Exponential Growth and Decay

Algebra 1 •Section 11.2

Name: _____	Date: _____	Score: _____ / 12

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. Write a growth model for 200 increasing by 5% each year.

_____

2. Write a decay model for 800 decreasing by 12% each year.

_____

3. Evaluate $500(1.1)^2$.

_____

4. Evaluate $1000(0.9)^3$.

_____

5. Find the growth factor for 7% growth.

_____

6. Find the decay factor for 35% decay.

_____

7. Does $y = 4(1.2)^x$ show growth or decay?

_____

8. Does $y = 9(0.75)^x$ show growth or decay?

_____

9. Find the initial value of $A = 350(1.04)^t$.

_____

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

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

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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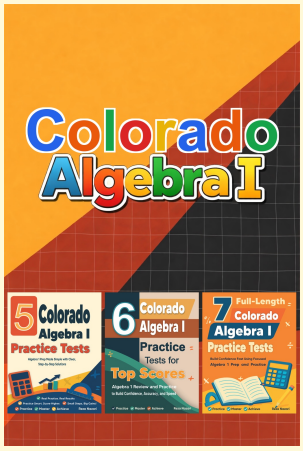

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