

General Physics 2-3 - 2-5

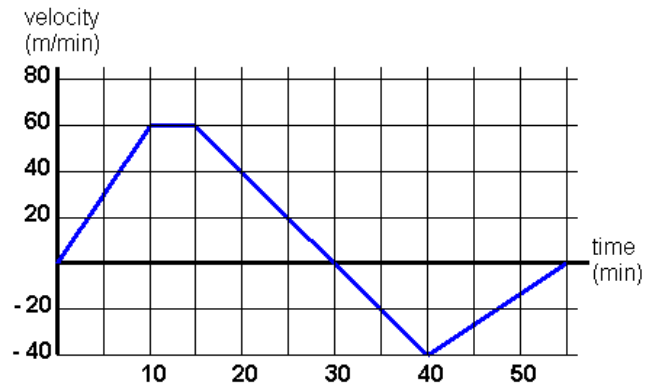
2.3 Acceleration

1.) Describe acceleration.

2.) What is the equation for average acceleration? Is it a vector or scalar quantity?

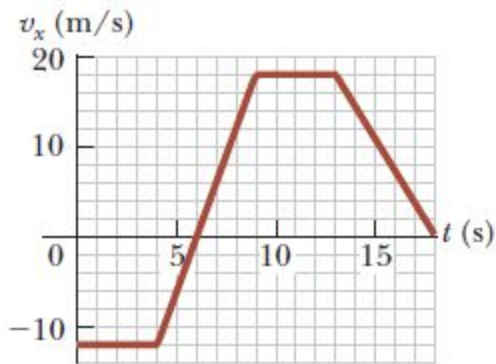
3.) What is the equation for instantaneous acceleration?

4.) Use the graph to answer each of the following.



- a) Where is acceleration positive?
- b) Where is acceleration constant?
- c) Where is acceleration negative?
- d) Find the average acceleration at $t = 15$ s.
- e) Find the instantaneous acceleration at $t = 25$ s.
- f) Find the average acceleration at $t = 40$ s.
- g) Find the average acceleration at $t = 35$ s.

5.) Use the graph to answer each of the following.



- a) Find the acceleration at $t = 6$ s.

- b) Find instantaneous acceleration at $t = 12$ s.

- c) Find average acceleration at $t = 18$ s.

- d) Find instantaneous acceleration at $t = 15$ s.

6.) Define acceleration with respect to derivatives.

7.) The position of a particle within the system is given by the function:

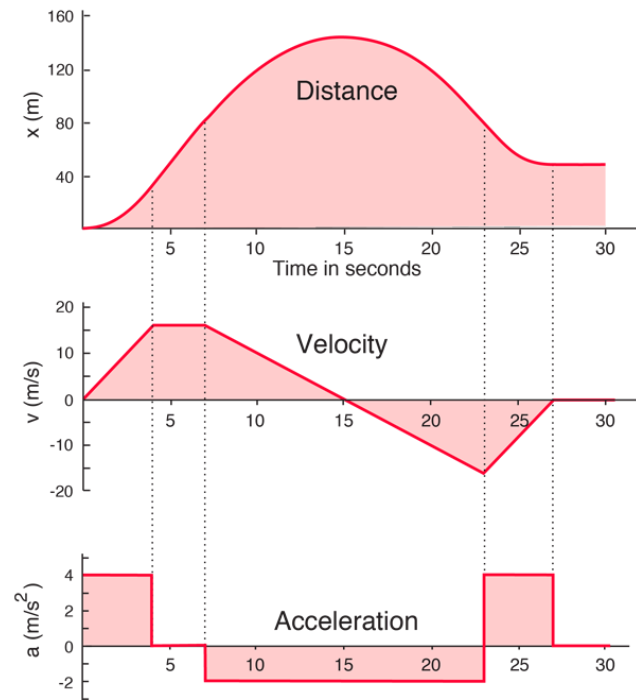
$$f(x) = 2x^2 - 8x + 12$$

a) Give the function for instantaneous velocity.

