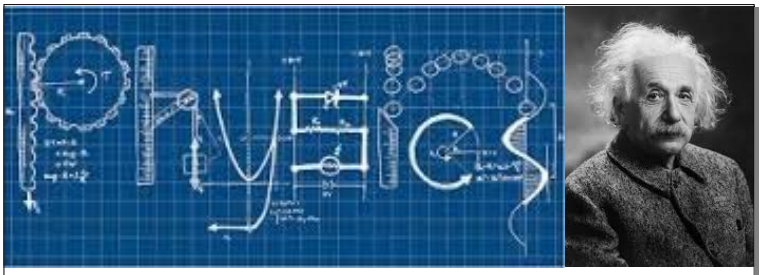
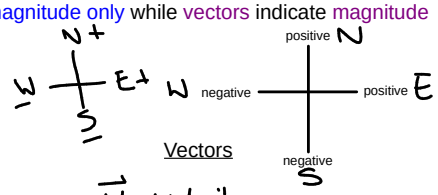


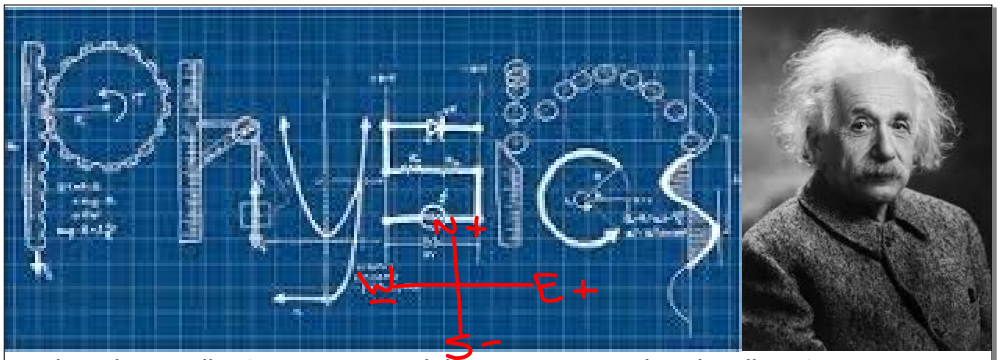
2.2 Calculating with Scalars and Vectors

Recall: Scalars indicate a magnitude only while vectors indicate magnitude and direction.

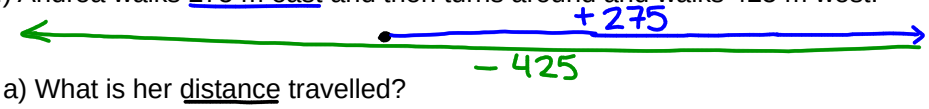


Examples:

Scalars	Vectors
v: speed (110 km/h)	$\vec{v}$: velocity (110 km/h [S])
d: distance (300 m)	$\vec{d}$: displacement (300 m [S of W])
a: acceleration ($9.81\ m/s^2$)	$\vec{a}$: acceleration ($9.81\ m/s^2$ [towards the centre of the Earth])



Ex.) Andrea walks 275 m east and then turns around and walks 425 m west.



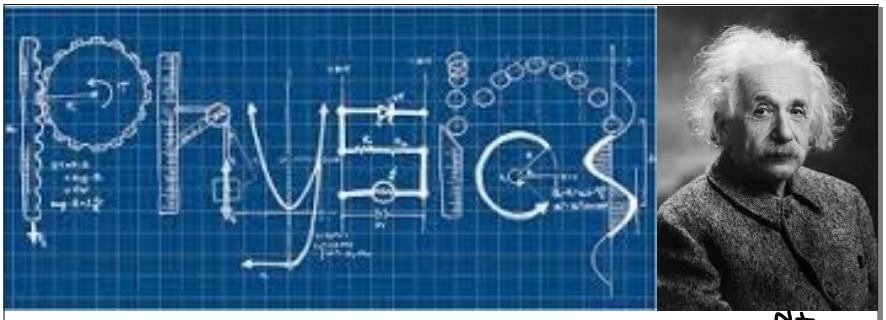
a) What is her distance travelled?

$d = 275 + 425 = \boxed{700\ m}$

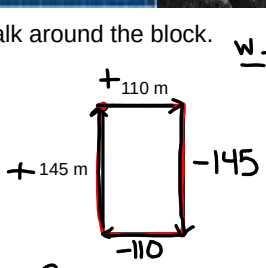
b) What is her displacement?

$\vec{d} = +275 + -425 = -150\ m$

$= \boxed{150\ m\ [W]}$



Ex.) Ms. Austin takes her dog, Bo, out for a walk around the block.



