Graph each function. State the domain and range. (Lesson 7-1)

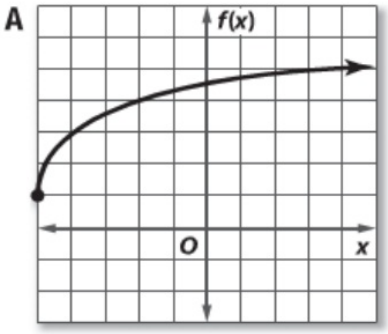
1. $f(x) = 3(4)^x$ **1–4. See Chapter 7 Answer Appendix.**
2. $f(x) = -(2)^x + 5$
3. $f(x) = -0.5(3)^{x+2} + 4$
4. $f(x) = -3\left(\frac{2}{3}\right)^{x-1} + 8$

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. (Lesson 7-1)
   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. **$f(x) = 6000(2.16025)^x$**
   b. How many bacteria cells can be expected after 4 hours? **about 130,667**

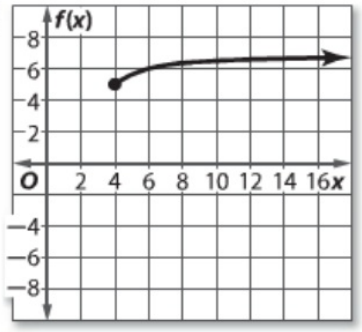
6. **MULTIPLE CHOICE** Which exponential function has a graph that passes through the points at (0, 125) and (3, 1000)? (Lesson 7-1) **D**
   A $f(x) = 125(3)^x$
   B $f(x) = 1000(3)^x$
   C $f(x) = 125(1000)^x$
   D $f(x) = 125(2)^x$

11. **MULTIPLE CHOICE** Which graph below is the graph of the function $f(x) = \log_3 (x + 5) + 3$? (Lesson 7-3) **A**

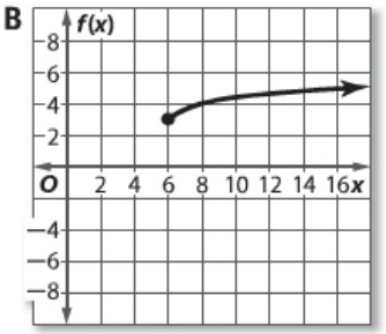
A



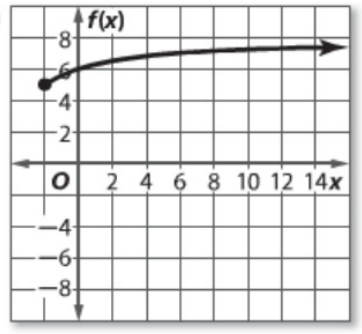
C



B



D



Evaluate each expression. (Lesson 7-3)

12. $\log_4 32$ **$\frac{5}{2}$**
13. $\log_5 5^{12}$ **12**

A $f(x) = 125(3)^x$

B $f(x) = 1000(3)^x$

C $f(x) = 125(1000)^x$

D $f(x) = 125(2)^x$

7. POPULATION In 1995, a certain city had a population of 45,000. It increased to 68,000 by 2007. (Lesson 7-2)

a. What is an exponential function that could be used to model the population of this city x years after 1995?

$f(x) = 45{,}000(1.0350)^x$

b. Use your model to estimate the population in 2020. **106,346**

8. MULTIPLE CHOICE Find the value of x for $\log_3 (x^2 + 2x) = \log_3 (x + 2)$. (Lesson 7-3) **H**

F $x = -2, 1$

G $x = -2$

H $x = 1$

J no solution

Graph each function. (Lesson 7-3) **9, 10. See Chapter 7 Answer Appendix.**

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

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

Evaluate each expression. (Lesson 7-3)

12. $\log_4 32$ $\frac{5}{2}$

13. $\log_5 5^{12}$ **12**

14. $\log_{16} 4$ $\frac{1}{2}$

15. Write $\log_9 729 = 3$ in exponential form. (Lesson 7-3) $9^3 = 729$

Solve each equation or inequality. Check your solution. (Lessons 7-2 and 7-4)

16. $3^x = 27^2$ **6**

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

18. $\frac{1}{9} = 243^{2x+1}$ $-\frac{7}{10}$

19. $16^{2x+3} < 64$ $\left\{x \mid x < -\frac{3}{4}\right\}$

20. $\left(\frac{1}{32}\right)^{x+3} \geq 16^{3x}$ $\left\{x \mid x \leq -\frac{15}{17}\right\}$

21. $\log_4 x = \frac{3}{2}$ **8**

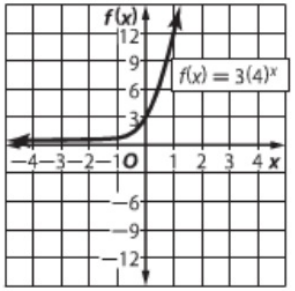
22. $\log_7 (-x + 3) = \log_7 (6x + 5)$ $-\frac{2}{7}$

23. $\log_2 x < -3$ $\left\{x \mid 0 < x < \frac{1}{8}\right\}$

24. $\log_8 (3x + 7) = \log_8 (2x - 5)$ **no solution**

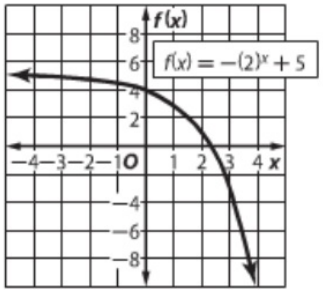
Mid-Chapter Quiz

1.



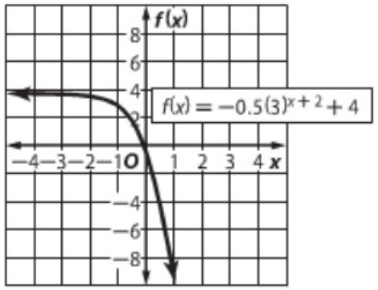
D = {all real numbers}; R = {$f(x) \mid f(x) > 0$}

2.



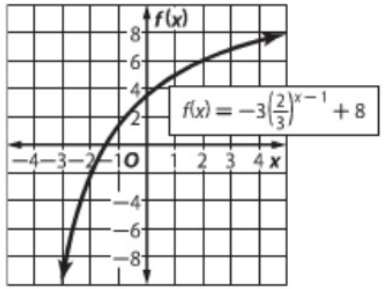
D = {all real numbers}; R = {$f(x) \mid f(x) < 5$}

3.



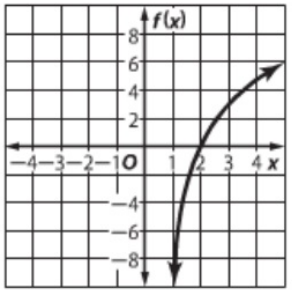
D = {all real numbers}; R = {$f(x) \mid f(x) < 4$}

4.



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

9.



10.