

Exponential Growth and Decay

Algebra 1 • Section 11.2

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.

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|---|-------|--|-------|
| 1. Write a growth model for 200 increasing by 5% each year. | _____ | 6. Find the decay factor for 35% decay. | _____ |
| 2. Write a decay model for 800 decreasing by 12% each year. | _____ | 7. Does $y = 4(1.2)^x$ show growth or decay? | _____ |
| 3. Evaluate $500(1.1)^2$. | _____ | 8. Does $y = 9(0.75)^x$ show growth or decay? | _____ |
| 4. Evaluate $1000(0.9)^3$. | _____ | 9. Find the initial value of $A = 350(1.04)^t$. | _____ |
| 5. Find the growth factor for 7% growth. | _____ | 10. What is the percent change in $y = 60(1.18)^x$? | _____ |

◆ Word Problems

11. A car worth \$20,000 loses 15% yearly. Write the model. _____
12. A population of 1,500 grows by 3% each year. Estimate after 2 years. _____



Answer Keys

- | | |
|---|--|
| <p>1. $200(1.05)^t$</p> <p>2. $800(0.88)^t$</p> <p>3. 605</p> <p>4. 729</p> <p>5. 1.07</p> <p>6. 0.65</p> | <p>7. Growth</p> <p>8. Decay</p> <p>9. 350</p> <p>10. 18% growth</p> <p>11. $20000(0.85)^t$</p> <p>12. 1,591.35</p> |
|---|--|

Step-by-Step Explanations

1. Going up 5% means you keep the whole amount plus a little more, so multiply by 1.05 every year.
2. Losing 12% leaves 88% behind, so the yearly multiplier is 0.88.
3. Two years of growth means multiplying by 1.1 twice: $1.1^2 = 1.21$, and $500 \times 1.21 = 605$.
4. Apply the 0.9 factor three times — $0.9^3 = 0.729$ — so 1000 shrinks to 729.
5. The factor is your starting whole, 1, plus the 0.07 you gain — so 1.07.
6. If 35% disappears, 65% stays — and that surviving share, 0.65, is your factor.
7. A base bigger than 1 makes each step larger than the last, so this one is growing.
8. When the base sits between 0 and 1, every multiply shrinks the value — that's decay.
9. At $t = 0$ the factor 1.04^0 equals 1, so the coefficient 350 is exactly where things start.
10. Read 1.18 as $1 + 0.18$ — that extra 0.18 is an 18% jump each step.
11. Drop 15% and 85% of the value carries over, so each year multiplies by 0.85.
12. Two years of 3% growth means 1500×1.03^2 ; since $1.03^2 = 1.0609$, you land at 1591.35.



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