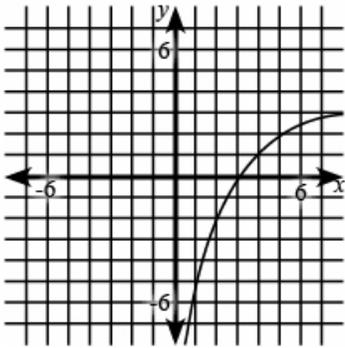
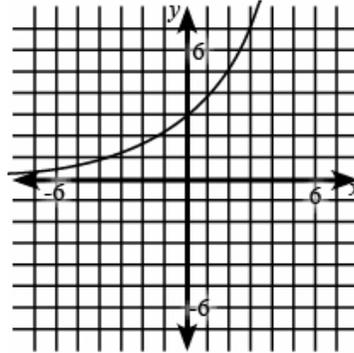


1. Which graph correctly represents $f(x) = 3\left(\frac{1}{2}\right)^x$?

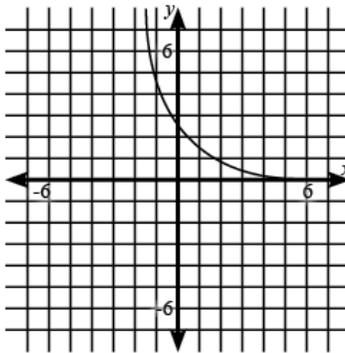
A.



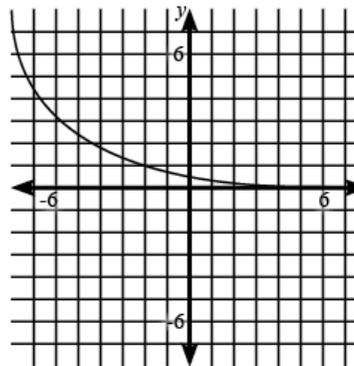
B.



C.



D.



2. Find the domain and range of: $g(x) = 3\cos(2x + \pi) + 1$

- A. Domain: all real numbers Range: $-3 \leq y \leq 3$
 B. Domain: all real numbers Range: $-2 \leq y \leq 4$
 C. Domain: all real numbers Range: $-2\pi \leq x \leq 2\pi$
 D. Domain: $x \geq -\frac{\pi}{2}$ Range: $-2 \leq y \leq 2$

3. Solve $2^{x+14} = 16^{2x}$

- A. 2
 B. 4
 C. 8
 D. 16

4. The table below shows the value of an investment fund.

Time, t (years)	Value of Fund
3	\$15,700
5	\$18,400
7	\$21,400
9	\$25,000
11	\$29,100
13	\$34,200
15	\$39,700

For what *approximate* value of t will the value of the fund be \$50,000? (Assume that the fund growth continues according to a best-fit exponential model based on the data in the table.)

- A. 18
B. 19
C. 20
D. 21
5. An exponential growth formula is $N = N_0e^{kt}$, where:

N is the population at time t ,
 N_0 is the initial population,
 k is the growth rate, and
 t is the time in years.

The enrollment of a school has been increasing exponentially at a rate of 1.5% per year. The school's enrollment now is 1,800. *Approximately* how long ago was the school's enrollment 1,200?

- A. 27 years
B. 20 years
C. 12 years
D. 3 years

6. The point $(3, 4)$ lies on the graph of $f(x) = \sqrt{2x+a}$. Which ordered pair below lies on the graph of $g(x) = \frac{1}{2}\sqrt{2x+a}$?

- A. $\left(\frac{3}{2}, 2\right)$
- B. $\left(\frac{5}{2}, \frac{3}{2}\right)$
- C. $(3, 2)$
- D. $(27, 8)$

7. Which of the following expressions is equivalent to $\log_6 40$?

- A. $\log_{10} 6 + \log_{10} 40$
- B. $\log_{10} 6 - \log_{10} 40$
- C. $(\log_{10} 6)(\log_{10} 40)$
- D. $\frac{\log_{10} 40}{\log_{10} 6}$

8. Which of the following equations is the inverse of the relation $y = 3x + 6$?

- A. $y = \frac{1}{3}x - 2$
- B. $y = \frac{1}{3}x + 2$
- C. $y = 3x - 2$
- D. $y = 3x + 2$

