3/11/2020

# S10 Unit B: S10 Physics Review Party!

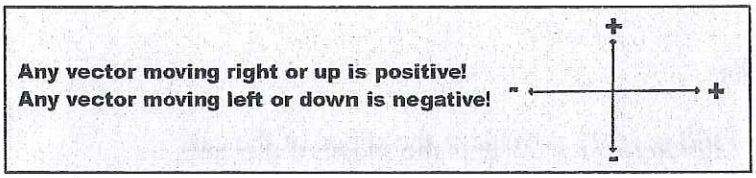
Name: Key!

Date: Mar 17th 2020

Terms:

Scalars : have magnitude (ex: distance , speed, time)

Vectors : have magnitude and direction (ex: displacement, velocity )




$\vec{v}$ ← **Vectors get a hat (harpoon)**

ex) LD walks 275 m east and then turns around and walks 425 m west.

a) What is the distance traveled?

$d = 275m + 425m = 700m$

Since we are looking for distance, which is a scalar, we just add the values, without worrying about direction.

b) What is the displacement?

east = positive, west = negative

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

Since we are looking for displacement, which is a vector, we add the values, but make anything west or south negative.

ex) LD takes his pet dog out for a walk around the block.

a) What is the distance traveled?

$d = 115m + 125m + 115m + 125m$

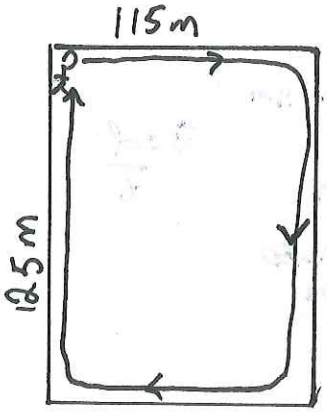
$= 480m$

b) What is the displacement traveled?

$\vec{d} = 115m + -125m + -115m + 125m$

$= 0m$

The total displacement is zero as he ends up where he starts.



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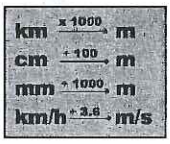
# Formula Time!

**Page 2 of the data booklet has the units each variable should be in.**




**Page 2 of the data booklet has the formulas from last year. Let's try them out!**

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

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

$$\vec{a} = \frac{\Delta \vec{v}}{\Delta t} = \frac{\vec{v}_f - \vec{v}_i}{\Delta t}$$

**LD's Problem Solving Method:**

1. List variables. Convert if needed.
2. Write formula.
3. Sub in (with units).
4. Algebra.
5. SD and final units.

1) 1) A car travels 1300 m in 31 s. What is the speed of the car?

| variables list | formula | substitution (with units) and algebra |
|---|---|---|
| $d = 1300\,m$<br>$t = 31\,s$<br>$v = ?$ | $v = \frac{d}{t}$ | $v = \frac{1300\,m}{31\,s} = 42\,m/s$ |

2) A car travels at 45 km/h [W] for 100 s. What is the car's displacement?

This is negative because we are dealing with a vector going west.

Don't forget to round to sig figs!

| variables list | formula | substitution (with units) and algebra |
|---|---|---|
| $\vec{v} = -45\,km/h$<br>$t = 100\,s$<br>$\vec{d} = ?$ | $\vec{v} = \frac{\vec{d}}{t}$ | $-45\frac{km}{h} \div 3.6 = -12.5\,m/s$<br>$-12.5\frac{m}{s} = \frac{\vec{d}}{100\,s}$ (×100 on both sides)<br>$\vec{d} = -1250\,m = -1.3 \times 10^3\,m$ |

3) A sound wave travels $2.0 \times 10^1$ km [W] in 1.00 minute. What is the velocity of sound (in m/s)?

| variables list | formula | substitution (with units) and algebra |
|---|---|---|
| $\vec{d} = -2.0 \times 10^1\,km$<br>$\times 1000$<br>$-20000\,m$<br>$t = 1.00\,min \times 60 = 60\,s$ | $\vec{v} = \frac{\vec{d}}{t}$ | $\vec{v} = \frac{-20000}{60\,s}$<br>$\vec{v} = -333.\overline{3}\frac{m}{s} \Rightarrow -3.3 \times 10^2\,m/s$ |

5) How long does it take a photon of light to travel 149598000 km (the distance between the sun and earth) if the speed of light is $3.00 \times 10^8$ m/s?

| variables list | formula | substitution (with units) and algebra |
|---|---|---|
| $v = 3.00 \times 10^8$ m/s<br>$d = 149598000000$ m<br>$t = ?$ | $v = \frac{d}{t}$ | $3 \times 10^8$ m/s $= \frac{149598000000\text{ m}}{t}$ (The swap!)<br>$t = \frac{149598000000\text{ m}}{3 \times 10^8\text{ m/s}} = 499\text{ s}$ |

6) A bike starts at a velocity of 3.5 m/s and increases velocity to 7.1 m/s over 55 s. What is the acceleration?

| variables list | formula | substitution (with units) and algebra |
|---|---|---|
| $\vec{v}_i = 3.5$ m/s<br>$\vec{v}_f = 7.1$ m/s<br>$t = 55$ s<br>$\vec{a} = ?$ | $\vec{a} = \frac{\vec{v}_f - \vec{v}_i}{t}$ | $\vec{a} = \frac{7.1\text{ m/s} - 3.5\text{ m/s}}{55\text{ s}}$<br>$\vec{a} = \frac{3.6\text{ m/s}}{55\text{ s}} = 0.065\text{ m/s}^2$ |

7) How long does it take a jet to accelerate at 50 m/s$^2$ and undergo a change in velocity of 450 m/s? (recall → this means $\Delta\vec{v}$!)

| variables list | formula | substitution (with units) and algebra |
|---|---|---|
| $\Delta\vec{v} = 450$ m/s<br>$\vec{a} = 50\text{ m/s}^2$<br>$t = ?$ | $\vec{a} = \frac{\Delta\vec{v}}{t}$ | $50\text{ m/s}^2 = \frac{450\text{ m/s}}{t}$<br>$t = 9.0$ s (Don't forget to add a zero to get 2 sig digs.) |

8) A car accelerates at 5.0 m/s$^2$. Starting from 3.0 m/s, how fast will the car move after 12 s?

| variables list | formula | substitution (with units) and algebra |
|---|---|---|
| $\vec{a} = 5.0\text{ m/s}^2$<br>$\vec{v}_i = 3$ m/s<br>$\vec{v}_f = ?$<br>$t = 12$ s | $\vec{a} = \frac{\vec{v}_f - \vec{v}_i}{t}$ | $5\text{ m/s}^2 = \left[\frac{\vec{v}_f - 3\text{ m/s}}{12\text{ s}}\right]$ (×12)<br>$60 = \vec{v}_f - 3$ (+3)<br>$63\text{ m/s} = \vec{v}_f$ |