2.2 Position vs. Time Graphs

STANDARDS

2.2 I can interpret, analyze, and create position vs. time graphs for objects moving with constant velocity.

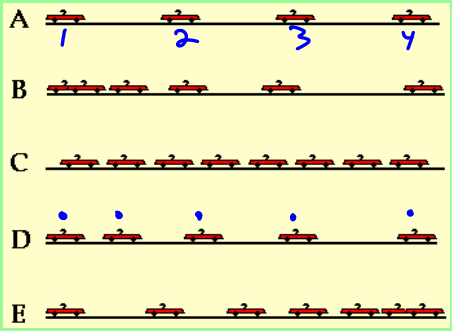
Chapter In Review

Distance = Total Length of Travel

Displacement = Change in position
$= \Delta x = x_f - x_o$

x_i

MOTION DIAGRAMS



NUMERICAL EXAMPLE

Position-time information are shown in the data table. Assume that the motion is uniform and fill in the blanks of the table.

Time (s)	Position (m)
0	0
0.5	12.5
1	_____
1.5	_____
2	_____
2.5	_____
3	75.0

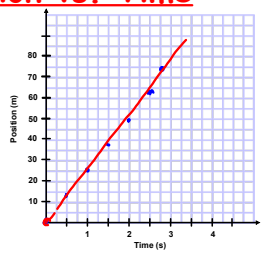
NUMERICAL EXAMPLE

Position-time information are shown in the data table. Assume that the motion is uniform and fill in the blanks of the table.

Time (s)	Position (m)
0	0
0.5	12.5
1	25
1.5	37.5
2	50
2.5	62.5
3	75.0

Position vs. Time

Time (s)	Position (m)
0	0
0.5	12.5
1	25
1.5	37.5
2	50
2.5	62.5
3	75.0



y-int = $x_o = 0$

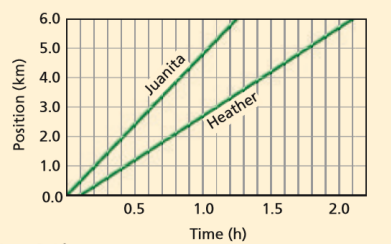
$m = \frac{75\ m}{3\ s} = 25\ m/s$

$x = (25\ m/s)\,t + 0$

Position vs. Time

Juanita and Heather both decide to go for walks. Their motions are represented by the position-time graphs to the right.

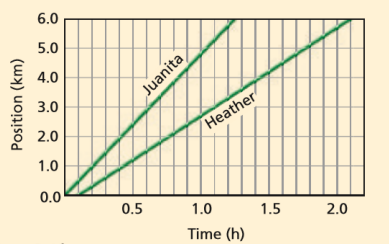
Tell the story of their walks.



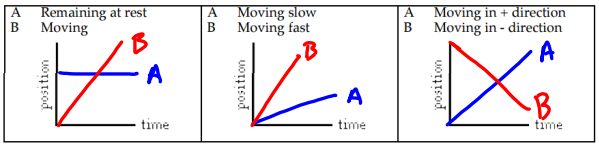
Position vs. Time

How long had Juanita been walking when Heather started her walk?

Will Heather catch up to Juanita? How can you tell?



Position vs. Time

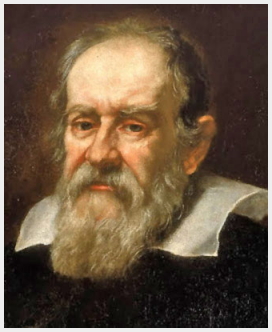


2.3 Speed and Velocity

2.1 I can interpret and analyze the motion of an object moving with constant velocity.

2.3 I can interpret, analyze, and create velocity vs. time graphs for objects moving with constant velocity.

Galileo Galilei



"Slow"
or
"Fast"

SPEED

Speed is defined as the distance an object travels per unit time.

$$\text{Speed} = \frac{\text{distance}}{\text{time}}$$

INSTANTANEOUS SPEED

The speed at any instant is the instantaneous speed.

INSTANTANEOUS SPEED

AVERAGE SPEED

Average speed is the total distance covered divided by the time it took to travel that distance.

AVERAGE SPEED

$$\text{Average speed} = \frac{\text{total distance}}{\text{time interval}}$$

AVERAGE SPEED

Usain Bolt set the world record in the 200-m dash at the 2009 World Championships in Berlin. His official time for 200-m was 19.19 seconds. What is Bolt's average speed in mph?

$$\text{Speed} = \frac{\text{dist}}{\text{time}} = \frac{200\text{ m}}{19.19\text{ s}} \times \frac{1\text{ mi}}{1600\text{ m}} \times \frac{3600\text{ s}}{1\text{ hr}}$$

$$\frac{200 \times 1\text{ mi} \times 3600}{19.19 \times 1600 \times 1\text{ hr}} = 23.45\text{ mph}$$

VELOCITY

Velocity is defined as displacement per time.

$$\text{Average velocity} = \frac{\text{displacement}}{\text{time interval}}$$

v Speed

$\vec{v}$ Velocity

AVERAGE VELOCITY

$$\vec{v}_{av} = \frac{\Delta\vec{x}}{\Delta t} = \frac{x_f - x_i}{t_f - t_i}$$

PRACTICE

UNIT 2 PROBLEMS
(10-14 & 5-9)