

1D Motion

By Walter and Ian

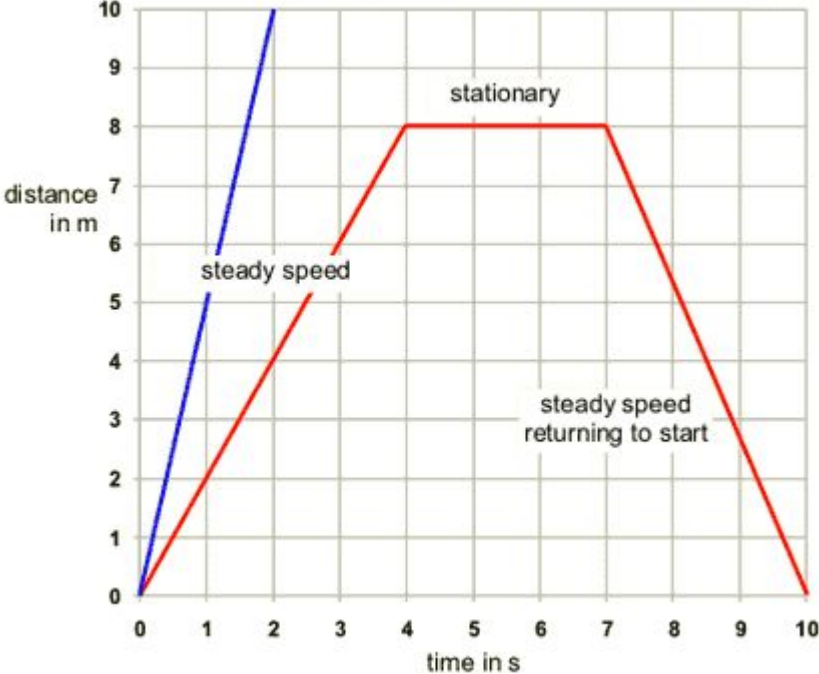
A Quick Summary

- 1D Motion: Motion in one dimension (up, down, left, and right).
- Velocity and displacement (same as distance except can be used for forward and backward motions) equations are very commonly used in this type of motion
- Very easy to calculate if you know the formulas!

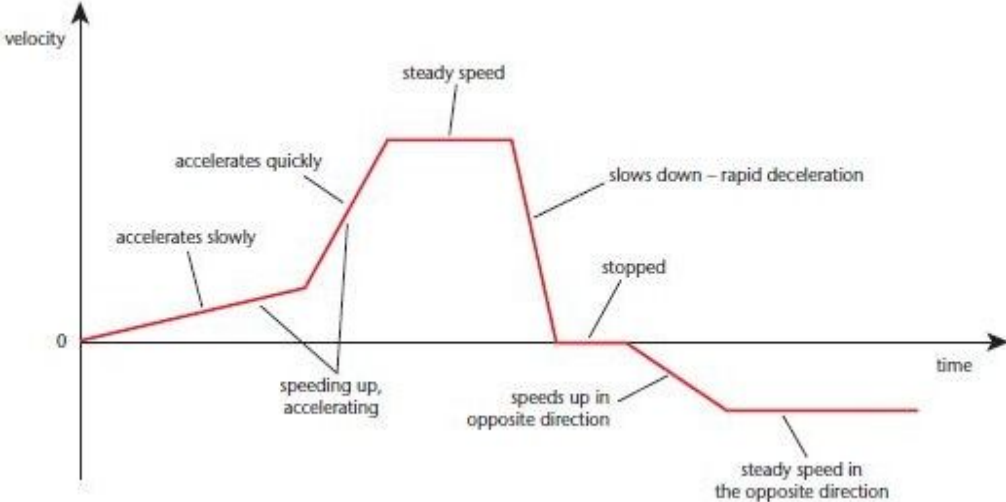
Tips and Tricks

- If your distance has a negative number, think of the object going backwards
- If you want to find the final velocity of an object and its initial velocity is 0, just use $v_f = a*t$ (normal equation is $v_f = v_i + a*t$, but $v_i = 0$ in this case).

Diagrams



Distance/Time Graph

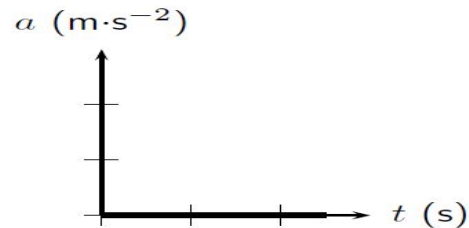
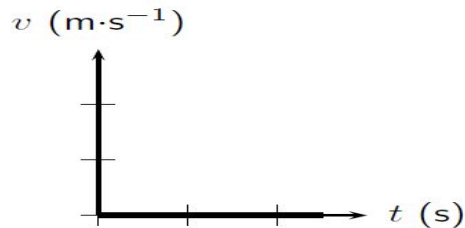
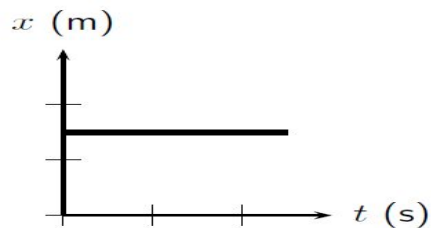


