

Section 1.4: Graphing Uniform Motion

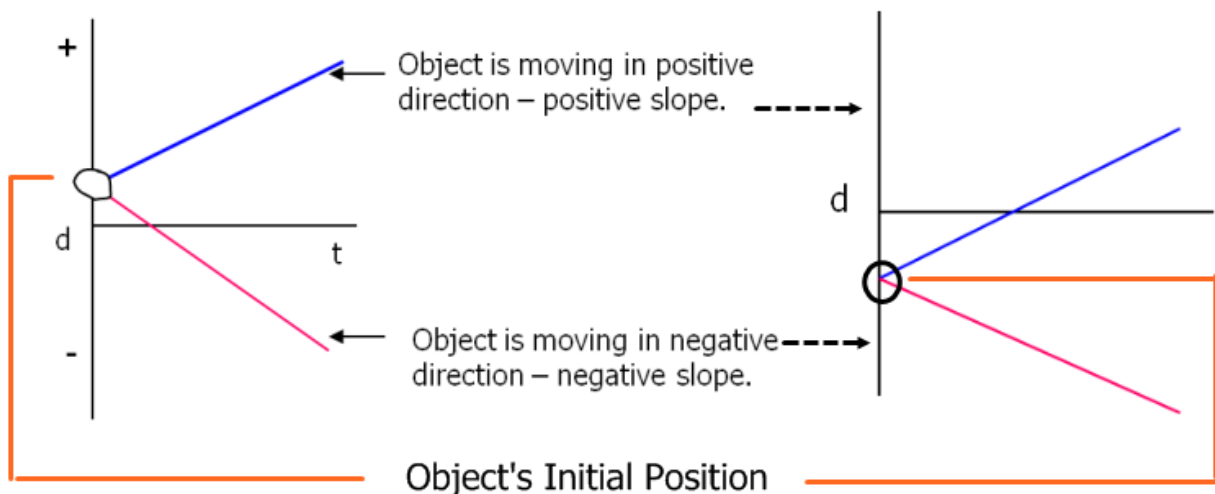
In this lesson you will

- Construct displacement-time and velocity-time graphs for an object undergoing uniform motion.
- determine the starting position and the average velocity of an object undergoing uniform motion given its displacement-time graph
- determine the average velocity and the displacement of an object undergoing uniform motion given its velocity-time graph

Motion Graphs with Direction

I) Uniform Motion

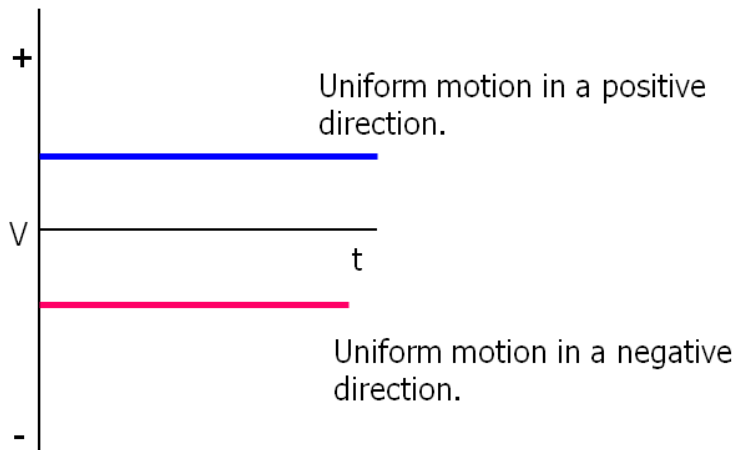
A) Displacement - Time Graphs



On displacement-time graphs:

- **slope** represents **velocity**.
steeper slope – greater speed.
positive slope - motion to the right or up [E or N]
negative slope - motion to the left or down [W or S]

B) Velocity - Time Graphs



On velocity-time graphs,

- **velocity** is indicated by the **y-intercept**.
positive y-intercept - motion to the right or up [E or N]
negative y-intercept - motion to the left or down [W or S]
- **displacement** is the **area** "under" the graph (between the graph and the time axis).

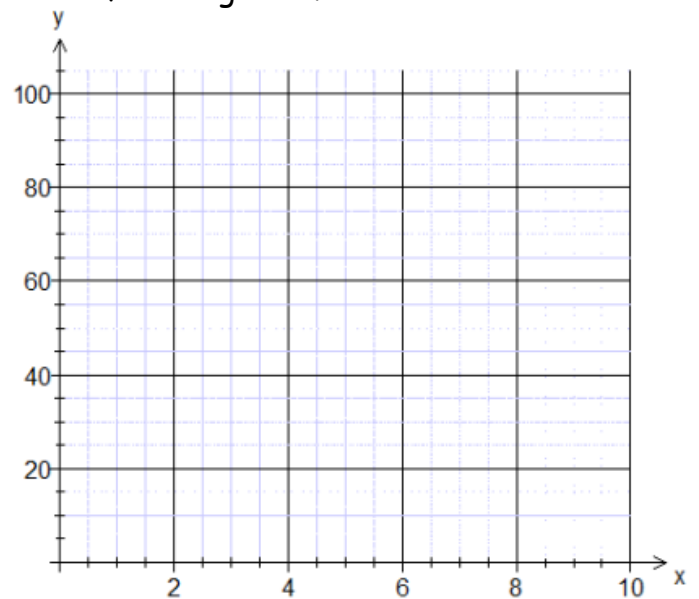
Displacement-Time and Velocity-Time Graphs

