

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

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

## 6.2 Growth and Decay

### Homework

Name: \_\_\_\_\_

Date: \_\_\_\_\_ Block: \_\_\_\_\_

For each of the following situations write an equation to represent the situation and then answer the question.

- 1) Zeus Industries bought a computer for \$2500. It is expected to <sup>decay</sup> depreciate at a rate of 20% per year. What will the value of the computer be in 2 years?

$$y = 2500(1-0.2)^2$$

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$$y = \$1600$$

- 2) The Martins bought a condominium for \$85,000. Assuming that the value of the condo will <sup>growth</sup> appreciate at most of 5% a year, how much will the condo be worth in 5 years?

$$y = 85000(1+0.05)^5$$

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$$y \approx \$108,483.93$$

- 3) The Mendes family bought a new house 10 years ago for \$120,000. The house is now worth \$191,000. Assuming a steady rate of growth, what was the yearly rate of appreciation?

$$191000 = 120000(1+r)^{10}$$

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$$\sqrt[10]{1.5917} = \sqrt[10]{(1+r)^{10}}$$

$$1.0476 \approx r$$

rate of appreciation  
5%

- 4) Mr. Rogers purchased a combine for \$175,000 for his farming operation. It is expected to depreciate at a rate of 18% per year. What will be the value of the combine in 3 years?

$$y = 175000(1-0.18)^3$$

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$$y = \$96,489.40$$

- 5) The Jacksons bought a house for \$65,000 in 1992. Houses in the neighborhood have appreciated at a rate of 4.5% a year. How much is the house worth in 2003?  $t = 11$  years

$$\begin{array}{r} 2003 \\ - 1992 \\ \hline 11 \end{array}$$

$$y = 65000(1+0.045)^{11}$$

$$y = 65000(1.045)^{11}$$

$$y \approx \$105,485.45$$

- 6) In 1950, the population of black bears has been decreasing at the rate of 0.75% per year. In 1990, it was estimated that there were 400 black bears in the state. If the populations continues to decline at the same rate, what will the population be in 2010?  $t = 20$  years

$$y = 400(1 - .0075)^t$$

$$y = 400(1 - .0075)^{20}$$

$$y \approx \boxed{344 \text{ black bears}}$$

- 7) Scott invests \$8,500 in a certificate of deposit (CD). The interest is calculated on the money once per year. If the interest rate for the CD is 6.875% and he invests in a 1-year CD, how much money will he have at the end of the investment period?

$$y = 8500(1.06875)^t$$

$$y = 8500(1 + .06875)^1$$

$$y \approx \boxed{\$9,084.38}$$

- 8) When Emily was 18 months old, she had a 10-word vocabulary. By the time she was 5 years old (60 months), her vocabulary was 2,500 words. If her vocabulary increased at a constant percent per month, what was the rate of the increase?

$$r = ?$$

$$\boxed{2500 = 10(1+r)^{42}}$$

$$\frac{2500}{10} = \frac{10(1+r)^{42}}{10}$$

$$250 = (1+r)^{42}$$

$$.14 \approx r$$

$$\frac{60 \text{ month} - 18 \text{ month}}{42}$$

$$\boxed{\text{rate of increase } r = 14\%}$$

- 9) Martin bought a painting for \$5,000. It is expected to appreciate at 4% per year. How much will the painting be worth in 6 years?

$$y = 5000(1.04)^t$$

$$y = 5000(1 + .04)^6$$

$$y \approx \boxed{\$6326.60}$$

- 10) At a wholesale food distribution center, the price of sugar has increased 6.3% annually since 1980. Supposed sugar cost \$0.43 per pound in 1980 and this growth continues. What will a pound of sugar cost in 2017? Round to the nearest cent.

$$t = 37$$

$$y = .43(1.063)^t$$

$$y = .43(1 + .063)^{37}$$

$$y \approx \boxed{\$4.12 \text{ per pounds}}$$