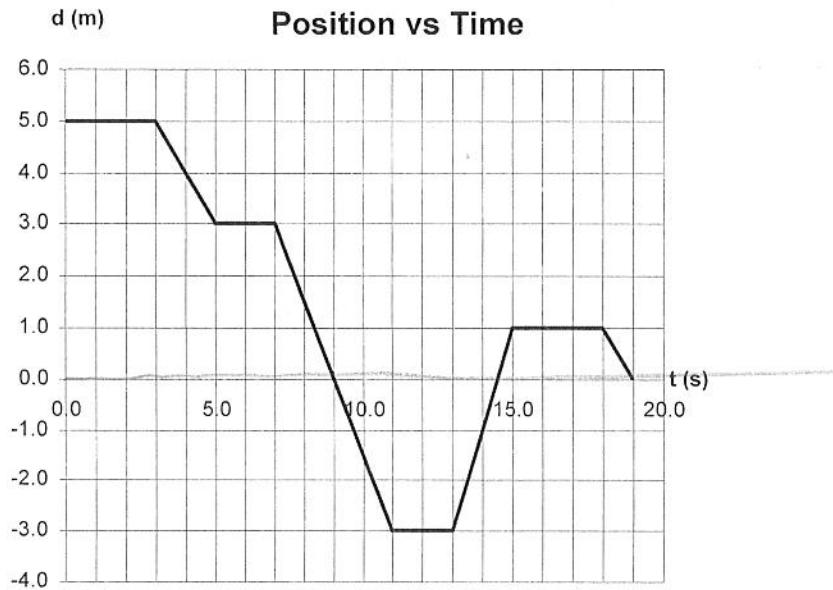


Practice Questions: d-t graphs

The graph below shows the relation between position and time for a certain object.



1. For what time interval(s) is the object at rest?

$$[0, 3] \text{ s} \cup [5, 7] \text{ s} \cup [11, 13] \text{ s} \cup [15, 18] \text{ s}$$

2. What is the velocity of the object at 9.0 s?

$$\begin{matrix} (9, 0) \\ (7, 3) \end{matrix} \text{ slope} = \frac{3\text{m} - 0\text{m}}{7\text{s} - 9\text{s}} = \frac{3\text{m}}{-2\text{s}} = -1.5 \frac{\text{m}}{\text{s}}$$

3. What is the velocity of the object at 14.0 s?

$$\begin{matrix} (13, -3) \\ (15, 1) \end{matrix} \text{ slope} = \frac{1\text{m} - (-3\text{m})}{15\text{s} - 13\text{s}} = \frac{4\text{m}}{2\text{s}} = 2 \frac{\text{m}}{\text{s}}$$

