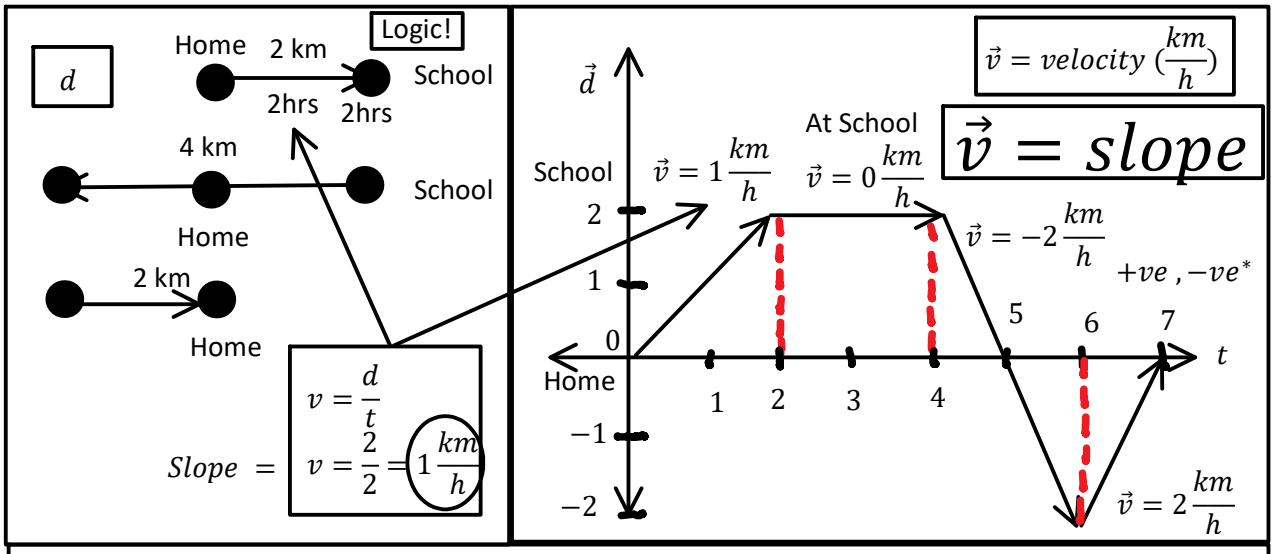
C12 - 2.2 - d , $\vec{d}$ vs t notes

$d = distance\ (s^*)$
$\vec{d} = Displacememt\ (v^*)$

You walk East straight to school at 1 km/h for 2km. You're at school for 2 hrs. You turn around and run 2km/h 2km past home then back home.



$\vec{v} = velocity\ (\frac{km}{h})$

$\vec{v} = slope$

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

$Slope\ = \quad v = \frac{2}{2} = 1\frac{km}{h}$

Distance

t	d
0	0
1	1
2	2
3	2
4	2
5	4
6	6
7	8

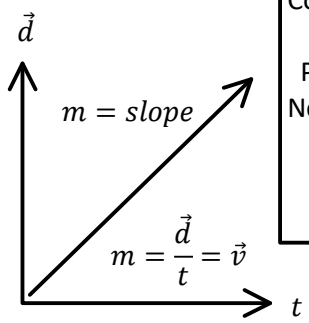
$m = \frac{d}{t} = s$

$s = |v|\ ; Always +$

Displacement

t	$\vec{d}$
0	0
1	1
2	2
3	2
4	2
5	0
6	−2
7	0

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



Velocity : Slope
Constant Velocity : Straight Line
Zero Velocity : Horizontal Line
Positive Velocity : Slope Up
Negative Velocity : Slope Down
Speeding Up : Getting Steeper
Slowing Down : Getting Flatter
Curve Velocity : Draw a Tangent!

$\vec{d} = \vec{d} + \vec{v}t$
$y = mx + b$

Physics 10 (0-2s)

$v_f = v_i + at$
$v_f = 0 + 1(2)$
$v_f = 2\frac{m}{s}$

Physics 11 (0-2s)

$\vec{v}_f^2 = \cancel{v_i^2} + 2\vec{a}d$
$d = \frac{\vec{v}_f^2}{2\vec{a}}$
$d = \frac{2^2}{2(1)} = 2m$

