

Vertical Motion In Exercises 91 and 92, use the position function $s(t) = -16t^2 + v_0t + s_0$ for free-falling objects.

91. A silver dollar is dropped from the top of a building that is 1362 feet tall.
- (a) Determine the position and velocity functions for the coin.
 - (b) Determine the average velocity on the interval $[1, 2]$.
 - (c) Find the instantaneous velocities when $t = 1$ and $t = 2$.
 - (d) Find the time required for the coin to reach ground level.
 - (e) Find the velocity of the coin at impact.

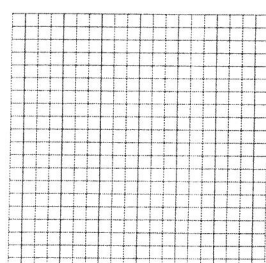
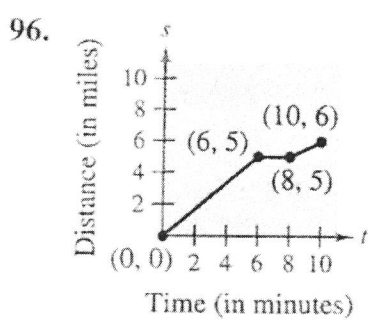
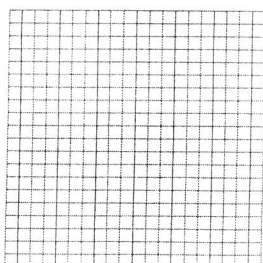
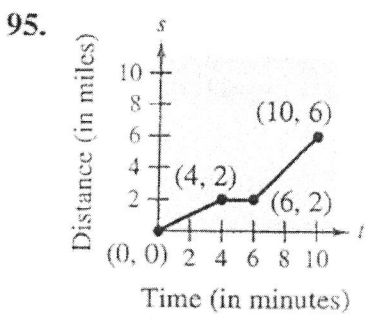
92. A ball is thrown straight down from the top of a 220-foot building with an initial velocity of -22 feet per second. What is its velocity after 3 seconds? What is its velocity after falling 108 feet?

Vertical Motion In Exercises 93 and 94, use the position function $s(t) = -4.9t^2 + v_0t + s_0$ for free-falling objects.

93. A projectile is shot upward from the surface of earth with an initial velocity of 120 meters per second. What is its velocity after 5 seconds? After 10 seconds?

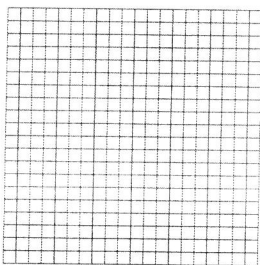
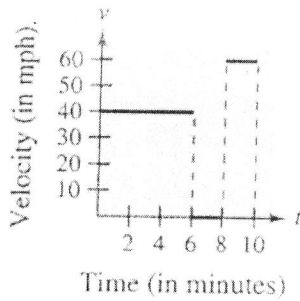
94. To estimate the height of a building, a stone is dropped from the top of the building into a pool of water at ground level. How high is the building if the splash is seen 6.8 seconds after the stone is dropped?

Think About It In Exercises 95 and 96, the graph of a position function is shown. It represents the distance in miles that a person drives during a 10-minute trip to work. Make a sketch of the corresponding velocity function.

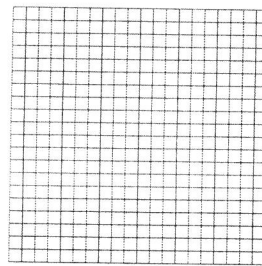
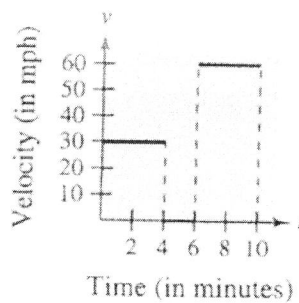


Think About It In Exercises 97 and 98, the graph of a velocity function is shown. It represents the velocity in miles per hour during a 10-minute drive to work. Make a sketch of the corresponding position function.

97.



98.



78. If the rate of change of the function $f(t) = t^{\frac{4}{3}}$ when $t = c$ is twice the rate of change of $f(t)$ when $t = 8$, then $c =$

- (A) -8
- (B) $\sqrt[3]{32}$
- (C) 16
- (D) 64
- (E) $\sqrt[3]{128}$

32. Let f be the function given by $f(x) = 3^x$. For what value of x is the slope of the line tangent to the curve at $(x, f(x))$ equal to 1?

- (A) 1.099
- (B) .086
- (C) 0
- (D) $-.086$
- (E) -1.099