

Displacement, Velocity and Acceleration

Starter

1. **(Review of last lesson)**

Find the total area between the curve $y = x(x^2 - 1)$ and the x -axis.

Notes

Vectors vs. scalars with moving objects

Scalar are represented by positive numbers.

Vectors can be positive or negative.

Vector	Scalar
Displacement	Distance
Velocity	Speed
Acceleration	

N.B. Speeds are always quoted as positive numbers but velocities can be positive or negative.

$$\text{Average speed} = \frac{\text{total distance travelled}}{\text{time}}$$

$$\text{Average velocity} = \frac{\text{final displacement} - \text{initial displacement}}{\text{time}}$$

Converting between km/h and m/s on the Classwiz

Type the number >> CONV (SHIFT 8) >> VELOCITY (Down arrow >> 1)

1: km/h to m/s

2: m/s to km/h

Converting between mph and km/h on the Classwiz

Type the number >> CONV (SHIFT 8) >> LENGTH (1)

7: mile to km

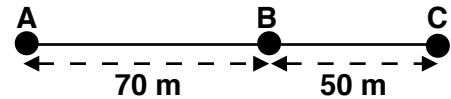
8: km to mile

Video: [Converting lengths and speeds on the Classwiz](#)

E.g. 1 A particle starts at *A* and takes 8 seconds to travel to *B* and then another 4 seconds to go from *B* to *C*. After reaching *C* it completes its journey by returning to *B* in 3 seconds.

(a) For the journey from *A* to *C* find:

- (i) the average speed
- (ii) the average velocity.



(b) For the **complete** journey from *A* to *B* find:

- (i) the average speed
- (ii) the average velocity.

N.B. The complete journey means *A* to *B* to *C* to *B*

Working:

(a) (i) Distance = $70 + 50 = 120$ m
Time from *A* to *C* = $8 + 4 = 12$ s
Average speed = $\frac{120}{12} = 10$ m/s

(ii) *The distance and displacement are the same for the journey from *A* to *C**

Displacement = $70 + 50 = 120$ m
Time from *A* to *C* = $8 + 4 = 12$ s
Average velocity = $\frac{120}{12} = 10$ m/s

Video: [Displacement](#)

[Solutions to Starter and E.g.s](#)

Exercise

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Summary

$$\text{Average speed} = \frac{\text{total distance travelled}}{\text{time}}$$

$$\text{Average velocity} = \frac{\text{final displacement} - \text{initial displacement}}{\text{time}}$$

Velocity could be positive or negative but speed is always positive.

Displacement is a vector so direction is important.