C12 - 2.1 - d vs. t, v vs. t

N
+
E

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.

1D $\vec{d}$ Graph

Home — 2 km — School — 2hrs — 2hrs — 2 km — Home — 2 km — School — Home — 2 km

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

$let\ t = time\ (hr)$ $\quad y = mx + b$

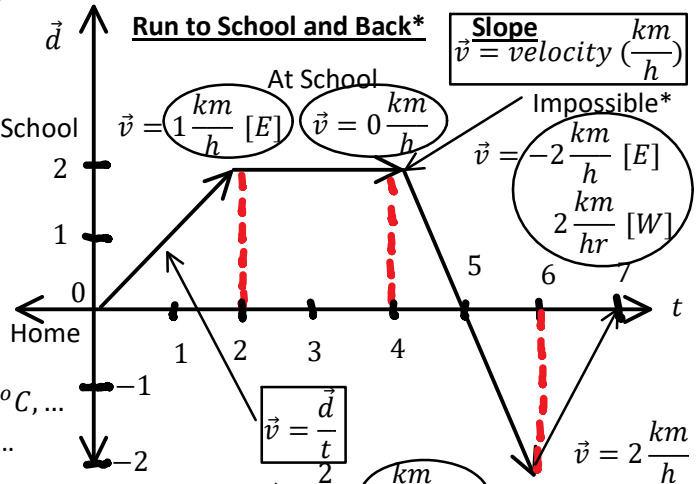
$let\ \vec{d} = displacememt\ [E]\ (\vec{v}^*)$

$let\ d = distance\ (s^*)$

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

Run to School and Back*

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



$Slope = \vec{v} = \frac{2}{2} = 1\frac{km}{h}\ [E]$

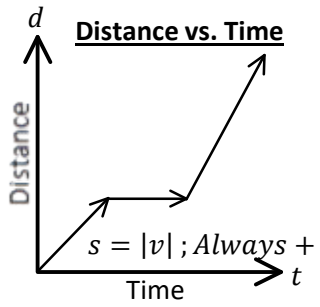
Scalar - Magnitude only (d, t, s, Energy, Mass, T^oC, ...

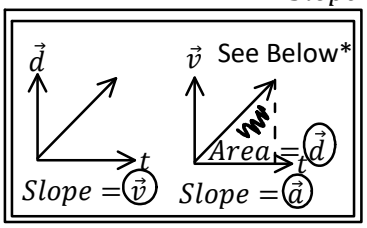
Vector - Magnitude & Direction ($\vec{d}, \vec{v}, \vec{a}$, Forces, ...

1D d Graph

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

Distance vs. Time





Velocity : Slope $(+ve, -ve)$
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!

Find Average Speed and Time (0,7).

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$d\ vs.\ t$

$s_{ave(0,7)} = \frac{8-0}{7-0} = 1.14\frac{km}{h}$

$\vec{d}\ vs.\ t$

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

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.

2s — 2s — 1s

$\vec{v} = 0$ $\quad \vec{v} = 2$ $\quad \vec{v} = 2$ $\quad \vec{v} = 0$

1s — 1s

$\vec{v} = 0$ $\quad \vec{v} = -2$ $\quad \vec{v} = 0$

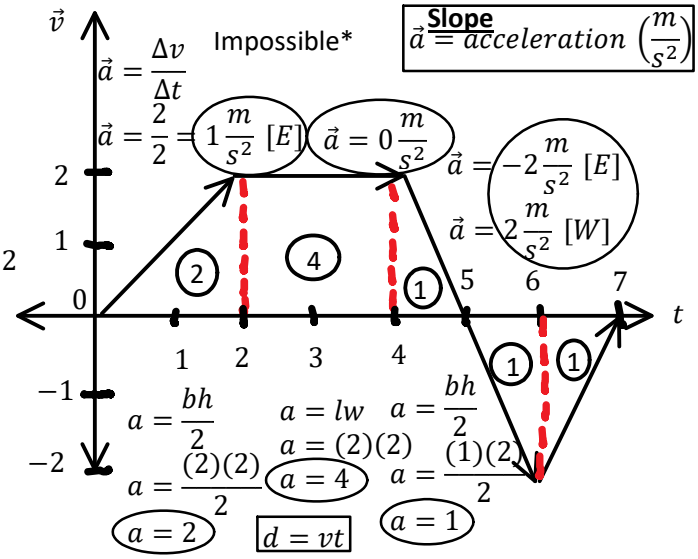
1D $\vec{v}$ Graph

$let\ t = time\ (s)$

$let\ \vec{v} = velocity\ [E]\ (\frac{m}{s})$

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

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



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*

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

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

$a = 2$ $\quad a = 4$ $\quad a = 1$

$d = vt$

$displacement = area$

Find the Total Distance Travelled and Displacement.

