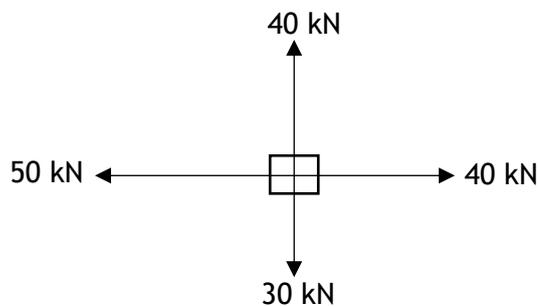
Identify which arrow represents the direction of the resultant force.

A

B

C

D

E

9. At an airport an aircraft moves from the terminal building to the end of the runway.

200 m

150 m

200 m

250 m

Identify which row shows the total distance travelled and the magnitude of the displacement of the aircraft.

	distance travelled (m)	magnitude of displacement (m)
A	400	800
B	450	200
C	450	400
D	800	400
E	800	800

10. Identify which row in the table contains only one vector.

A	acceleration	displacement	force
B	distance	velocity	energy
C	acceleration	speed	force
D	force	energy	distance
E	speed	distance	time

11. An orienteer starts as point A, walks 300 metres North then 400 metres East, until point B is reached in a total time of 900 seconds.
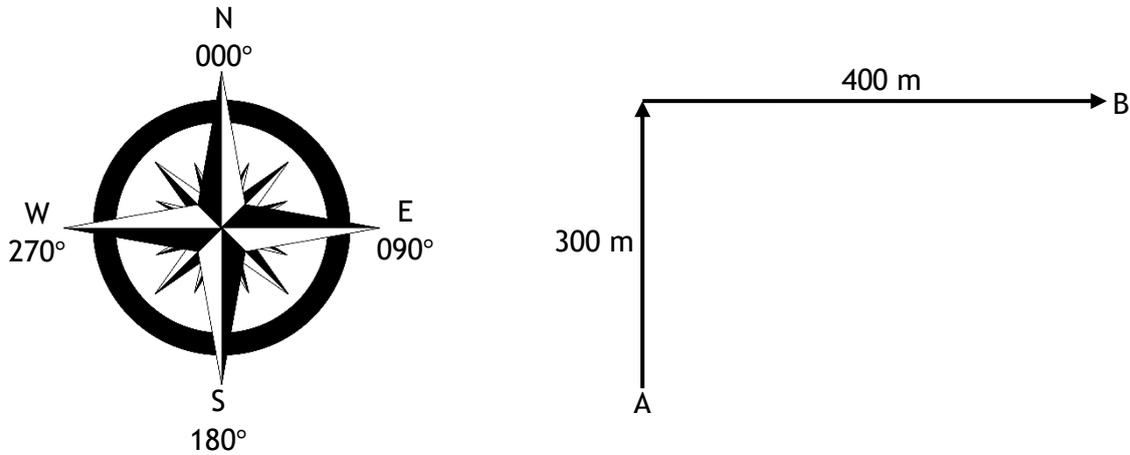
(a) Calculate the total **distance** walked by the orienteer.

(b) Calculate the **displacement** of point B relative to point A (magnitude and direction).

(c) Calculate the average **speed** of the orienteer.

(d) Calculate the average **velocity** of the orienteer.

12. A car is driven 15 kilometres East for 12 minutes before the road changes. The car is then driven 18 kilometres South for 18 minutes.

(a) Calculate the average **speed** of the car, **kilometres per hour** (kmh^{-1}).

(b) Calculate the average **velocity** of the car, in **kilometres per hour** (kmh^{-1}).

13. A helicopter is flying at a constant height above the ground. The helicopter is carrying a crate suspended from a cable, as shown.

The helicopter flies 20 km on a bearing of 180°. It turns on a bearing of 270° and travels for a further 30 km.
The helicopter takes 15 minutes to travel the total distance of 50 km.

(a) Calculate the resultant displacement of the helicopter, after the 15 minutes (magnitude and direction).

(b) Calculate the average speed of the helicopter.

(c) Calculate the average velocity of the helicopter (magnitude and direction).