



Science 20: Physics

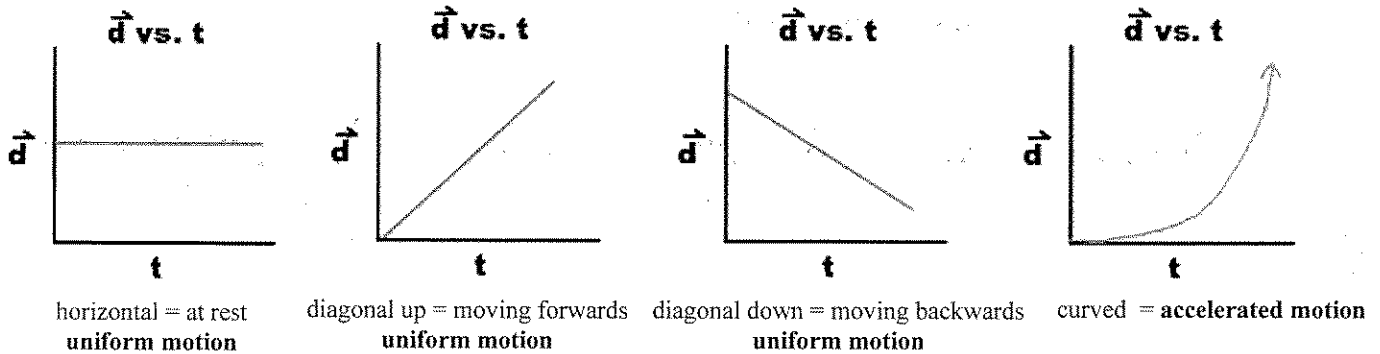
Graphing Notes

Name: Key!
 Date: Mar 17th 2020

Graphs can tell us about the motion of an object. There are only two types of motion we study:

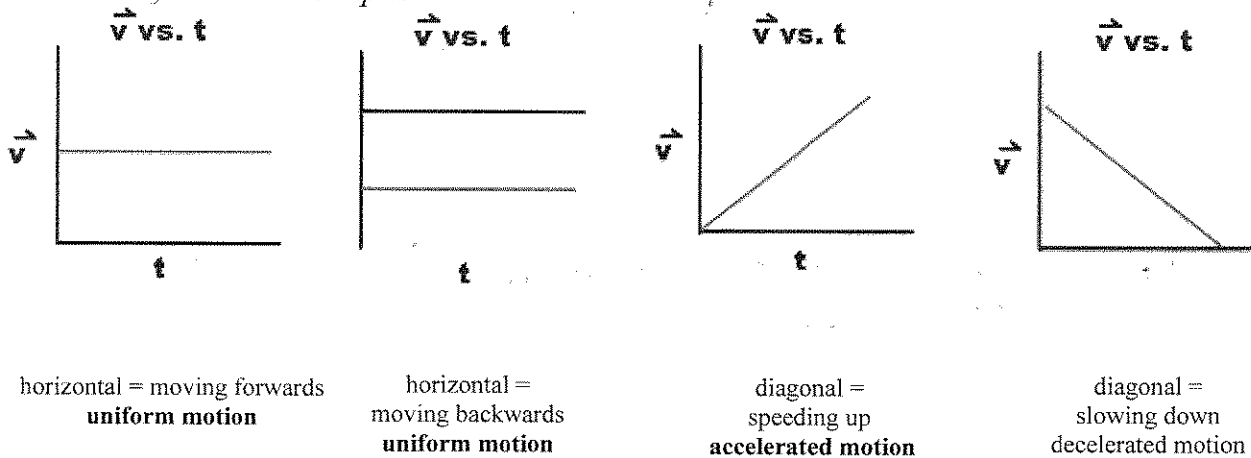
1. Uniform Motion (object moves at a constant velocity in a straight line)
2. Accelerated Motion (object speeds up or slows down or changes direction)

Displacement vs. Time Graphs



The slope of a displacement vs. time graph gives velocity!