	$\vec{a}-t$ graphs	$\vec{v}-t$ graphs	Velocity	Acceleration	Example
Stopped			$\vec{v} = 0$	$\vec{a} = 0$	
Constant velocity			$\vec{v} = 0$	$\vec{a} = 0$	
			$\vec{v} > 0$	$\vec{a} = 0$	
			$\vec{v} < 0$	$\vec{a} = 0$	

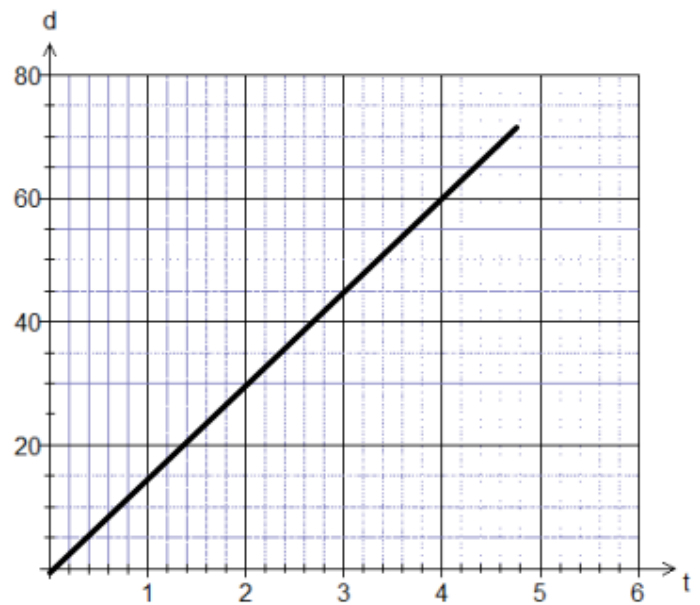
Examples

1. a) Graph a position-time graph for the following data.

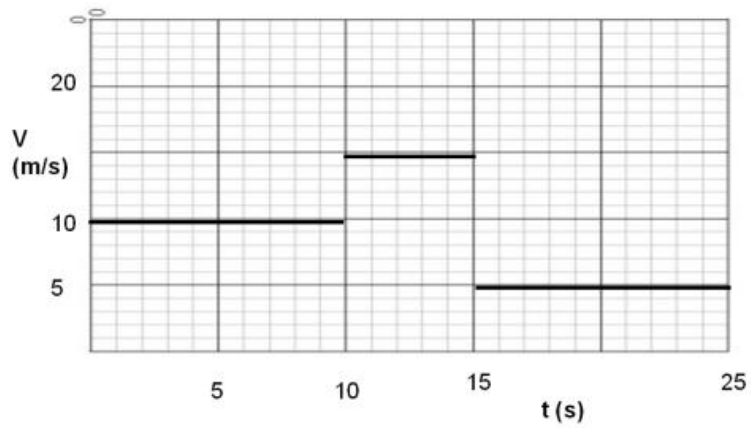
Time (s)	Position (m)
0	0
1.0	15
2.0	30
3.0	45
4.0	60
5.0	75
6.0	90
7.0	105



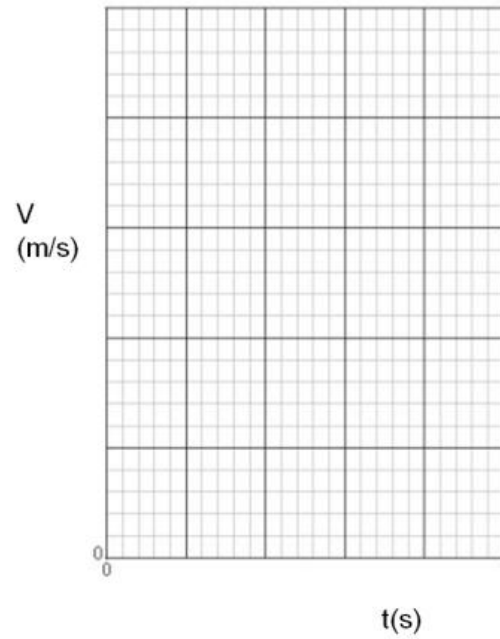
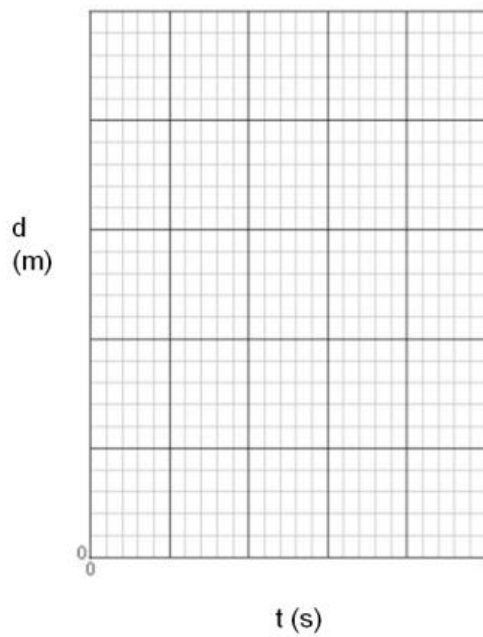
- b) Find the velocity of the object.
2. a) What is the position of the object at 4.5s?
b) What is the object's displacement between 2.0 s and 6.0 s?
c) What is the velocity of the object?



3. Compute the total displacement .Compute the average velocity.



4. A cyclist paddles her bike at 5m/s for 3 seconds and then at 2 m/s for 2 s. Produce both a d-t and a v-t graph of the motion.



5. Draw a position-time and velocity-time graph for a runner who moves at 3.0 m/s for 5.0 s, then 1.0 m/s for 10.0 s and finally -2.5 m/s for 10.0 s.

