

Topic 1B: Distance (Scalar) and Displacement (Vector)

Intro to Vector and Scalar

Skill 4: Scalars and Vectors (Distance vs Displacement) (represented by arrows)

Scalar quantities - No direction required

Ex: Time, mass, work/energy, distance, speed.

Distance is the amount of ground covered (ie odometer reading)

Vector - Both magnitude & Direction (SIZE)

Ex: Displacement, velocity, acceleration, force, momentum

Displacement - is overall position from start including direction

Example: A car travels 20m west and 5m east
Distance = 25m, Displacement = 15m west.

Distance and displacement are the same when direction doesn't change

Magnitude - How big? What size?

Direction - angle, North, East, West, South, Down, Up

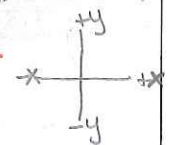
Skill 5: Adding Parallel Vectors (Vectors on the same axis)

Resultant - Sum (combination) of 2 or more vectors

For 2 vectors on the same axis (x & $-x$; y & $-y$; North/South; East & West) assign positive or negative as related to x & y axes and sum.

Ex: 5m **east** & 20m **west** = $(+5m) + (-20m) = -15m$ or 15m **west**

7m **South** & 6m **South** = $(-7m) + (-6m) = -13m$ or 13m **South**



2 vectors in the same direction (0° difference) is max resultant magnitude
opposite direction (180° difference) is min resultant magnitude

Ex: 3m east & 5m east = 8m east
Same direction = max resultant magnitude
 0° difference

3m east + 5m west = 2m west
opposite direction = min resultant magnitude

Skill 6: Position vs. Time Graphs

Position vs. time graphs can be called distance vs. time or displacement vs. time for an object moving on a SINGLE AXIS (ie back and forth in a line)

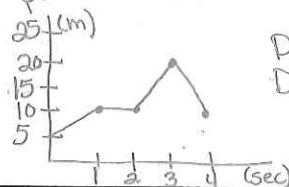
The y-axis of graph represents the position at any point

x-axis of graph represents time

Distance - is the sum of all changes in position ($\sum \Delta y$)

symbol for summation

Displacement - is the difference in position between start point and end point



Distance = $(15m + 10m)$
Displacement = 5m right
(difference between end 10m - start 5m)