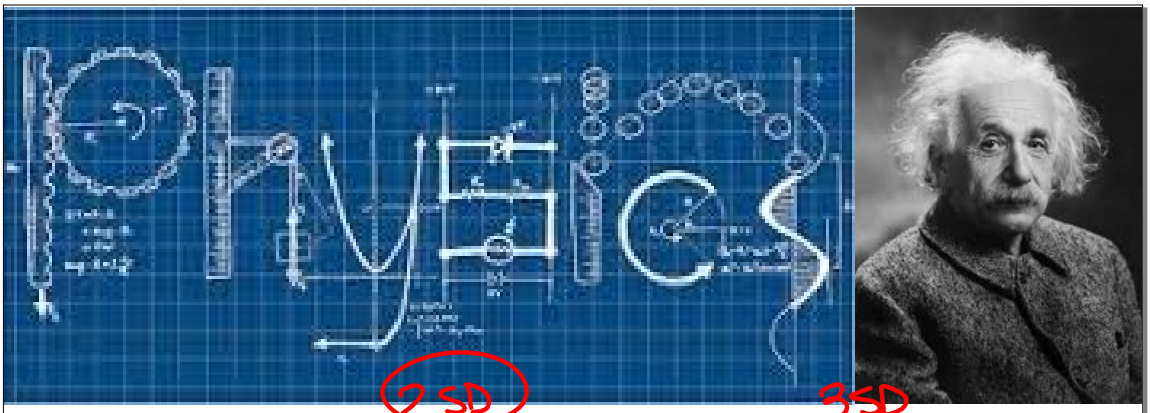
a) What is their distance travelled?

$d = \begin{matrix} 110m + 145m + 110m + 145m \\ (110 \times 2) + (145 \times 2) \end{matrix} \Big\} = \boxed{510m}$

b) What is their displacement?

$\vec{d} = +110 + -145 + -110 + +145$

$\vec{d} = 0m$



Ex.) A truck travels west for 3.0 h. Its displacement is then 2.60 x 10^2 km west from its starting point.

260 km

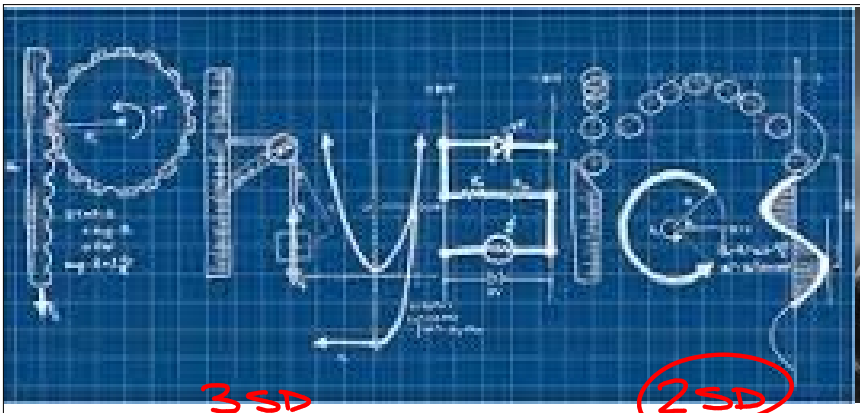
a) What is the average velocity of the truck?

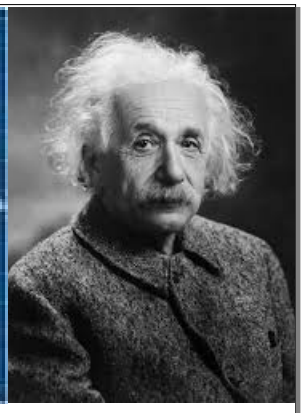
$\vec{v} = \frac{\vec{d}}{t}$ $t = 3.0h$ $\vec{d} = 2.60 \times 10^2 km$

$\vec{v} = \frac{2.60 \times 10^2 km}{3.0 h}$

$\vec{v} = 86.6666...$

$\vec{v} = 87 km/h [W]$





3 SD 2 SD

Ex.) It takes 1.00 min for a sound wave to travel 2.0×10^1 km [W]. What is the velocity of sound, in m/s?

$\vec{v} = \frac{\vec{d}}{t}$

$t = 1.00\,\text{min} = 60.0\,\text{s}$

$\vec{d} = 20\,\text{km [W]}$

$= 20\,000\,\text{m [W]}$

$\vec{v} = \frac{20\,000\,\text{m}}{60.0\,\text{s}}$

$\vec{v} = 3.3 \times 10^2\,\text{m/s [W]}$