

PreCalculus: Section 4.2
Logarithmic Functions: Homework

Rewrite in exponential form.

1. $\log_3 81 = 4$

2. $\log_7 7 = 1$

3. $\log_{14} 1 = 0$

Rewrite in logarithmic form.

4. $5^3 = 125$

5. $9^{3/2} = 27$

6. $e^3 = 20.0855\dots$

Simplify each expression.

7. $7^{\log_7(x)}$

8. $10^{\log 8}$

9. $\log_2 32^x$

Evaluate each logarithm without using a calculator.

10. $\log_9 1$

11. $\log_2 64$

12. $\log_{1/2} 8$

13. $\log_5 625$

14. $\log_{16} 1/4$

15. $\log_6 1/36$

Graph the following and state the domain and range.

10. $\log_2 x - 3$

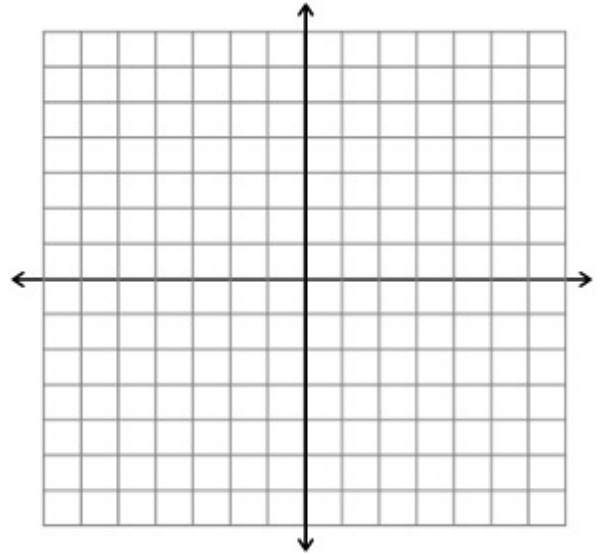
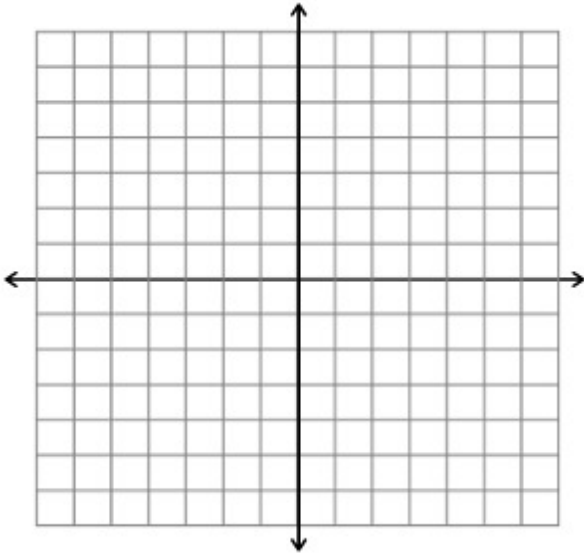
Domain:

Range:

11. $\log_5(x + 1) - 3$

Domain:

Range:

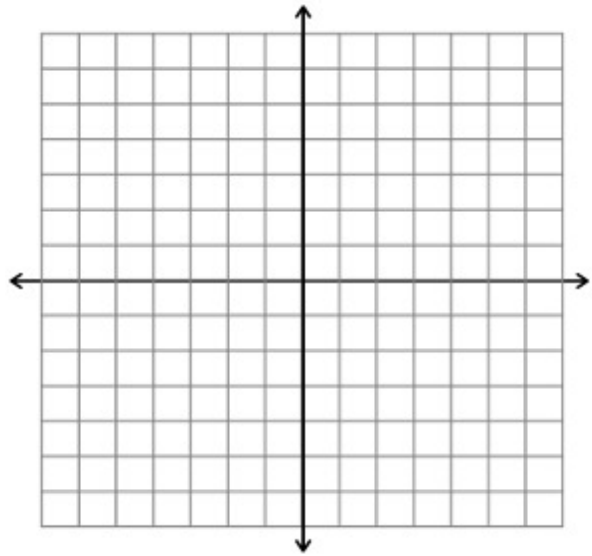


12. The wind speed s (in miles per hour) near the center of a tornado can be modeled by

$$s = 93 \log d + 65$$

where d is the distance (in miles) that the tornado travels. In 1925, a tornado traveled 220 miles through three states. Estimate the wind speed near the tornado's center.

13. Biologists have found that an alligator's length l (in inches) and weight w (in pounds) are related by the function $l = 27.1\ln w - 32.8$. Graph the function. Use your graph to estimate the weight of an alligator that is 10 feet long.



14. A study in Florida found that the number of fish species s in a lake can be modeled by the function $s = 30.6 - 20.5(\log A) + 3.8(\log A)^2$ where A is the area (in square meters) of the lake.

- Use a graphing utility to graph the function on the domain $200 \leq A \leq 35,000$.
- Use your graph to estimate the number of fish species in a lake with an area of 30,000 square meters.
- Use your graph to estimate the area of the lake that contains 6 species of fish.
- Describe what happens to the number of fish species as the area of the lake increases. Explain why your answer makes sense.