9. If $f(x) = x^2 - x$ and $g(x) = x - 1$, what is $f(g(x))$?

- A. $x^2 - x - 1$
- B. $x^2 - x - 2$
- C. $x^2 - 3x + 2$
- D. $x^2 - 3x + 1$

10. If $\log_{10} x = -2$, what is the value of x ?

A. $x = -\sqrt{\frac{1}{10}}$

B. $x = \sqrt{\frac{1}{10}}$

C. $x = \frac{1}{100}$

D. $x = 100$

11. If \$10,000 is invested at 5%, how much money will there be in 12 years? Use $A(t) = a(1 \pm r)^t$.

A. \$15,403.67

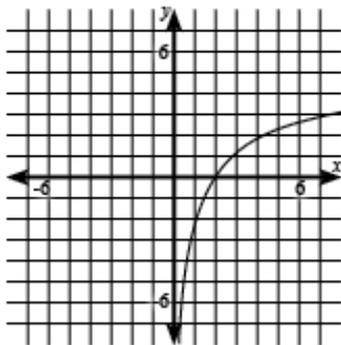
B. \$15,277.33

C. \$17,623.41

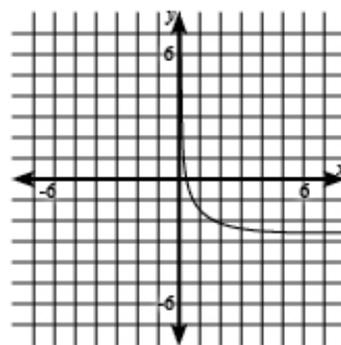
D. \$17,958.56

12. Which graph correctly represents $f(x) = \log_5 x$?

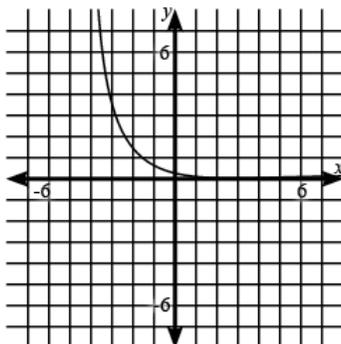
A.



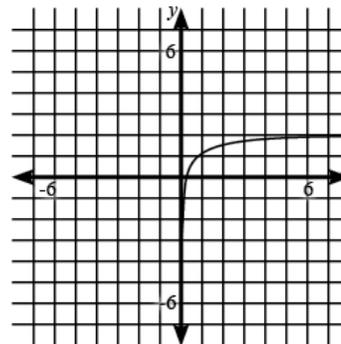
B.



C.

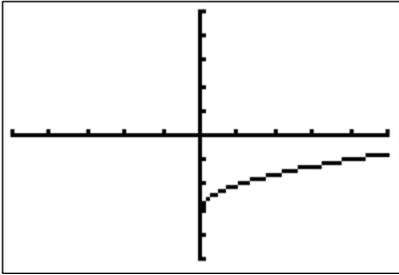


D.

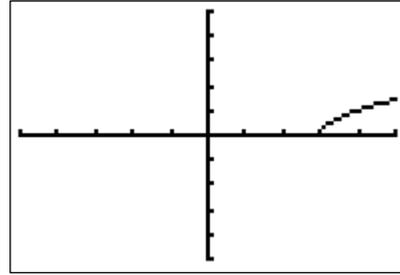


13. Which of the following graphs shown below represents the equation $y = \sqrt{x+3}$?

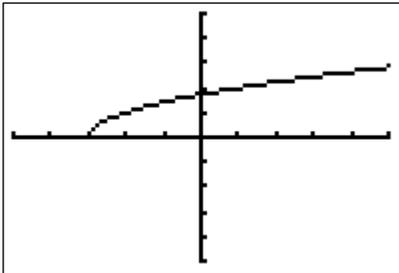
A.



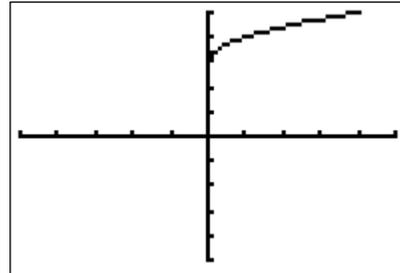
B.



C.



D.



14. What is the value of $\log_3 27$?

- A. 2
- B. 3
- C. 6
- D. 9

15. A certain radioactive element decays over time according to the equation $y = A\left(\frac{1}{2}\right)^{\frac{t}{300}}$, where

A = the number of grams present initially and t = time in years. If 1000 grams were present initially, how many grams will remain after 900 years?

- A. 500 grams
- B. 250 grams
- C. 125 grams
- D. 62.5 grams

16. James purchased a truck for \$25,900. The value of the truck decreases by 12% per year. What will be the *approximate* value 8 years after the purchase?

