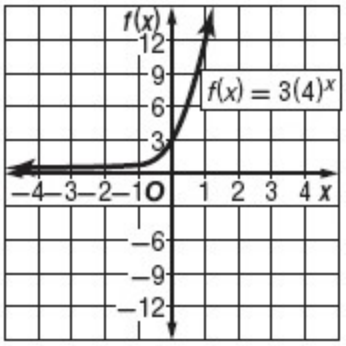
Mid-Chapter Quiz: Lessons 7-1 through 7- 4

Graph each function. State the domain and range.

1. $f(x) = 3(4)^x$

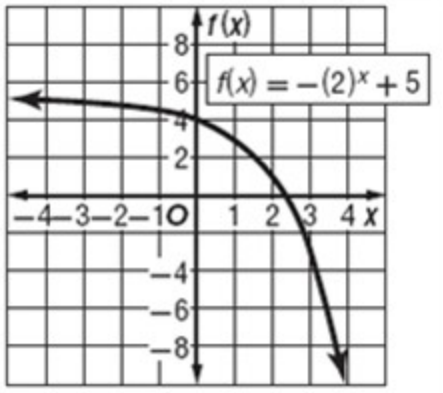
ANSWER:



D = {all real numbers}; R = $\{f(x) \mid f(x) > 0\}$

2. $f(x) = -(2)^x + 5$

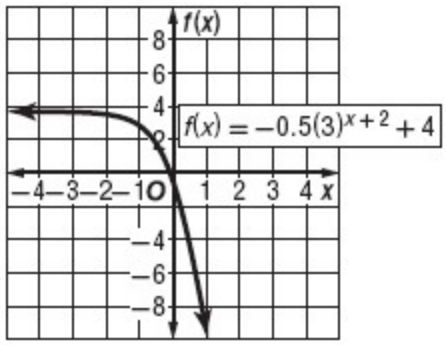
ANSWER:



D = {all real numbers}; R = $\{f(x) \mid f(x) < 5\}$

3. $f(x) = -0.5(3)^{x+2} + 4$

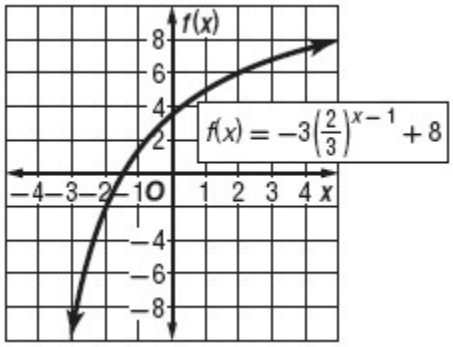
ANSWER:



D = {all real numbers}; R = $\{f(x) \mid f(x) < 4\}$

4. $f(x) = -3\left(\frac{2}{3}\right)^{x-1} + 8$

ANSWER:



D = {all real numbers}; R = $\{f(x) \mid f(x) < 8\}$

5. **SCIENCE** You are studying a bacteria population. The population originally started with 6000 bacteria cells. After 2 hours, there were 28,000 bacteria cells.
a. Write an exponential function that could be used to model the number of bacteria after *x* hours if the number of bacteria changes at the same rate.
b. How many bacteria cells can be expected after 4 hours?

ANSWER:

a. $f(x) = 6000(2.16025)^x$
b. about 130,667

6. **MULTIPLE CHOICE** Which exponential function has a graph that passes through the points at (0, 125) and (3, 1000)?

A $f(x) = 125(3)^x$
B $f(x) = 1000(3)^x$
C $f(x) = 125(1000)^x$
D $f(x) = 125(2)^x$

ANSWER:

D

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7. **POPULATION** In 1995, a certain city had a population of 45,000. It increased to 68,000 by 2007.
a. What is an exponential function that could be used to model the population of this city x years after 1995?
b. Use your model to estimate the population in 2020.

ANSWER:

a. $f(x) = 45{,}000(1.0350)^x$
b. 106,346

8. **MULTIPLE CHOICE** Find the value of x for $\log_3 (x^2 + 2x) = \log_3 (x + 2)$.

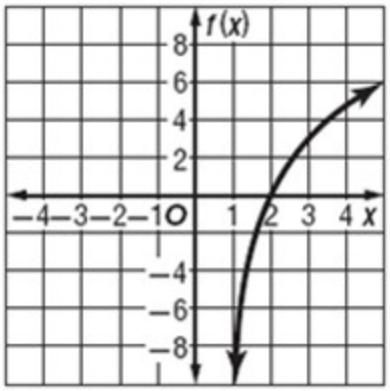
F $x = -2, 1$
G $x = -2$
H $x = 1$
J no solution

ANSWER:
H

Graph each function.

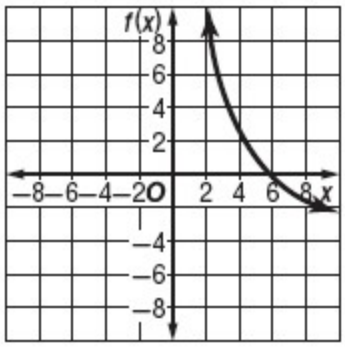
9. $f(x) = 3 \log_2 (x - 1)$

ANSWER:

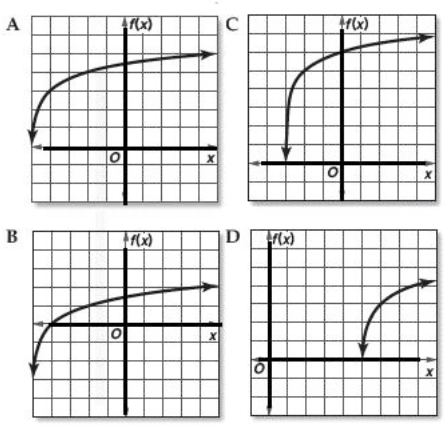


10. $f(x) = -4 \log_3 (x - 2) + 5$

ANSWER:



11. **MULTIPLE CHOICE** Which graph below is the graph of the function $f(x) = \log_3 (x + 5) + 3$?



ANSWER:
A

Evaluate each expression.

12. $\log_4 32$

ANSWER:

$\frac{5}{2}$

13. $\log_5 5^{12}$

ANSWER:
12

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14. $\log_{16} 4$

ANSWER:

$\frac{1}{2}$

15. Write $\log_9 729 = 3$ in exponential form.

ANSWER:

$9^3 = 729$

Solve each equation or inequality. Check your solution.

16. $3^x = 27^2$

ANSWER:

6

17. $4^{3x-1} = 16^x$

ANSWER:

1

18. $\frac{1}{9} = 243^{2x+1}$

ANSWER:

$-\frac{7}{10}$

19. $16^{2x+3} < 64$

ANSWER:

$\left\{x \mid x < -\frac{3}{4}\right\}$

20. $\left(\frac{1}{32}\right)^{x+3} \geq 16^{3x}$

ANSWER:

$\left\{x \mid x \leq -\frac{15}{17}\right\}$

21. $\log_4 x = \frac{3}{2}$

ANSWER:

8

22. $\log_7 (-x + 3) = \log_7 (6x + 5)$

ANSWER:

$-\frac{2}{7}$

23. $\log_2 x < -3$

ANSWER:

$\left\{x \mid 0 < x < \frac{1}{8}\right\}$

24. $\log_8 (3x + 7) = \log_8 (2x - 5)$

ANSWER:

no solution