Velocity vs. Time Graphs

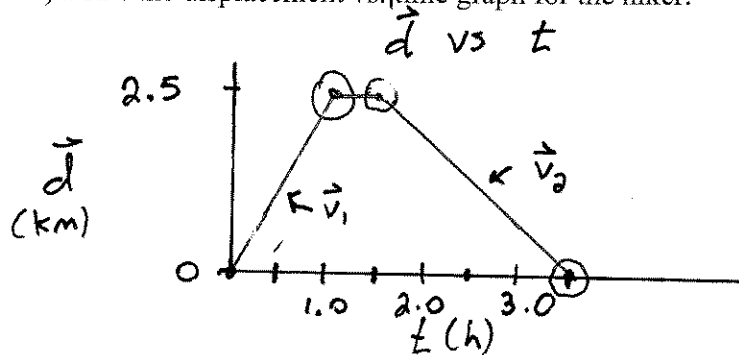


The slope of a velocity vs. time graph gives acceleration!
 The area under a velocity vs. time graph gives displacement!

9/10/2010

ex) A hiker walks 2.5 km [N] from his starting point in 1.0 h, stops for 0.50 h, then walks back south to his starting point in 2.0 h.

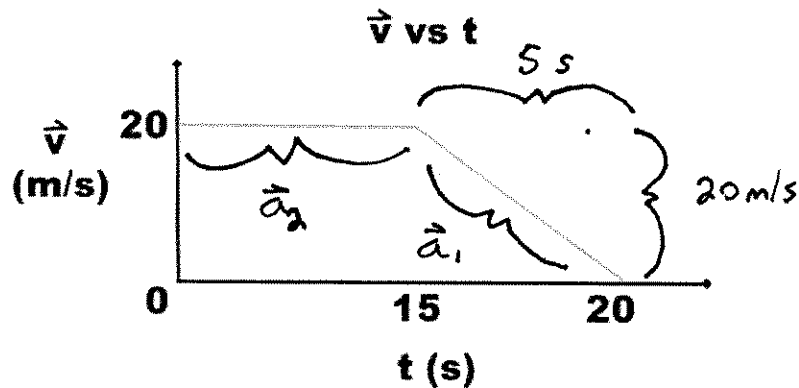
a) Draw the displacement vs. time graph for the hiker.



b) Calculate the velocities of the hiker.

$$\vec{v} = \text{slope} = \frac{\text{rise}}{\text{run}} \quad \vec{v}_1 = \frac{2.5 \text{ km}}{1 \text{ h}} = \underline{\underline{2.5 \text{ km/h}}} \quad \vec{v}_2 = \frac{-2.5 \text{ km}}{2 \text{ h}} = \underline{\underline{-1.3 \text{ km/h}}}$$

ex) A car makes the velocity vs. time graph shown below:



a) Calculate the acceleration of the car between 0 s – 15 s and between 15 s – 20 s.

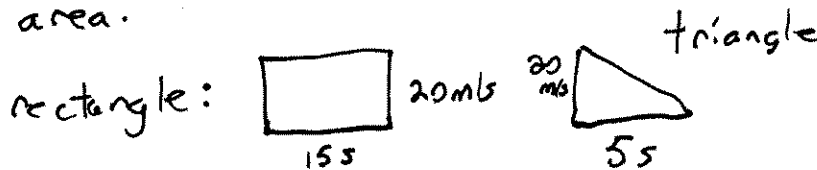
$$\vec{a} = \text{slope} = \frac{\text{rise}}{\text{run}} = \frac{-20 \text{ m/s}}{5 \text{ s}} = -4.0 \text{ m/s}^2 = \vec{a}_1 \quad \vec{a}_2 = 0 \text{ m/s}^2$$

as the slope of a horizontal line is zero.

because the diagonal line moves down from 20 m/s to 0 m/s.

b) Calculate the total displacement of the car.

$$\vec{d} = \text{area.}$$



$$A = L \times W = (15 \text{ s})(20 \text{ m/s}) = 300 \text{ m}$$

$$A = \frac{1}{2} L \times W = \frac{1}{2} (5 \text{ s})(20 \text{ m/s}) = 50 \text{ m}$$

$$\vec{d} = \underline{\underline{350 \text{ m}}}$$