Scalars and Vectors Markscheme

1. State the definition of a scalar.

A quantity that has size only.

2. State the definition of a vector.

A quantity that has size and direction.

3. Sort the following quantities into scalars and vectors:

Displacement, acceleration, distance, speed, mass, weight, energy, force, velocity

Scalar	Vector
Distance, speed, mass, energy	**Displacement, acceleration, weight, force, velocity**

4. State the definitions of:
   a. Distance

How far an object has travelled.

   b. Displacement

The position of an object relative to its starting point or another object.

   c. Speed

How far an object travels in a given time.

   d. Velocity

How far an object travels in a given direction in a given time (speed with direction).

5. Soldiers go on a march in the desert. They first walk 6km west from their camp, rest for a bit then 10km east, rest a bit then 4km west.

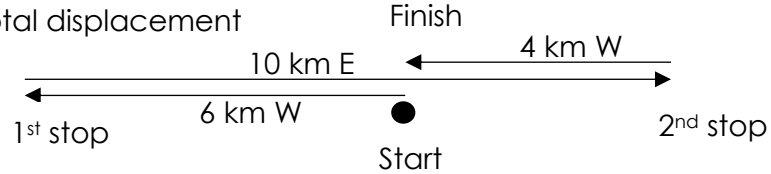
Calculate:

   a. The distance covered

Distance = 6 km + 10 km + 4 km

= 20 km

   b. The total displacement



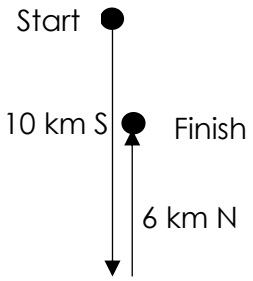
Displacement = 10 – (6+4)

= 0 km (the soldiers have returned to the same place).

c. Their displacement at the second rest stop

Displacement = 4 km East

6. Harry walks 10 km South. Then walks 6 km North. What is his Calculate:



a. The distance travelled

Distance = 10 km + 6 km

= 16 km

b. His total displacement

Displacement = 4 km South

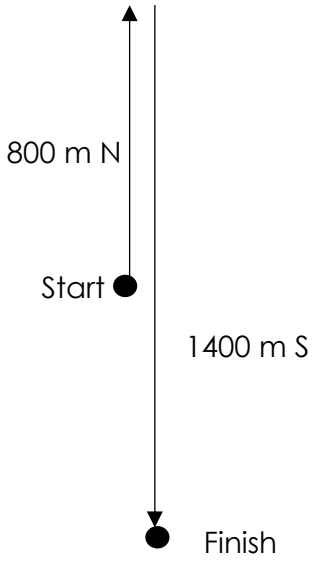
7. A cyclist cycles 800m in a straight line North, turns around and completes a further 1400 m South. The cyclist completes the whole route in 200s.

a. Calculate the distance covered

Distance = 800 m + 1400 m

= 2200 m

b. Calculate the displacement of the cyclist



Displacement = 600 m South

c. Calculate the average speed

Average speed = Total distance/total time taken

= 2200 m/ 200 s

= 11 m/s

d. Calculate the average velocity

Average velocity = displacement/time

= 600 m South/ 200 s

= 3 m/s South

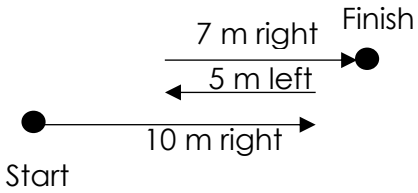
8. A trolley is pushed 10 m to the right, then 5 m to the left and back 7 m towards the right. The total time taken was 2 minutes.

a. Calculate the total distance covered.

Distance = 10 m + 5 m + 7 m

= 22 m

b. Calculate the displacement.



Displacement = 12 m right

c. Calculate the average speed.

Average speed = total distance/total time taken

= 22 m/120 s

= 0.18 m/s

d. Calculate the average velocity.

Average velocity = displacement/time

= 12 m right/120 s

= 0.1 m/s right