

Calculus AB  
7.1 Worksheet

Name \_\_\_\_\_

Date \_\_\_\_\_ Prd \_\_\_\_\_

A particle moves along the x-axis and its position is given by the graph of the velocity function  $v$  ft/s

Given  $x(0) = -25$  and the graph of  $v(t)$  for  $0 \leq t \leq 16$

(a) Does the particle begin moving right or left?

(b) When is the particle at rest?

(c) What is the maximum velocity?

(d) What is the maximum speed of the particle?

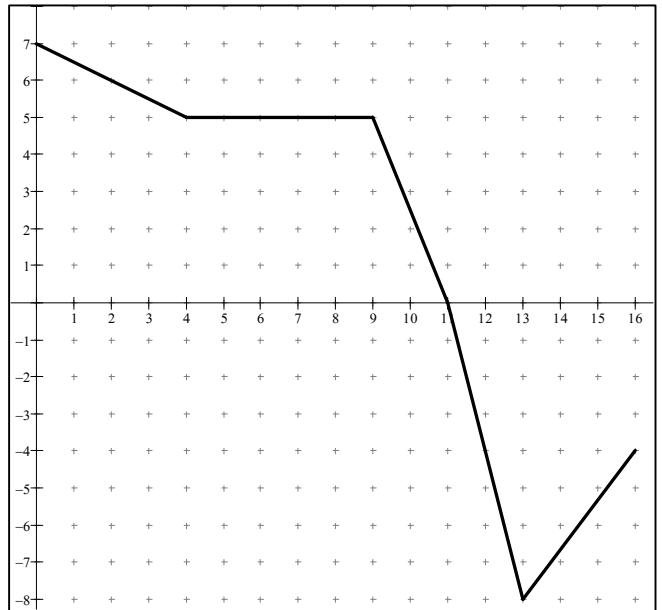
(e) When is the particle moving to the left?

(f) What is the total distance the particle travels?

(g) What is the x-coordinate of the particle's position when it is farthest to the right?

(h) What is the displacement of the particle for  $[0, 16]$ ?

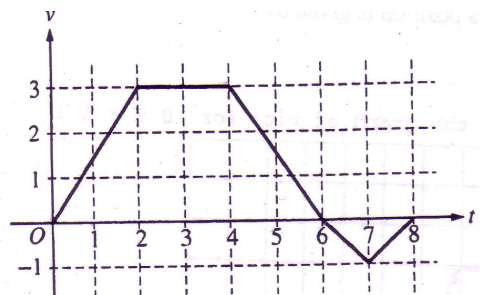
(i) What is the x-coordinate of the particle's finishing position?



2. A bug begins to crawl up a vertical wire at time  $t = 0$ . The velocity  $v$  of the bug at time,  $t$ , where  $t$  is  $[0, 8]$ , is given by the function whose graph is shown above.

i) At what value of  $t$  does the bug change direction?

- (a) 2                      (b) 4  
(c) 6                      (d) 7                      (e) 8



ii) What is the total distance the bug traveled from  $t = 0$  to  $t = 8$ ?

- (a) 14                      (b) 13                      (c) 11                      (d) 8                      (e) 6

3. An equation of the line tangent to the graph of  $y = \cos(2x)$  at  $x = \frac{\pi}{4}$  is

(a)  $y - 1 = -(x - \frac{\pi}{4})$

(b)  $y - 1 = -2(x - \frac{\pi}{4})$

(c)  $y = 2(x - \frac{\pi}{4})$

(d)  $y = -(x - \frac{\pi}{4})$

(e)  $y = -2(x - \frac{\pi}{4})$

4. An object moves along the x-axis with initial position  $x(0) = 2$ . The velocity of the object at time  $t \geq 0$  is given by  $v(t) = \sin\left(\frac{\pi}{3}t\right)$ .

(a) What is the acceleration of the object at time  $t = 4$ ?

(b) Consider the following two statements.

Statement I: For  $3 < t < 4.5$ , the velocity of the object is decreasing.

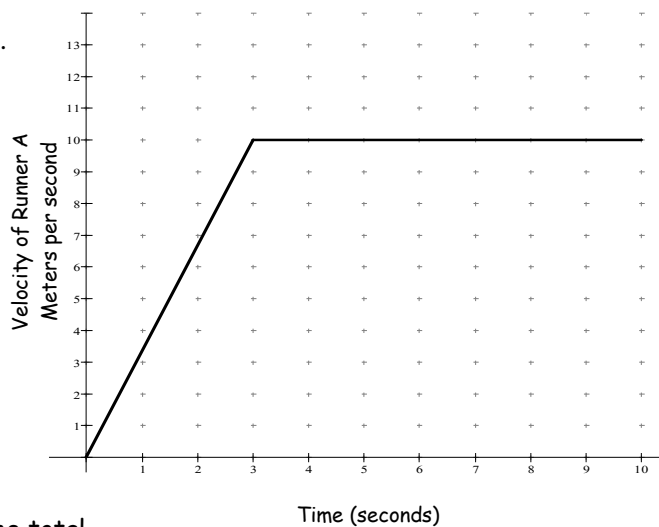
Statement II: For  $3 < t < 4.5$ , the speed of the object is increasing.

Are either or both of these statements correct? For each statement provide a reason why it is correct or not correct.

(c) What is the total distance traveled by the object over the time interval  $[0, 4]$ ?

(d) What is the position of the object at time  $t = 4$ ?

5. Two runners, A and B, run on a straight racetrack for  $0 \leq t \leq 10$  seconds. The graph above, which consists of two line segments, shows the velocity, in meters per second, of Runner A. The velocity, in meters per second, of Runner B is given by the function  $v$  defined by  $v(t) = \frac{24t}{2t + 3}$ .



(a) Find the velocity of Runner A and the velocity of Runner B at time  $t = 2$  seconds. Indicate units of measure.

(b) Find the acceleration of Runner A and the acceleration of Runner B at time  $t = 2$  seconds. Indicate units of measure.

(c) Find the total distance run by Runner A and the total distance run by Runner B over the time interval  $0 \leq t \leq 10$  seconds. Indicate units of measure.