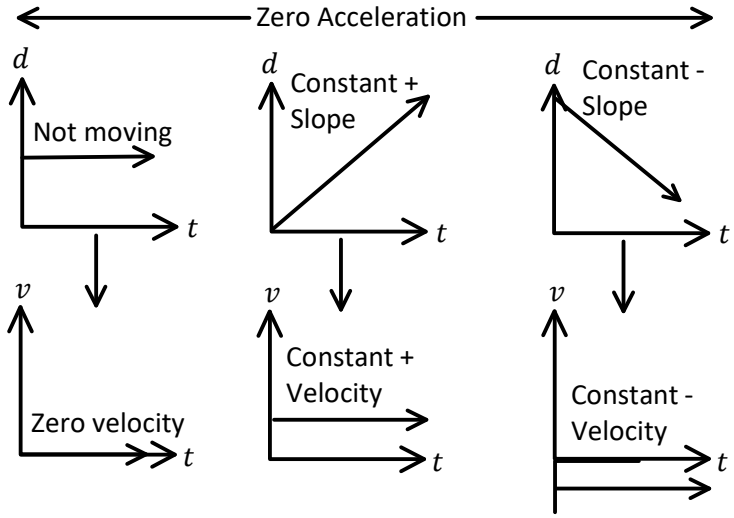
$Distance = 2 + 4 + 1 + 1 + 1$

$Distance = 9\ m$

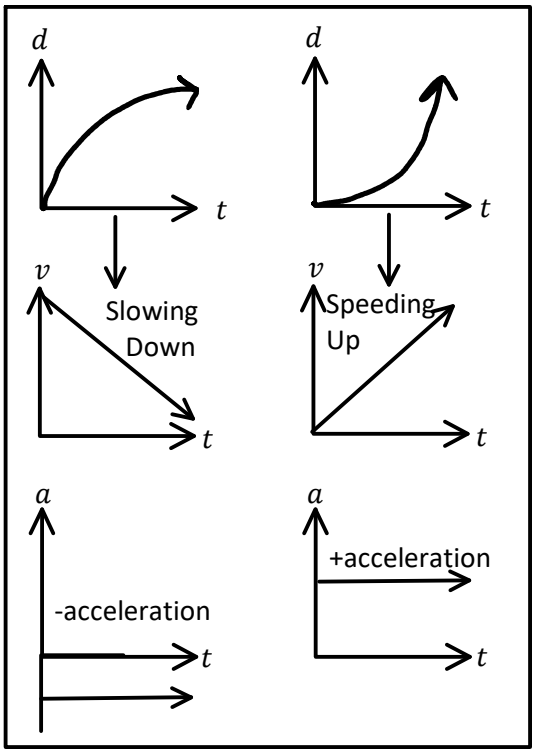
$Displacement = 2 + 4 + 1 - 1 - 1$

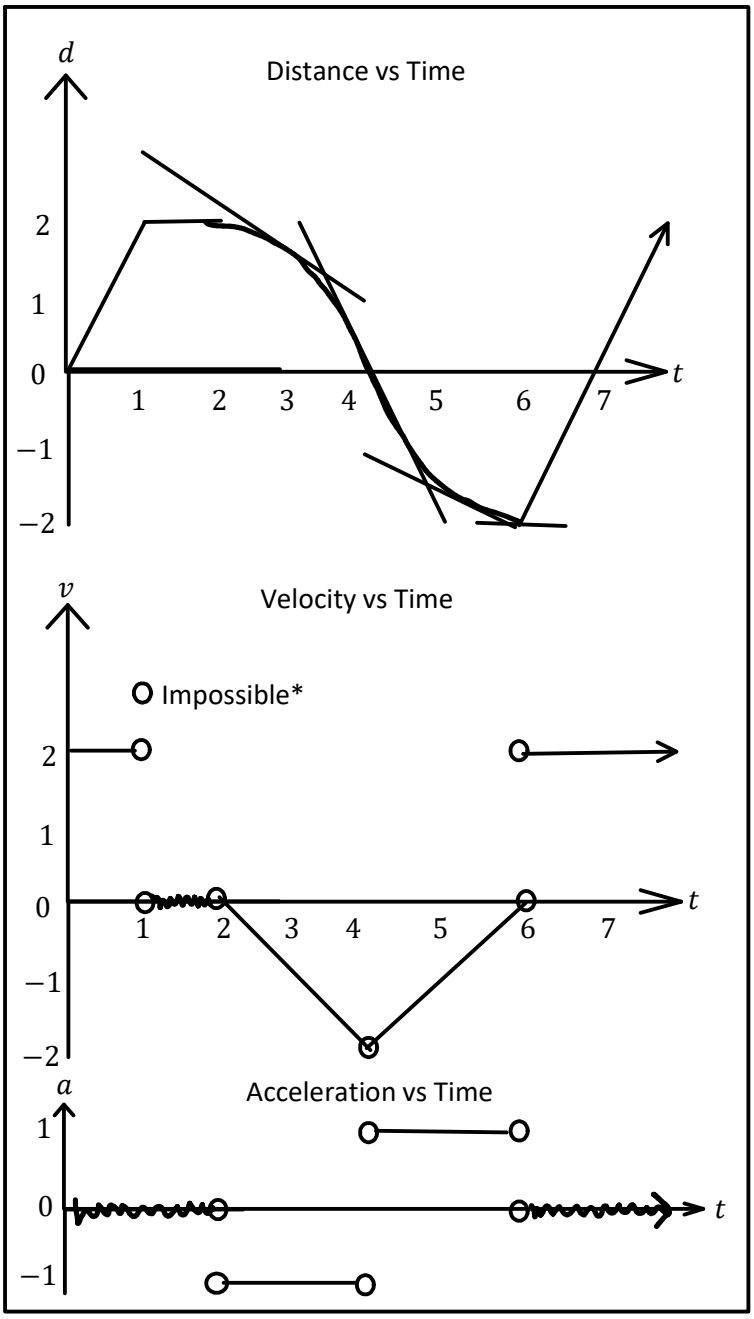
$Displacement = 5\ m$

C12 - 2.1 - d vs t, v vs t Notes



Physics 11/12 Constant Acceleration





Slope→Value

Draw Tangents

Velocity is Slope of Distance vs Time

0-1 Slope is 2, draw a line at two
0-2 Slope is 0, draw a line at zero
2-4 Slope is 0 then about -2, draw a slope of -2
4-6 Slope is -2 then about 0, draw a slope of $+2$
