1) The distance that an object will fall in t seconds varies directly with the square of t. An object falls 64 feet in 2 seconds. How long will it take to fall 576 feet?

A. 36 seconds

B. 9 seconds

C. 18 seconds

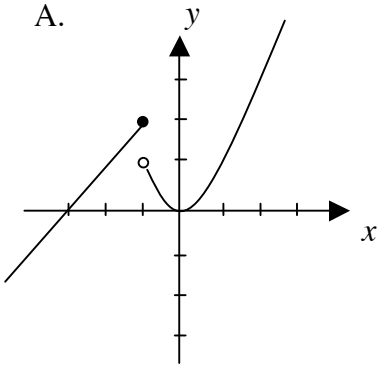
D. 6 seconds

E. None of these.

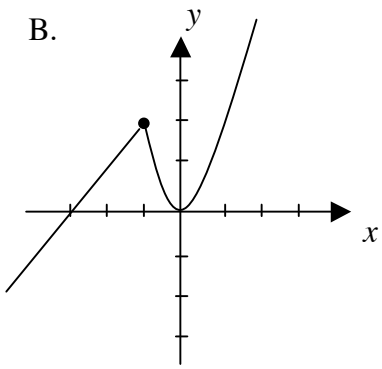
2) Which of the following depicts the graph of the following function?

$$h(x) = \begin{cases} x + 3 \text{ if } x \leq -1 \\ x^2 \text{ if } x > -1 \end{cases}$$

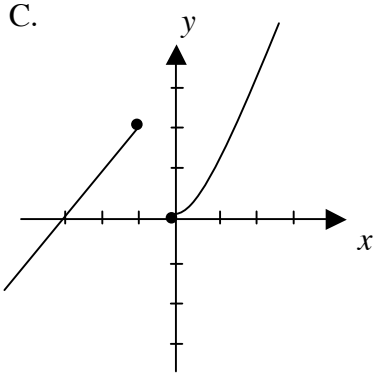
A.



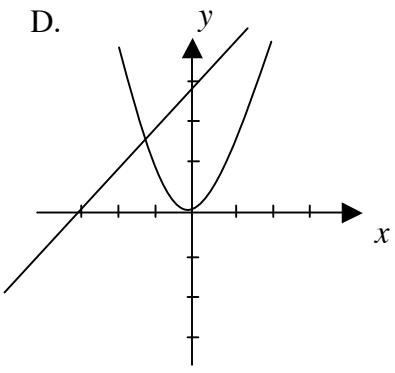
B.



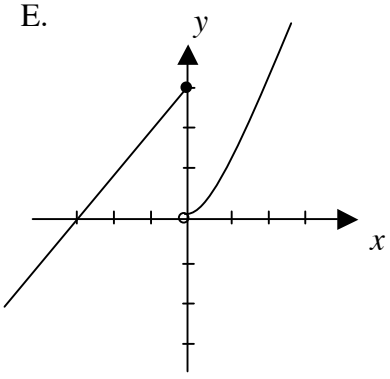
C.



D.



E.



3) Let $f(x) = x^2$ and $g(x) = \sqrt{x+3}$. Find $g \circ f$.

A. $\sqrt{x^2 + 9}$

B. $x + 3$

C. $\sqrt{3x^2}$

D. $\sqrt{x^2+6x+9}$

E. None of these.

4) Let $f(x) = \dfrac{x}{x-4}$. Find $f(k+1)$.

A. $\dfrac{k+1}{k-4}$

B. $\dfrac{k+1}{k-3}$

C. $\dfrac{k}{k-4} + 1$

D. $\dfrac{k}{k-3} + 1$

E. $\dfrac{k}{k+1}$

5) A function is defined by $f(x) = \dfrac{4}{x+1}$. Find f^{-1}.

A. $f^{-1}(x) = \dfrac{x-1}{4}$

B. $f^{-1}(x) = \dfrac{4-x}{x}$

C. $f^{-1}(x) = \dfrac{x+1}{4}$

D. $f^{-1}(x) = \dfrac{1}{4+x}$

E. $f^{-1}(x) = \dfrac{3}{x}$

6) Let $f(x)=x+4$ and $g(x)=2x^2$. Find $(f \circ g)\left(\frac{1}{4}\right)$.

A. $\frac{33}{8}$

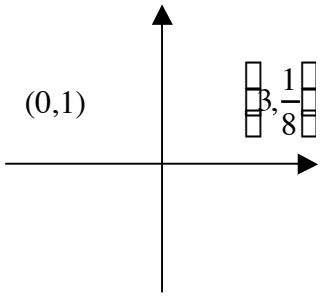
B. $\frac{1}{2}$

C. 2

D. $\frac{15}{16}$

E. None of these.

7) From the graph of $y = b^x$ (below), find the value of b.



A. $b=\frac{1}{8}$

B. $b=3$

C. $b=\frac{3}{8}$

D. $b=\frac{1}{3}$

E. $b=\frac{1}{2}$

8) A colony of 5 million bacteria is growing in a culture medium. The population P after t hours is given by the formula $P = (5 \times 10^6)(2.1)^t$.
Find the population after 7 hours.

A. 1.41×10^6 million

B. 7.35×10^5 million

C. 9.0×10^8 million

D. 9.0×10^6 million

E. 73.5×10^6 million

9) Write this equation in logarithmic form.

$4^{-3} = \frac{1}{64}$

A. $\log_{64} 4 = -3$

B. $\log_4 (-3) = \frac{1}{64}$

C. $\log_3 \frac{1}{64} = -4$

D. $\log_4 \frac{1}{64} = -3$

E. None of these.

10) Find the value of *x*. $\log_x 9 = \frac{1}{2}$

A. $x = \frac{1}{18}$

B. $x = 3$

C. $x = 18$

D. $x = 81$

E. $x = \frac{9}{2}$

11) An investment of $16,000 in Arrow Aluminum in 1996 is worth $18,500 in 2002. Find the average growth rate during this period. Use the formula $r = \frac{1}{t} \ln \frac{P}{P_0}$ where P is the current value, P_0 is the amount originally invested, t is the number of years, and r is the growth rate. Round your answer to the nearest tenth of a percent.

A. 2.9%

B. 2.4%

C. 8.7%

D. 6.1%

E. 19.3%

12) Write this expression in terms of the logarithms of x, y, and z.

$$\log_b \frac{\sqrt{xy}}{z}$$

A. $2\log_b x + 2\log_b y - \log_b z$

B. $\frac{1}{2}\log_b x + \log_b y - \log_b z$

C. $\log_b x + \log_b y + \log_b z$

D. $\frac{1}{2}\log_b x + \frac{1}{2}\log_b y - \log_b z$

E. None of these.

13) Solve. $\log(x+3) - \log x = \log 7$

A. $x = 4$

B. $x = -3.85$

C. $x = 2$

D. $x = 1$

E. $x = \frac{1}{2}$

14) Solve for y.

$$2x - 3y = -2$$
$$3x + 6y = 4$$

A. $y = \frac{2}{3}$

B. $y = 0$

C. $y = \frac{4}{3}$

D. $y = 2$

E. None of these.