8.2 Connecting Pos, Vel, Acc with Integrals

CA #1

Calculus Name: _____

1. A particle moves along the x-axis for $t \geq 0$ with an acceleration of $a(t) = 12t + 6$ where t is time in seconds. The particle's velocity at $t = 3$ is 36 cm/sec. The initial position of the particle is 4 cm. What is the position of the particle when the velocity is zero?

2. A particle moves along the y-axis for $t \geq 0$ with a velocity of $v(t) = 12t^2 - 24t$. The particle's initial position is 10 cm. Find the position of the function at the particle's minimum velocity.

3. Mr. Brust leaves for a bike ride at 10:00 a.m. (time $t = 0$) and rides with velocity $v(t) = 20 - \frac{t}{5}$ miles per hour, where t is the number of hours since he started riding.
   a. Find $\int_1^2 v(t)\,dt$

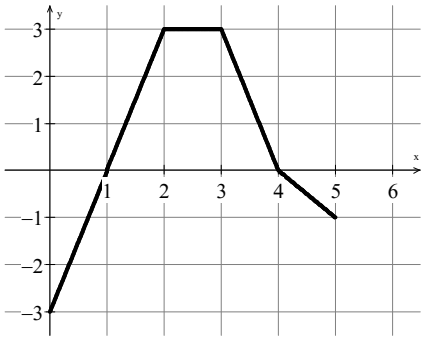
   b. Explain the meaning of your answer to part *a* in the context of this problem.

4. A particle's velocity along the x-axis is given by $v(t) = 5\cos t$.
   a. Find the particle's displacement on the interval $0 \leq t \leq \frac{3\pi}{2}$.

   b. If $s(0) = 3$, what is the particles position at $t = \frac{3\pi}{2}$?

5. The graph to the right shows the velocity of an object moving along the x-axis over a 5-second period.
   a) If the object started 10 meters to the right, where is the object after 3 seconds?

   b) Find the total distance traveled by the object over the 5-second period



6. A particle's velocity is given by $v(t) = 20 - 8t$, where t is measured in weeks, v is measured in inches per week, and $s(t)$ represents the particle's position.
   a. If $s(0) = 3$, what is the value of $s(3)$?

   b. What is the net change in distance over the first 10 weeks?

   c. What is the total distance traveled by the particle during the first 10 weeks? Show the set up AND your work.

7. **Calculator active.** A particle's velocity is given by $v(t) = e^{\sin t} \cos t$, where t is measured in months, v is measured in yards per month, and $s(t)$ represents the particle's position.
   a. If $s(0) = 5$, what is the value of $s(2\pi)$?

   b. What is the net change in distance over the first 8 months?

   c. What is the total distance traveled by the particle during the first 8 months? Show the set up.

Answers to 8.2 CA #1

1. -40 cm	2. 2 cm	3a. 19.7 3b. During the 2nd hour, Brust rode 19.7 miles.	4a. 5 units to the left. 4b. 2 units to the left.
5a. 13 meters to the right. 5b. 8 meters	6a. 27 6b. -200 inches 6c. 250 inches	7a. 5 7b. 1.6895 yards 7c. 6.4478 yards	