6-8 Slope is 2, draw a line at two.

Probably won't see curved velocity until Calculus

Acceleration is Slope of Velocity vs Time

0-2 Slope is 0, draw a line at zero
2-4 Slope is -1, draw a line at -1
4-6 Slope is $+1$, draw a line at $+1$
6-8 Slope is 0, draw a line at 2

C12 - 2.1 - Anti/Derivatives Notes

$let\ m = slope$

Draw the Derivative/Antiderivative.

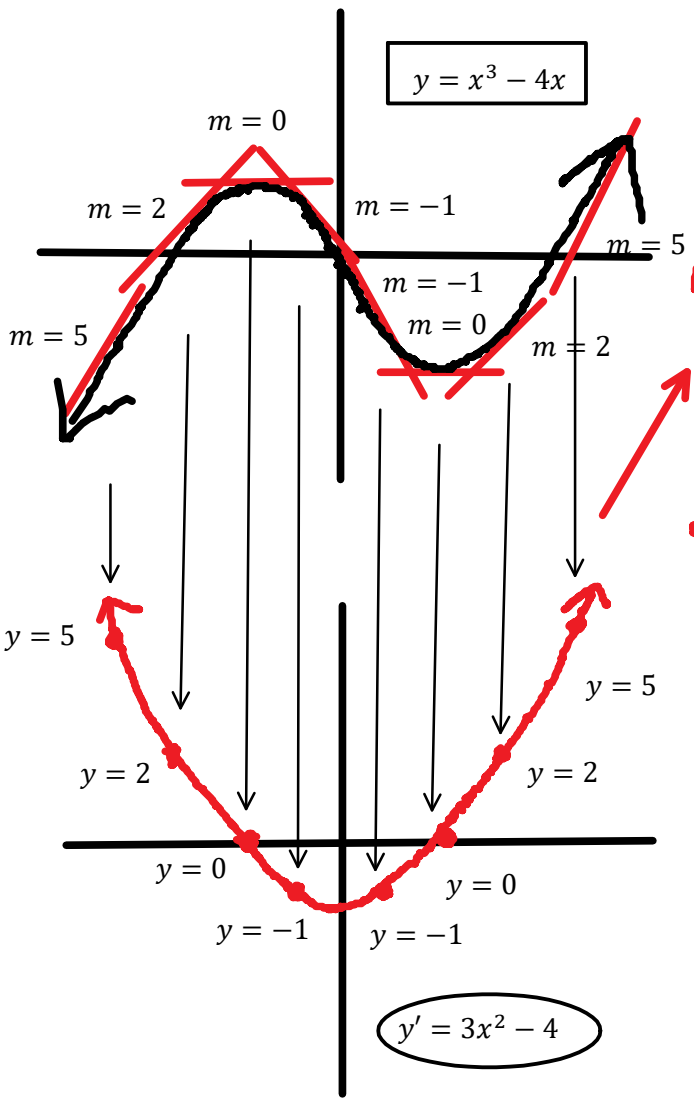
Pick an x-value to talk about, we are not done talking about that x-value until were done talking about that x-value.

