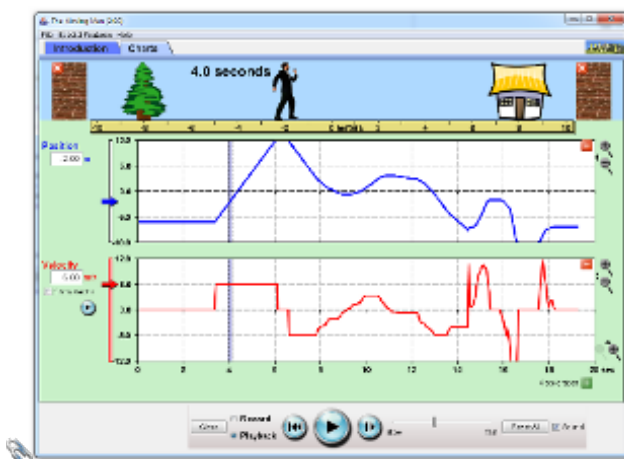


The Graphical Analysis of Position & Time

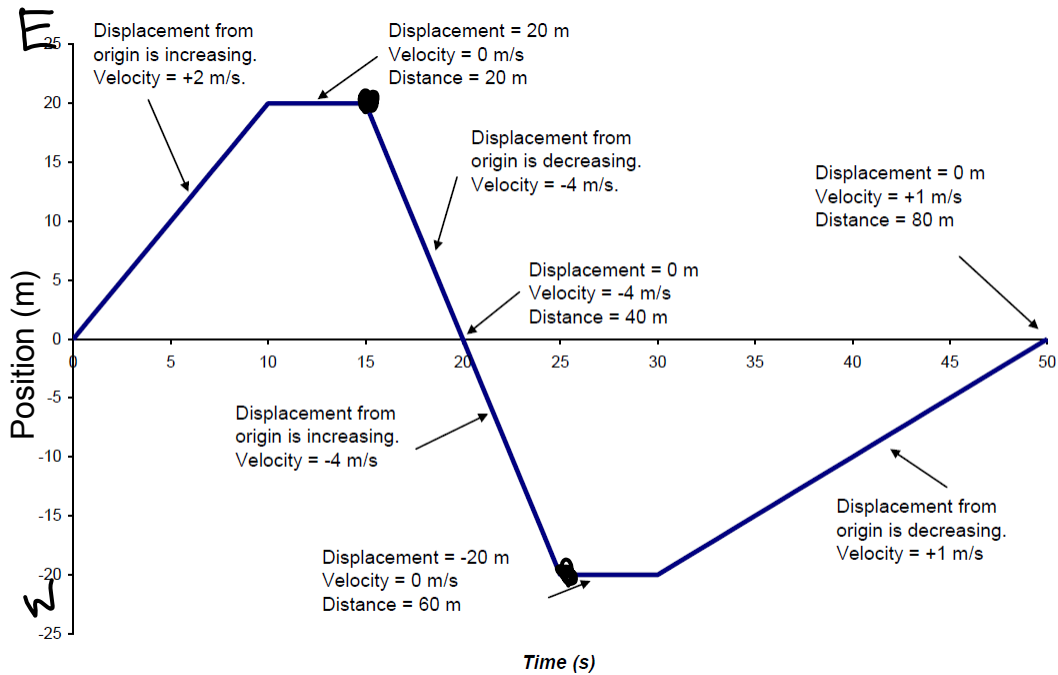
The Moving Man



*Use equation feature

Objectives

- Review Frame of reference and coordinate system.
- Analyze how position can change with time.
- Learn how to find key points on the graph.
- Develop knowledge about how the graph relates to speed and velocity.



- Slope at any point is the instantaneous velocity.
- Sign of the slope indicates the direction the object is travelling.
- Distance is the sum of the displacements in both directions.
- Average velocity is the object's displacement divided by the time.
- Average speed is the object's distance divided by the time.

Guided Practice

1. Calculate the average velocity between 10 and 20 s.

$$\vec{v}_{avg} = \frac{d_f - d_o}{t}$$

$d_f = 0\text{ m}$
 $d_o = 20\text{ m}$
 $t = 10\text{ s}$

$$v_{avg} = \frac{0 - 20}{10}$$

$v_{avg} = -2\text{ m/s}$

2. Calculate the average velocity between 5 and 35 s.

$$v_{avg} = \frac{d_f - d_o}{t} = \frac{-15\text{ m} - 10\text{ m}}{30\text{ s}} = \frac{-25\text{ m}}{30\text{ s}}$$

