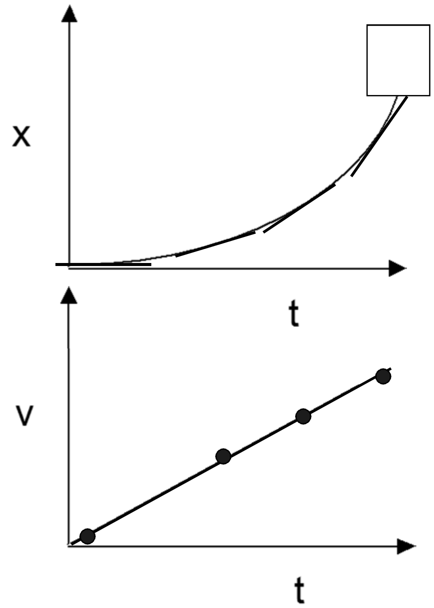
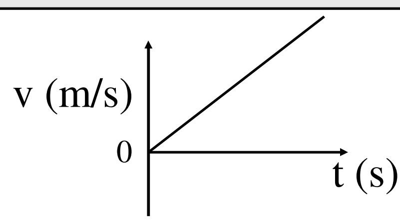
Displacement, Velocity & Acceleration

If the velocity of the object changes at a constant rate, the position - time graph is a parabola.

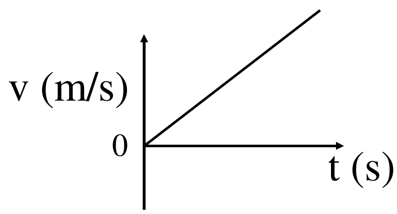
Slope of the position-time graph at several clock readings gives __________ at those ________ of ________.



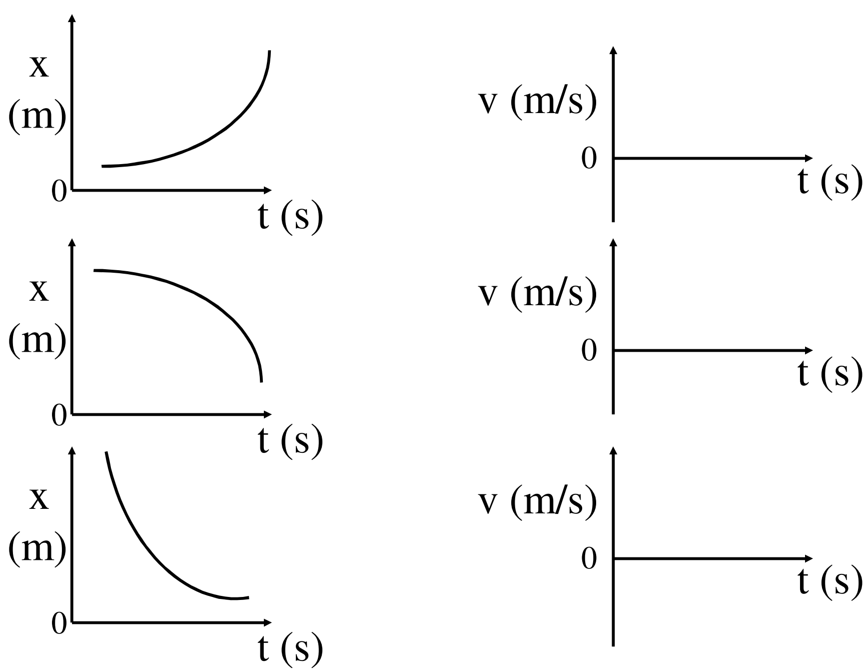


v is the _____________________

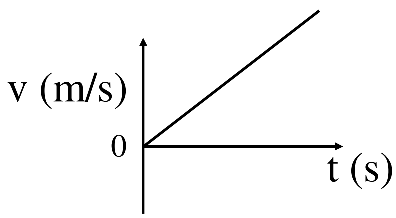
at elapsed time = t seconds.