Velocity/Time Graph

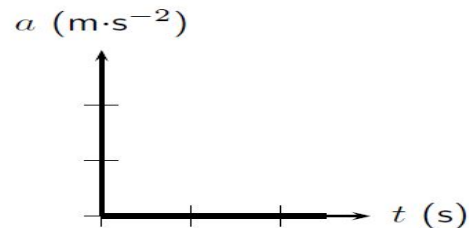
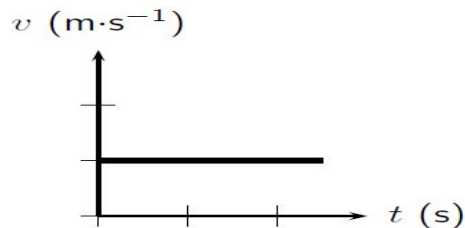
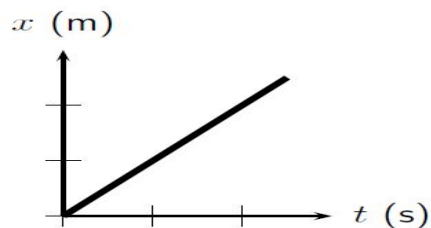
One More Diagram

Acceleration/Time Graph

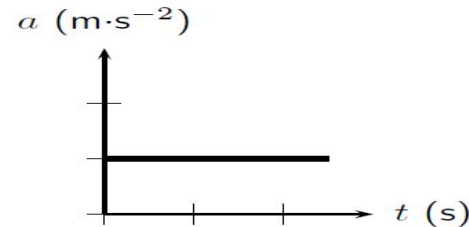
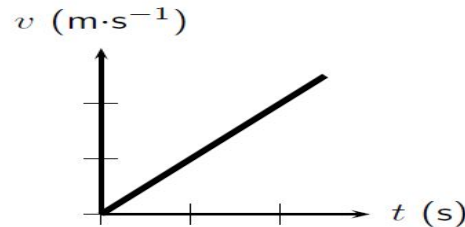
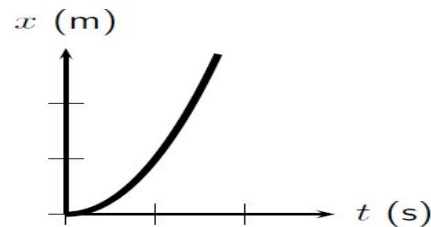
Stationary
Object



Uniform Motion



Motion with
constant ac-
celeration



FORMULAS

- The Variables
 - $D = \text{distance (meters [m])}$
 - $t = \text{Time (seconds [sec])}$
 - $v_i = \text{Initial Velocity (m/sec)}$
 - $v_f = \text{Final Velocity (m/sec)}$
 - $v = \text{Velocity (m/sec)}$
 - $a = \text{Acceleration (m/sec}^2\text{)}$
- Displacement Formulas
 - $d = v_i + .5*a*t^2$
 - $d = v*t$
 - $d = .5(v_i + v_f)t$
 - $d = .5*a*t^2$
- Velocity Formulas
 - $v_f = v_i + a*t$
 - $v = d/t$

2 Examples

1. A cute kitten, prancing at 5 m/s, accelerates at 1 m/s² for 5 seconds. What is its final velocity after the 5 seconds?
 - a. Variables
 - i. $V_f = ?$
 - ii. $V_i = 5 \text{ m/s}$
 - iii. $t = 5 \text{ seconds}$
 - iv. $a = 1 \text{ m/s}^2$
 - b. $v_f = v_i + a \cdot t$
 - i. $v_f = 5 + 1 \cdot 5$
 - ii. **$v_f = 10 \text{ m/s}$**

2. In meters, what was its displacement (using the same initial velocity, final velocity, and time)?
 - a. Variables
 - i. $V_i = 5 \text{ m/s}$
 - ii. $V_f = 10 \text{ m/s}$
 - iii. $t = 5 \text{ sec}$
 - b. $d = .5(v_i + v_f)t$
 - i. $d = .5(5 + 10)5$
 - ii. **$d = 37.5 \text{ m}$**

3 Practice Problems

- A cute puppy, skipping at 10 m/s, accelerates at 3 m/s² for 1 minute. What is its final velocity after the minute?
- In meters, what was its displacement?
- A reindeer is falling straight down a house 5 meters. What was its displacement?