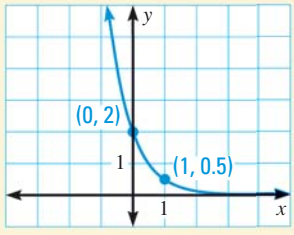
8 CHAPTER REVIEW

8.6 Write and Graph Exponential Decay Functions

pp. 531–538

EXAMPLE 1

Tell whether the graph represents *exponential growth* or *exponential decay*. Then write a rule for the function.



The graph represents exponential decay ($y = ab^x$ where $0 < b < 1$). The y-intercept is 2, so $a = 2$. Find the value of b by using the point (1, 0.5) and $a = 2$.

$y = ab^x$ **Write function.**

$0.5 = 2 \cdot b^1$ **Substitute.**

$0.25 = b$ **Solve for *b*.**

A function rule is $y = 2(0.25)^x$.

EXAMPLE 2

CAR VALUE A family purchases a car for \$11,000. The car depreciates (loses value) at a rate of about 16% annually. Write a function that models the value of the car over time. Find the approximate value of the car in 4 years.

Let V represent the value (in dollars) of the car, and let t represent the time (in years since the car was purchased). The initial value is 11,000, and the decay rate is 0.16.

$V = a(1 - r)^t$ **Write exponential decay model.**

$= 11{,}000(1 - 0.16)^t$ **Substitute 11,000 for *a* and 0.16 for *r*.**

$= 11{,}000(0.84)^t$ **Simplify.**

To find the approximate value of the car in 4 years, substitute 4 for t.

$V = 11{,}000(0.84)^t = 11{,}000(0.84)^4 \approx \$5477$

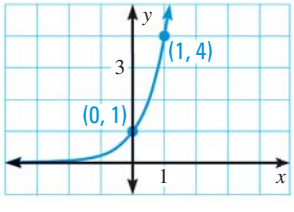
The approximate value of the car in 4 years is \$5477.

EXERCISES

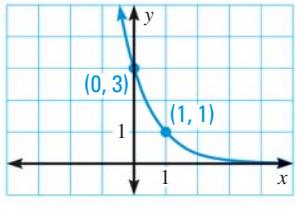
EXAMPLES 4 and 5 on pp. 533–534 for Exs. 40–42

Tell whether the graph represents *exponential growth* or *exponential decay*. Then write a rule for the function.

40.



41.



42. CAR VALUE The value of a car is \$13,000. The car depreciates (loses value) at a rate of about 15% annually. Write an exponential decay model for the value of the car. Find the approximate value of the car in 4 years.