

# Graphing Exponential Functions

Algebra 1 • Section 11.1

Name: \_\_\_\_\_

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## Quick Review and Helpful Hints

Exponential models multiply by a constant factor over equal input intervals. Compare the initial value, multiplier, and long-term behavior before deciding what the model means.

▷ **Example:** Evaluate  $100(1.05)^2$ .

**Work:** Square the growth factor:  $1.05^2 = 1.1025$ . Then multiply:  $100(1.1025) = 110.25$ .

★ **Answer:** 110.25

## ◆ Practice Problems

Solve each problem. Show enough work that another student could follow your thinking.

1. Evaluate  $2^x$  at  $x = 5$ . \_\_\_\_\_

6. Describe  $y = 2^x + 4$ . \_\_\_\_\_

2. Find the initial value of  $y = 4(3)^x$ . \_\_\_\_\_

7. Describe  $y = 3(2)^x$  compared with  $y = 2^x$ . \_\_\_\_\_

3. Is  $y = 7(0.5)^x$  growth or decay? \_\_\_\_\_

8. Find  $y$  when  $x = -1$  for  $y = 10(2)^x$ . \_\_\_\_\_

4. Find  $y$  when  $x = 2$  for  $y = 5(2)^x$ . \_\_\_\_\_

9. Which point is on  $y = 2^x$ :  $(3, 8)$  or  $(3, 6)$ ? \_\_\_\_\_

5. Find the horizontal asymptote of  $y = 3^x$ . \_\_\_\_\_

10. Find the multiplier in  $y = 6(1.25)^x$ . \_\_\_\_\_

## ◆ Word Problems

11. A rumor triples each hour from 4 people. Write the model. \_\_\_\_\_

12. A sample halves every day from 160 grams. Write the model. \_\_\_\_\_



## Answer Keys

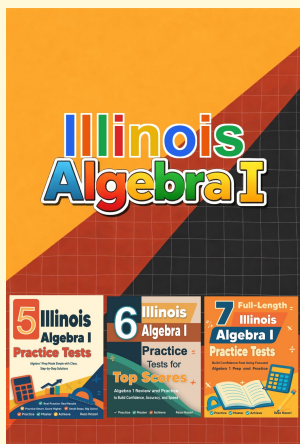
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|---------------|--------------------------|
| 1. 32         | 7. Vertical stretch by 3 |
| 2. 4          | 8. 5                     |
| 3. Decay      | 9. (3, 8)                |
| 4. 20         | 10. 1.25                 |
| 5. $y = 0$    | 11. $4 \cdot 3^h$        |
| 6. Shift up 4 | 12. $160(0.5)^d$         |

### Step-by-Step Explanations

- Multiply 2 by itself five times and you reach  $2^5 = 32$ .
- At  $x = 0$  the power  $3^0$  is just 1, so the output starts at the coefficient 4.
- With a base between 0 and 1, each step shaves the value down — so it's decaying.
- First  $2^2 = 4$ , then multiply by the 5 out front to get 20.
- As  $x$  runs negative,  $3^x$  keeps shrinking toward zero but never quite touches the  $x$ -axis.
- That +4 tacked on outside lifts every point of the graph up by 4.
- Multiplying the whole thing by 3 triples every output, stretching the graph tall.
- A negative exponent flips it, so  $2^{-1} = \frac{1}{2}$ , and  $10 \times \frac{1}{2} = 5$ .
- Check the rule:  $2^3 = 8$ , so (3, 8) is the one that actually lands on the curve.
- The base is the number doing the repeated multiplying, so here that's 1.25.
- Start with 4 people, and tripling each hour makes 3 the repeated multiplier.
- Begin at 160 grams, and cutting in half daily means multiplying by 0.5 each day.



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