$m = \frac{\vec{d}_2 - \vec{d}_1}{t_2 - t_1}$

Distance vs Time

$s_{ave(0,7)} = \frac{8-0}{7-0}$

$s_{ave(0,7)} = 1.14\frac{km}{h}$

Displacement vs Time

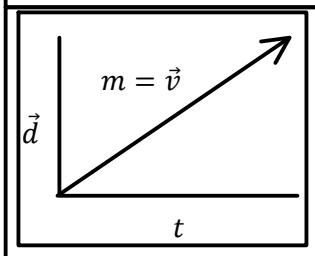
$\vec{v}_{ave(0,4)} = \frac{2-0}{4-0}$

$\vec{v}_{ave(0,4)} = 0.5\frac{km}{h}\ [E]$

Displacement vs Time

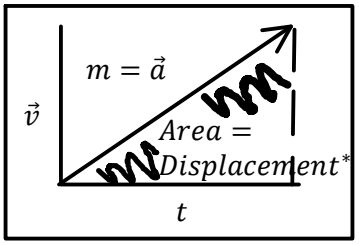
$\vec{v}_{ave(2,7)} = \frac{0-2}{7-2}$

$\vec{v}_{ave(0,4)} = -0.4\frac{km}{h}\ [E]$



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

$m = \frac{\vec{v}}{t} = \vec{a}$

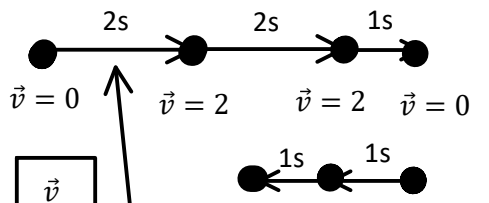


Displacement (Vector - Magnitude and Direction): How far you are from where you started. (Velocity*)
Distance (Scalar - Magnitude only): How far you've gone. (Speed*)

C12 - 2.2 - $\vec{v}$ vs t Notes

$\vec{v} = velocity\ (\frac{m}{s})$

You start from rest and accelerate East at 1 m/s^2 for 2s then run for 2s at constant speed then slow down at 2 m/s^2 to a stop and run backwards speeding up at 2 m/s^2 for 1s then slow down to a stop in 1s.



$\vec{v}$

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

$\vec{a} = \frac{2}{2} = 1\frac{m}{s^2}$

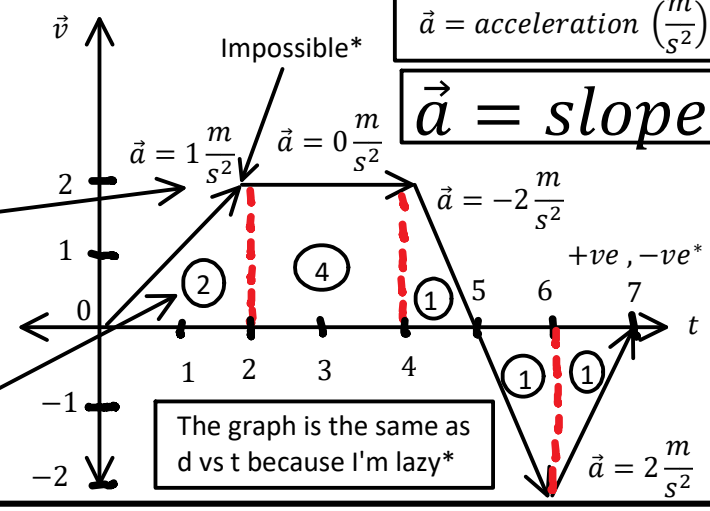
$\vec{v}_f^2 = \cancel{v_i^2} + 2\vec{a}d$

$d = \frac{\vec{v}_f^2}{2\vec{a}}$

$d = \frac{2^2}{2(1)} = 2m$

$\vec{a} = acceleration\ (\frac{m}{s^2})$

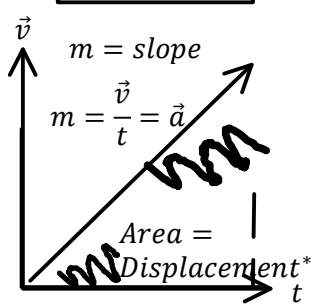
$\vec{a} = slope$



The graph is the same as d vs t because I'm lazy*

t	$\vec{v}$
0	0
1	1
2	2
3	2
4	2
5	0
6	−2
7	0

$m = \frac{\vec{v}_2 - \vec{v}_1}{t_2 - t_1}$



Velocity vs Time

$\vec{a}_{(0,2)} = \frac{2-0}{2-0}$

$\vec{a}_{(0,2)} = 1\frac{m}{s^2}\ [E]$

$\vec{a}_{(2,4)} = \frac{2-2}{4-2}$

$\vec{a}_{(2,4)} = 0\frac{m}{s^2}\ [E]$

$\vec{a}_{(4,6)} = -2\frac{m}{s^2}\ or\ 2\frac{m}{s^2}\ [W]$

$displacement = area$

$a = \frac{bh}{2}$

$a = \frac{(2)(2)}{2}$

$a = 2$

$d = 2m$

$a = lw$

$a = (2)(2)$

$a = 4$

$d = 4m$

$a = \frac{bh}{2}$

$a = \frac{(1)(2)}{2}$

$a = 1$

$d = 1m$

Constant Velocity : Horizontal Line
Zero Velocity : $x - int$
Positive Velocity : Above $x - axis$
Negative Velocity : Below $x - axis$
Acceleration : Slope
Speeding Up : $\vec{a}$ & $\vec{v}$ *same sign*
Slowing Down : $\vec{a}$ & $\vec{v}$ *opposite sign*
Displacement : Area*

Find the total Distance Travelled and Displacement.

$Distance = 2 + 4 + 1 + 1 + 1$

$Distance = 9\ m$

$Displacement = 2 + 4 + 1 - 1 - 1$

$Displacement = 5\ m$

$slope = \vec{a}$

$m = \frac{\vec{v}_2 - \vec{v}_1}{t_2 - t_1} = \frac{\Delta\vec{v}}{\Delta t} = \boxed{\vec{a}}$

$\Delta = change\ in$

$\vec{a} = \frac{d}{dt}\vec{v}(t)$ Leibniz Notation

Derivatives Calc 12