The slope of the line for this velocity-time graph is __________ or _____________________



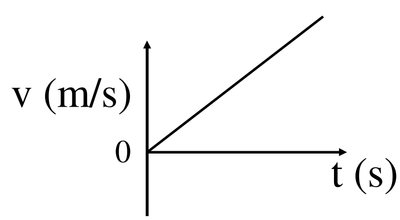
$v_f = a\,t + v_i$

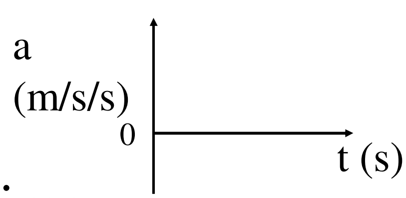


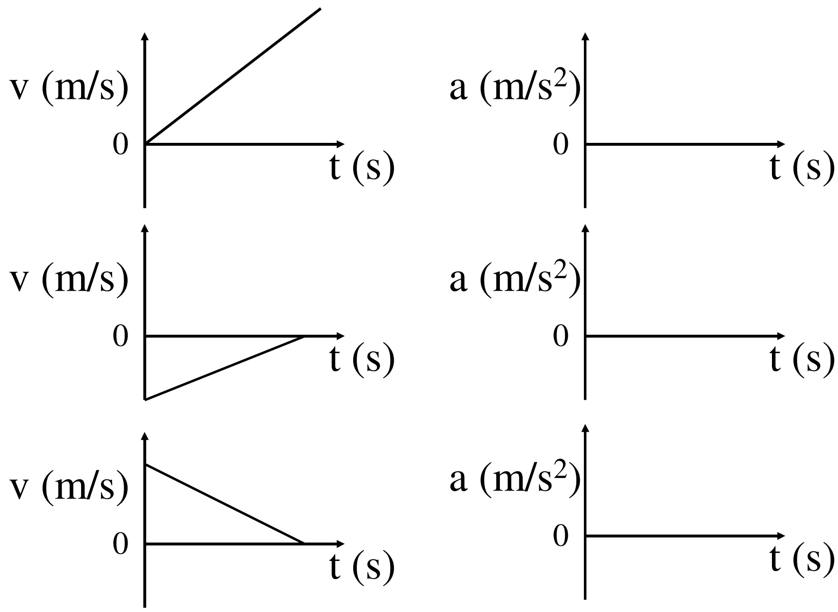
Since the _________ of the line is __________________, a graph can be plotted of the ___________________ versus ___________

The velocity-time graph has a constant slope equal to the acceleration of the object.

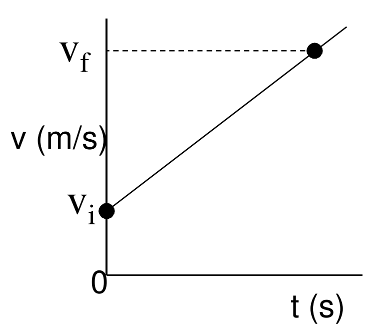
The acceleration-time graph can be plotted.



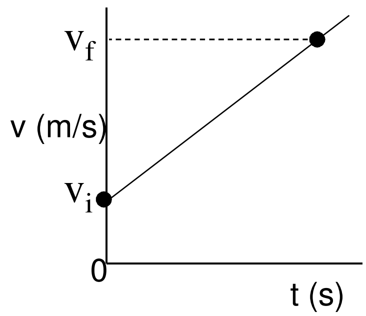


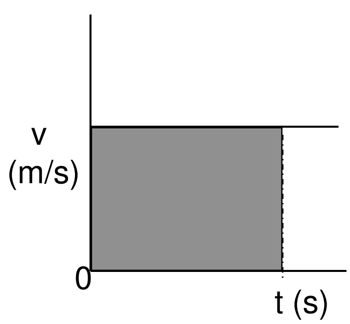


For any motion with constant acceleration, ___________ velocity may be calculated by adding ___________ & _____________ velocities together and dividing by ____



