Name **Key** Date _____ Class _____
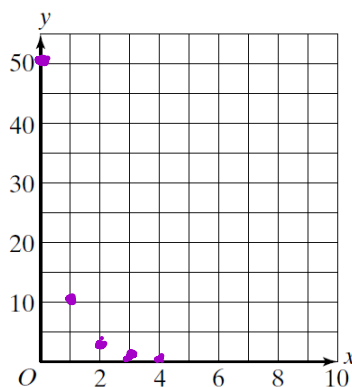
Skill: Exponential Growth and Decay

Growing, Growing, Growing

1. Complete the table for integer values of x from 0 to 4. Then graph the function.

$$y = 50(0.2)^x$$

x	y	(x, y)
0	50	$(0, 50)$
1	10	$(1, 10)$
2	2	$(2, 2)$
3	0.4	$(3, 0.4)$
4	0.08	$(4, 0.08)$

Write an exponential function to model each situation. Find each amount after the specified time.

2. Suppose the acreage of forest is decreasing by 2% per year because of development. If there are currently 4,500,000 acres of forest, determine the amount of forest land after each of the following.

a. 3 years
$y = 4,500,000(.98)^3$
$y = 4,235,364$
acres

b. 5 years
$y = 4,500,000(.98)^5$
$y = 4,067,643.6$
acres

c. 10 years
$y = 4,500,000(.98)^{10}$
$y = 3,676,827.6$
acres

d. 20 years
$y = 4,500,000(.98)^{20}$
$y = 3,004,235.9$
acres

3. A $10,500 investment has a 15% loss each year. Determine the value of the investment after each of the following.

a. 1 year
$y = 10,500(.85)^1$
$y = \$8925$

b. 2 years
$y = 10,500(.85)^2$
$y = \$7586.25$

c. 4 years
$y = 10,500(.85)^4$
$y = \$5481.07$

d. 10 years
$y = 10,500(.85)^{10}$
$y = \$2067.18$

4. A city of 2,950,000 people has a 2.5% annual increase in population. Determine the city's population after each of the following.

a. 1 year
$y = 2,950,000(1.025)^1$
$y = 3,023,750$
people

b. 5 years
$y = 2,950,000(1.025)^5$
$y = 3,337,654$
people

c. 15 years
$y = 2,950,000(1.025)^{15}$
$y = 4,272,479$
people

d. 25 years
$y = 2,950,000(1.025)^{25}$
$y = 5,469,135$
people

5. A $25,000 purchase decreases 12% in value per year. Determine the value of the purchase after each of the following.

a. 1 year
$y = 25,000(.88)^1$
$y = \$22,000$

b. 3 years
$y = 25,000(.88)^3$
$y = \$17,036.80$

c. 5 years
$y = 25,000(.88)^5$
$y = \$13,193.30$

d. 7 years
$y = 25,000(.88)^7$
$y = \$10,216.89$

6. $20,000 is invested at an interest rate of 4.8%. The investor has the option of having the interest compounded yearly or quarterly. Determine the value of the account for both quarterly and annually compounded interest after each of the following.

   a. 1 year   b. 5 years   c. 10 years   d. 20 years

Yearly

$y = 20{,}000(1.048)^1$
$y = \$20{,}960$

$y = 20{,}000(1.048)^5$
$y = \$25{,}283.45$

$y = 20{,}000(1.048)^{10}$
$y = \$31{,}962.65$

$y = 20{,}000(1.048)^{20}$
$y = \$51{,}080.56$

Quarterly

$y = 20{,}000(1.012)^4$
$y = \$20{,}977.42$

$y = 20{,}000(1.012)^{20}$
$y = \$25{,}388.69$

$y = 20{,}000(1.012)^{40}$
$y = \$32{,}229.27$

$y = 20{,}000(1.012)^{80}$
$y = \$51{,}936.30$

7. The mosquito population at Morse's Pond was increasing at a rate of 150% each week. If there were 2000 mosquitos at the beginning of June, how many mosquitos could we expect there to be four weeks later?

GF = 1 + Rate
GF = 1 + 1.5
GF = 2.5

$$y = 2000(2.5)^4$$
$$y = 78{,}125$$
Mosquitos