4. What is the velocity of the object at 17.0 s?

$$0 \frac{\text{m}}{\text{s}} \text{ (not moving)}$$

5. What is the displacement of the object from 4.0 s to 16.0 s?

$$\Delta \vec{d} = \vec{d}_f - \vec{d}_i = 1\text{m} - 4\text{m} = -3\text{m}$$

6. What is the distance covered from 4.0 s to 16.0 s?

$$\text{distance} = 7\text{m} + 4\text{m} = 11\text{m}$$

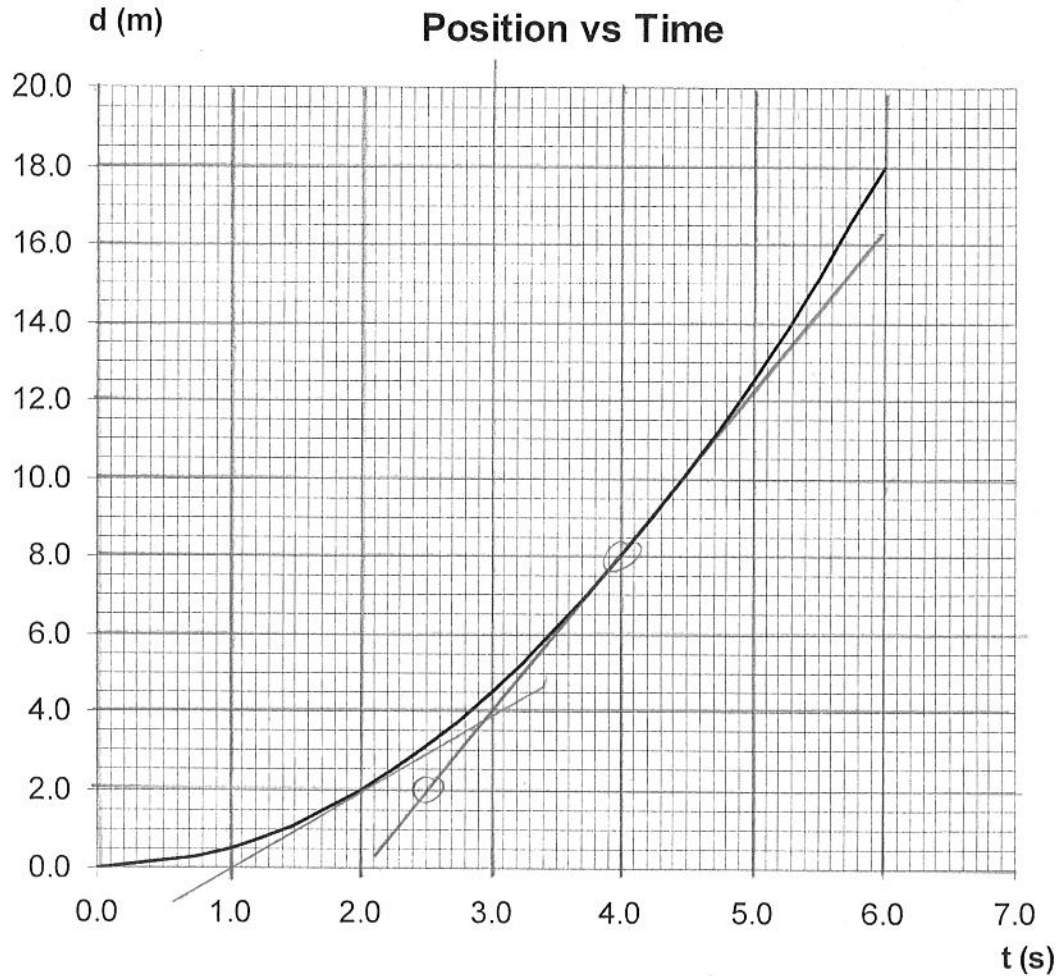
7. What is the average speed from 4.0 s to 16.0 s?

$$\text{Speed}_{\text{ave}} = \frac{\text{distance}}{\Delta t} = \frac{11\text{m}}{12\text{s}} = 0.92 \frac{\text{m}}{\text{s}}$$

8. What is the average velocity from 4.0 s to 16.0 s?

$$\vec{v}_{\text{ave}} = \frac{\Delta \vec{d}}{\Delta t} = \frac{-3\text{m}}{12\text{s}} = -0.25 \frac{\text{m}}{\text{s}}$$

Use the graph below to answer questions 9 to 12.



9. What is the velocity at 2.0 s?

$$\begin{matrix} (1, 0) \\ (2, 2) \end{matrix} \text{ slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2 - 0}{2 - 1} = \frac{2 \text{ m}}{1 \text{ s}} = 2 \frac{\text{m}}{\text{s}}$$

10. What is the velocity at 4.0 s?

$$\begin{matrix} (4, 8) \\ (2.5, 2) \end{matrix} \text{ slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{8 - 2}{4 - 2.5} = \frac{6 \text{ m}}{1.5 \text{ s}} = 4 \frac{\text{m}}{\text{s}}$$

11. What is position at 1.0 s?

0.5 m

12. What is the average velocity from 3.0 s to 5.0 s?

$$\begin{aligned} \vec{v}_{\text{ave}} &= \frac{\Delta \vec{d}}{\Delta t} = \frac{\vec{d}_f - \vec{d}_i}{\Delta t} \\ &= \frac{12.5 \text{ m} - 4.5 \text{ m}}{2 \text{ s}} = 4 \frac{\text{m}}{\text{s}} \end{aligned}$$