$v_{avg} = -0.83$

3. Calculate the average velocity between 15 and 25 s.

4. Calculate the average speed between 15 and 25 s.

$$v_{sp} = \frac{d}{t}$$

$$v_{sp} = \frac{40}{10\text{ s}} = 4.0\text{ m/s}$$

4.0 m/s

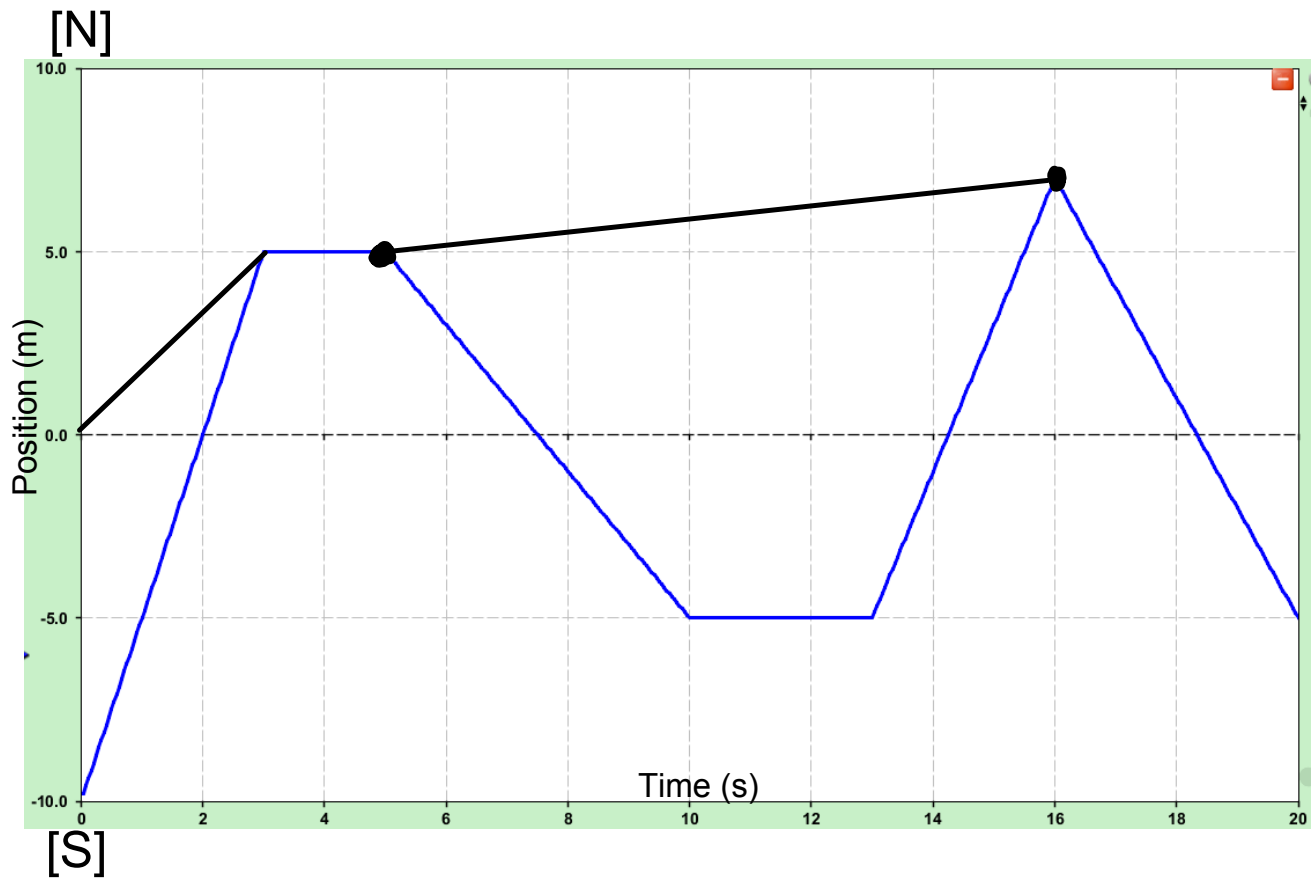
$$d = 40\text{ m}$$

5. Calculate the average speed between 20 and 50 s.

Position - Time Formative Assessment

Grade:11
Subject:Physics 112
Date:2014

Use the graph to answer the following 10 questions.



1 What was the initial velocity of the object?

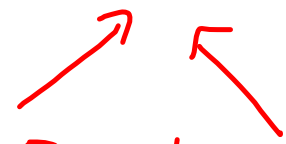
$$\vec{v} = \frac{\vec{d}}{t} = \frac{5 \text{ m} [N]}{3}$$

$$= 1.7 \text{ m/s} [N]$$

2 For how long was the object not moving?

$$t_{\text{not moving}} = 5 \text{ s}$$

3-5s mark 10-13s mark



3 How many times did the object return to the starting position?

3 times

4 Calculate the distance traveled in the first 10 seconds.

15 m

5 m [N] + 10 m [S]

5 For what length of time was the object traveling south?

9s

6 Calculate the instantaneous velocity at the 7 second mark.

$$\vec{v} = \frac{\vec{d}_f - \vec{d}_o}{t} = \frac{-5 - 5}{5} = -2 \text{ m/s [N]}$$

* Slope of the line containing the time of 7s.

7 Calculate the average speed between 3 and 13 seconds.

$$v_{sp} = \frac{d}{t}, \quad d = 10 \text{ m}$$
$$t = 10 \text{ s}$$
$$= \frac{10 \text{ m}}{10 \text{ s}} = \boxed{1.0 \text{ m/s}}$$

8 Calculate the average velocity between 5 and 16 seconds.

$$\vec{v}_{\text{avg}} = \frac{\vec{d}_f - \vec{d}_0}{t} \quad \begin{array}{l} d_f = 7\text{m} \\ d_0 = 5\text{m} \end{array}$$

$$= \frac{7 - 5}{11} = \frac{2}{11} = \boxed{0.18\text{m/s}}$$

9 Calculate the average speed between 5 and 16 seconds.

$$v_{sp} = \frac{d}{t} = \frac{22\text{m}}{11\text{s}} = \boxed{2.0\text{m/s}}$$

$$d = 10\text{m} + 12\text{m}$$

$$d = 22\text{m}$$

10 Calculate the average velocity for the entire 20 seconds.

$$\vec{v}_{\text{avg}} = \frac{d_f - d_o}{t} \quad \begin{array}{l} t = 20 \text{ s} \\ d_f = -5 \text{ m} \\ d_o = 0 \text{ m} \end{array}$$

$$v_{\text{avg}} = \frac{-5 \text{ m}}{20} = \boxed{-0.25 \text{ m/s}}$$

Attachments

moving-man_all.jar