- A. \$3,100
- B. \$7,200
- C. \$9,300
- D. \$22,800

17. Find the inverse of $f(x) = (3x - 24)^2$?

- A. $f^{-1}(x) = \sqrt{x} + 8$
- B. $f^{-1}(x) = \frac{\sqrt{x + 24}}{3}$
- C. $f^{-1}(x) = \frac{1}{3}\sqrt{x} + 8$
- D. $f^{-1}(x) = \frac{1}{3}\sqrt{x} + 24$

18. Isabella invested \$500 at 6% annual interest, compounded quarterly. The value, A , of an

investment can be calculated using the equation $A = P\left(1 + \frac{r}{n}\right)^{nt}$, where P is the initial

investment, r is the interest rate, n is the number of times the interest is compounded each year, and t is time in years. Exactly how long will it take for her investment to be worth four times as much (quadruple) in value?

- A. $t = \frac{\log 500}{4 \log 1.06}$
- B. $t = \frac{\log 500}{4 \log 0.265}$
- C. $t = \frac{4 \log 4}{\log 1.015}$
- D. $t = \frac{\log 4}{4 \log 1.015}$

19. Given $f(x) = x^3$ and $g(x) = 4x + 3$ what is $g(f(3))$?
- A. 108
 - B. 111
 - C. 405
 - D. 3,375
20. If $f(x) = x^2$ and $g(x) = x - 2$, find the domain and range of $(f \circ g)(x)$.
- A. D: all real numbers R: all real numbers
 - B. D: all real numbers R: $y \geq 0$
 - C. D: $x \geq 2$ R: $y \geq 0$
 - D. D: $x \geq 0$ R: all real numbers
21. What is the solution of the equation $e^x e^{2x} = 4$?
- A. $x = \sqrt{\frac{\ln 4}{2}}$
 - B. $x = \frac{4}{3e}$
 - C. $x = \ln\left(\frac{4}{3}\right)$
 - D. $x = \frac{\ln 4}{3}$
22. Shirley is paid an annual salary plus a bonus of 4% of her sales over \$15,000. Let x represent Shirley's sales, $f(x) = x - 15,000$ represents her sales over \$15,000, and $p(x)$ represents her bonus. Which function notation expresses the **amount** of her bonus?
- A. $f(x) + p(x)$
 - B. $f(x) - p(x)$
 - C. $f(p(x))$
 - D. $p(f(x))$

23. Rewrite $3^4 = 81$ in logarithmic form.

- A. $\log_3 4 = 81$
- B. $\log_4 81 = 3$
- C. $\log_{81} 3 = 4$
- D. $\log_3 81 = 4$

24. Jonathan wrote the equation $\log_6(x - 4) = 0$ on the board. He needs one clue for problems solving. Which fact provides the correct information that he needs to solve the equation?

- A. $6^0 = 1$
- B. $6^1 = 6$
- C. $4 - 4 = 0$
- D. $6 - 4 = 2$

25. What is the solution to $\sqrt{x+16} = 3\sqrt{x}$?

- A. $x = \frac{1}{2}$
- B. $x = \frac{8}{5}$
- C. $x = 2$
- D. $x = 8$

26. If $f(x) = 2x^2 + 8x - 4$ and $g(x) = -5x + 6$, find $(f - g)(x)$?

- A. $7x^2 + 2x - 4$
- B. $7x^2 + 8x - 10$
- C. $2x^2 + 13x - 10$
- D. $2x^2 + 3x + 2$

27. A car insurance company has a special plan for safe drivers. For each year that a driver has no tickets or violations, the premium is reduced by 10%, and a credit of \$15.00 is awarded. Which equation shows the amount a driver with no tickets or violations owes in the $(n + 1)$ th year as a function of the amount owed in the n th year?

- A. $f(n + 1) = f(n) - 0.10f(n) - 15$
- B. $f(n + 1) = f(n) + 0.10f(n) + 15$
- C. $f(n + 1) = f(n) + 0.10f(n) - 15$
- D. $f(n + 1) = f(n) - 0.10f(n) + 15$

28. The table shows the growth of a certain bacteria.

Time in Hours, x	0	1	2	3	4	5
Number of Cells, N	50	71	100	141	200	283

If N represents the number of cells at time x , which equation *best* models this set of data?

- A. $N = 45.51x + 27.05$
 - B. $N = 27.05x + 45.51$
 - C. $N = (1.41)(50.06)^x$
 - D. $N = (50.06)(1.41)^x$
29. If the equation $y = 2^x$ is graphed, which of the following values of x would produce a point closest to the x -axis?

- A. $\frac{1}{4}$
- B. $\frac{3}{4}$
- C. $\frac{5}{3}$
- D. $\frac{8}{3}$

30. What is the logarithmic form of the equation $y = 20^{\frac{-3}{2}}$?

A. $\log_{20} y = \frac{-3}{2}$

B. $\log_{\frac{3}{2}} 20 = y$

C. $^{-}\log_{\frac{3}{2}} y = 20$

D. $\log_{20} \left(\frac{-3}{2} \right) = y$