

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

- | | |
|---------------|--------------------------|
| 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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