HW Answers 10.3 Ex. 14,15,17-19,22,23,27 p.469

14. The value of a collectible baseball card is increasing at a rate of 0.5% per year. In 2000, the card was worth $1350. Find the value of the card in 2013.

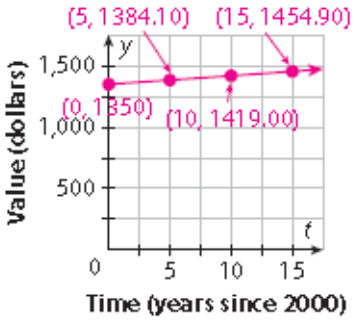
$y = a(1+r)^t = 1350(1.005)^t$

$y = 1350(1.005)^{13} \approx 1440.43$

After 13 years, the card will be worth approximately $1440.43.

Domain: $\{x|0 < x < \infty\}$ Range: $\{y|\ y > 0\}$

The y-intercept is 1350.00, the original value of the card in 2000.



15. The value of an airplane is depreciating at a rate of 7% per year. In 2004, the airplane was worth $51.5 million. Find the value of the airplane in 2013.

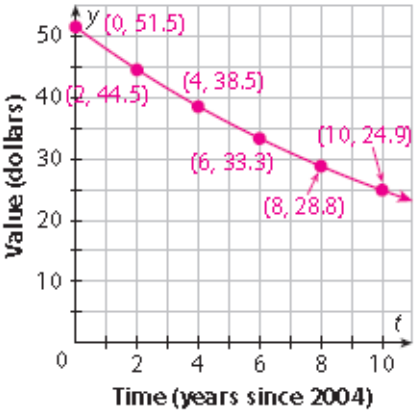
$y = a(1-r)^t = 51.5(0.93)^t$

$y = 51.5(0.93)^9 \approx 26.8$

After 9 years, the airplane will be worth approximately $26.8 million.

Domain: $\{x|0 < x < \infty\}$ Range: $\{y|\ y > 0\}$

The y-intercept is 51.5, the original value of the airplane in 2004.



17. The value of a couch is decreasing at a rate of 6.2% per year. In 2007, the couch was worth $1232. Find the value of the couch in 2014.

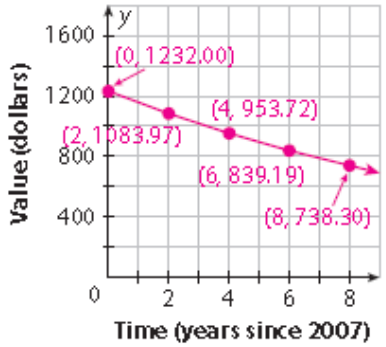
$y = a(1-r)^t = 1232(0.938)^t$

$y = 1232(0.938)^7 \approx 787.10$

After 7 years, the couch will be worth approximately $787.10.

Domain: $\{x|0 < x < \infty\}$ Range: $\{y|\ y > 0\}$

The y-intercept is 1232, the original value of the couch in 2007.



18. The population of a town is increasing at a rate of 2.2% per year. In 2001, the town had a population of 34,567. Find the population of the town in 2018.

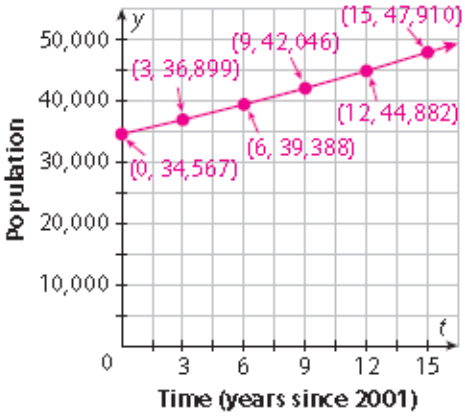
$y = a(1 + r)^t = 34{,}567(1.022)^t$

$y = 34{,}567(1.022)^{17} \approx 50{,}041$

After 17 years, the town will have about 50,041 people.

Domain: $\{x|0 < x < \infty\}$ Range: $\{y|\ y > 0\}$

The *y*-intercept is 34,567, the original population of the town in 2001.



19. A house is losing value at a rate of 5.4% per year. In 2009, the house was worth \$131,000. Find the value of the house in 2019.

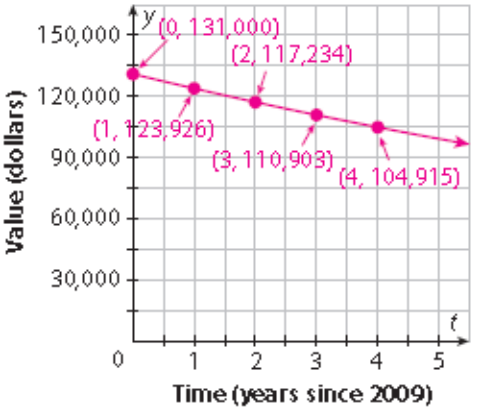
$y = a(1 - r)^t = 131{,}000(0.946)^t$

$y = 131{,}000(0.946)^{10} \approx 75{,}194$

After 10 years, the house will be worth about \$75,194.

Domain: $\{x|0 < x < \infty\}$ Range: $\{y|\ y > 0\}$

The *y*-intercept is 131,000, the original value of the house in 2009.



22. $A(t) = 9(0.4)^t$ and $B(t) = 0.6(1.4)^t$

The value of $A(t)$ is decreasing. The value of $B(t)$ is increasing. The initial value of $A(t)$ is greater than the initial value of $B(t)$. However, after about 2.2 units, the value of $B(t)$ becomes greater than the value of $A(t)$.

23. $A(t) = 547(0.32)^t$ and $B(t) = 324(3)^t$

The value of $A(t)$ is decreasing. The value of $B(t)$ is increasing. The initial value of $A(t)$ is greater than the initial value of $B(t)$. However, after about .2 units, the value of $B(t)$ becomes greater than the value of $A(t)$.

27. **Make a Conjecture** The value of a certain car can be modeled by the function $y = 18000(0.76)^t$, where t is time in years. Will the value of the function ever be 0?

The value of the function will never be 0 because the right side of the function is a product of positive numbers. Although the value can become extremely close to 0, it can never equal 0.