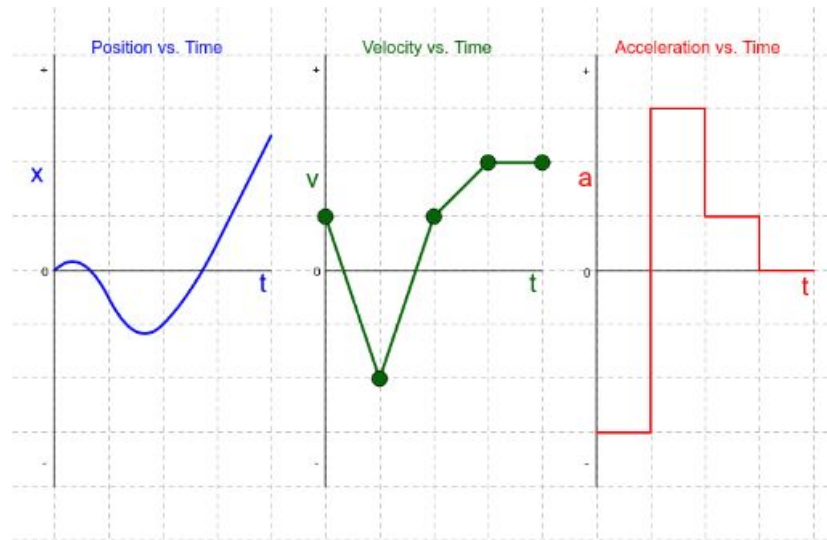
b) Give the function for instantaneous acceleration.

8.) Describe the process of speeding up and slowing down with respect to acceleration.

9.) Evaluate the graph with respect to position, velocity, and acceleration.



10.) Evaluate the graph with respect to position, velocity, and acceleration.



2.4 Motion Diagrams

11.) Draw a free body diagram to represent each of the following.

a) Velocity decreasing.

b) Velocity increasing.

c) Velocity constant.

2.5 One-Dimensional Motion with Constant Acceleration

12.) Write the formula with the given terms: final velocity, initial velocity, acceleration, and time.

13.) Solve each.

a) Find the final velocity with the following parameters.

$$v_i = 40.0 \text{ m/s} \quad a = 2.00 \text{ m/s}^2 \quad t = 12.0 \text{ s}$$

b) Find the final velocity with the following parameters.

$$v_i = 28.0 \text{ m/s} \quad a = 3.50 \text{ m/s}^2 \quad t = 4.50 \text{ s}$$

c) Find the initial velocity with the following parameters.

$$v_f = 16.0 \text{ m/s} \quad a = 1.50 \text{ m/s}^2 \quad t = 6.00 \text{ s}$$

d) Find the acceleration with the following parameters.

$$v_f = 24.0 \text{ m/s} \quad v_i = 18.0 \text{ m/s} \quad t = 3.00 \text{ s}$$

14.) Write the formula for average velocity (with constant acceleration).

15.) If the acceleration is constant, find the average velocity under each of the following conditions:

a) $v_f = 33.0 \text{ m/s} \quad v_i = 15.0 \text{ m/s}$

b) $v_f = 60.0 \text{ m/s} \quad v_i = 72.0 \text{ m/s}$

16.) Write the formula with the given terms: final position, initial position, final velocity, initial velocity, and time.

17.) Find the final velocity under each of the following conditions:

a) $v_f = 26.0 \text{ m/s}$ $v_i = 14.0 \text{ m/s}$ $x_i = 45.0 \text{ m}$ $t = 4.00 \text{ s}$

b) $v_f = 16 \text{ m/s}$ $v_i = 28 \text{ m/s}$ $x_i = 80 \text{ m}$ $t = 6 \text{ s}$

18.) Write the formula with the given terms: final position, initial position, acceleration, initial velocity, and time.

19.) Find the final position under each of the following conditions:

a) $x_i = 52.0 \text{ m}$ $v_i = 8.50 \text{ m/s}$ $a = 2.00 \text{ m/s}^2$ $t = 8.00 \text{ s}$

b) $x_i = 24.0 \text{ m}$ $v_i = 12.5 \text{ m/s}$ $a = 3.50 \text{ m/s}^2$ $t = 6.00 \text{ s}$

c) $x_i = 35.0 \text{ m}$ $v_i = -2.50 \text{ m/s}$ $a = 4.00 \text{ m/s}^2$ $t = 3.00 \text{ s}$

20.) Write the formula with the given terms: final position, initial position, acceleration, initial velocity, and final velocity.

21.) Find the final velocity under each of the following conditions.

a) $x_i = 30.0 \text{ m}$ $v_f = 10.0 \text{ m/s}$ $v_i = 15.0 \text{ m/s}$ $a = 2.00 \text{ m/s}^2$

b) $x_i = 55.0 \text{ m}$ $v_f = 22.0 \text{ m/s}$ $v_i = 12.0 \text{ m/s}$ $a = 3.00 \text{ m/s}^2$