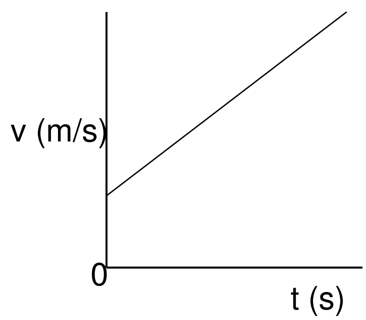
Average velocity



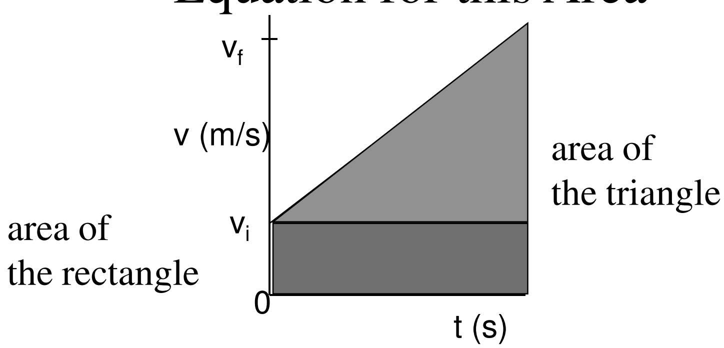


The area may be viewed as a

____________________ & ____________________.



Equation for this Area



area = ____________________ = ___________

Remember that

Rearrange this equation

Substitute

$$\Delta x = v_i t + \frac{1}{2}(v_f - v_i)t$$

And you get

$$\Delta x = v_i t + \frac{1}{2}(at)t$$

Combine like terms.

You will often seen it written

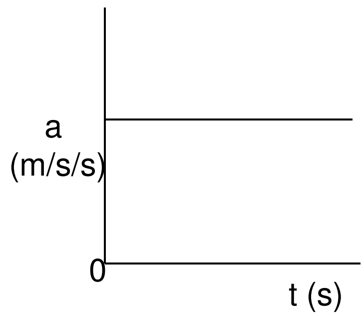
Some Useful Mathematical Relationships have been developed

$$v_f = at + v_i$$

$$v_{avg} = \frac{v_f + v_i}{2} \qquad x = v_i t + \frac{1}{2}at^2 + x_o$$

$$\Delta x = v_i t + \frac{1}{2}(v_f - v_i)t$$

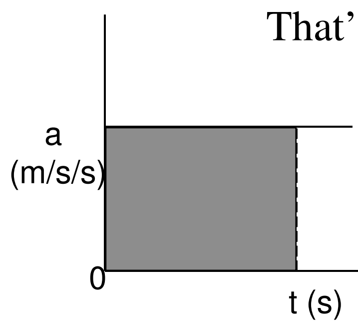
The marked area = ______________________



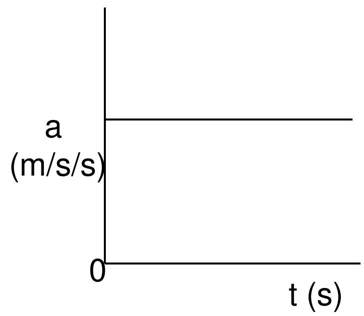
Here is an example.

____

That’s a ____________!



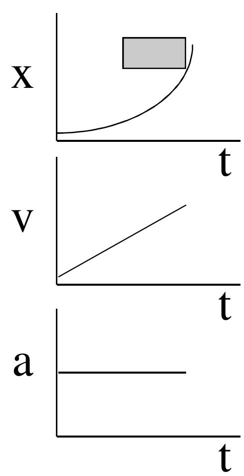
Area under an acceleration curve is used to calculate the _______ for any chosen ____________________ of ___________.



To Summarize

Slope of the Line Calculates:

Area Under The Curve Calculates:



Here is one more equation you need that
Was made by combining the other 2
equations

Lab Report

Title
Purpose:
Data/Data Analysis:

- Type the data in separate tables (1 for each graph), x *vs.* t graph, and v *vs.* t graph (shows or list slope & y- int.)
- write out the equation from the v vs. t graph with units on the slope & y-int.

Lab Report Continued

Still in Data/Data Analysis:

- After all graphs, data tables, and equations you should have the general equation we came up with.

Conclusion: In a paragraph

- explain the meaning of the slope and y-int. on a v vs t graph
- explain the term acceleration

Lab Report Continued

Still in Conclusion: In another paragraph

- explain what the sign of the velocity and acc. need to be to increase velocity (faster)
- explain what the sign of the velocity and acc. need to be to decrease velocity (slower)

In another paragraph

- explain how you got the second equation: $\Delta x = v_o t + \frac{1}{2}(v_f - v_o)t$

Lab Report Continued

Still in Conclusion: In the same paragraph as before

- explain how you got the equation:

$$\Delta x = v_i t + \frac{1}{2} a t^2$$