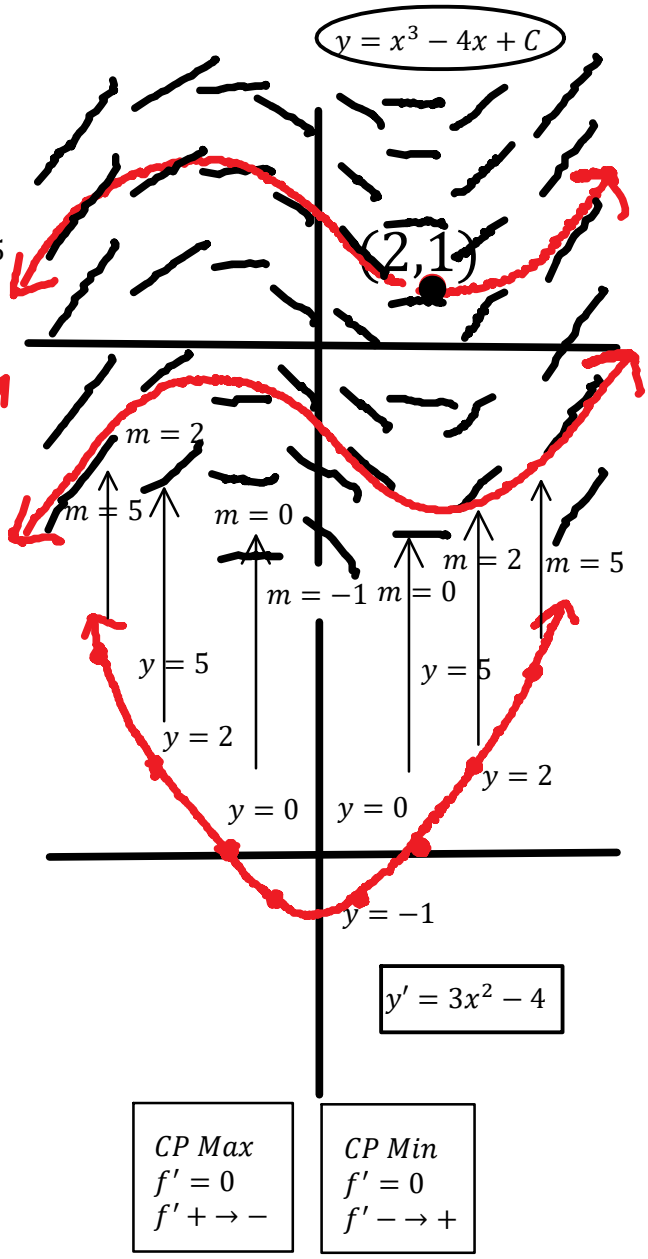
$y'\ value \rightarrow y\ value$

$y\ value \rightarrow m\ value\ (y')$

$y' = 0\ where\ y = max/min$

$y = max/\min\ where\ y' = 0$





$CP\ Max$	$CP\ Min$
$f' = 0$	$f' = 0$
$f' + \rightarrow -$	$f' - \rightarrow +$