<u>**Lesson 1.8 Notes**</u>

Write a recursive and explicit equation to represent each situation.

1) Steven invested $3,000 in an account that earns 1.2% interest per month.

   An increase of 1.2% per month means we want 101.2% of the amount of money in the account each month. So, our growth factor is 1.012.

   $f(x) = 1.012^x \cdot 3000$ where x is the number of months since the account was opened.

2) Sherri invests $2,000 into an account that earns 6.5% interest per year.

   An increase of 6.5% per year means we want 106.5% of the amount of money in the account each year. So, our growth factor is 1.065.

   $g(x) = 1.065^x \cdot 2000$ where x is the number of years since the account was opened.

3) Will Sherri or Steven have more money after 2 years?

   We will need to find $f(24)$, since Steven has invested for 24 months after two years, and $g(2)$, since Sherri has invested for two years.

   $f(24) = 1.012^{24} \cdot 3000$

   $f(24) = 3994.42$

   $g(2) = 1.065^2 \cdot 2000$

   $g(2) = 2268.45$

   Steven will have more money after two years and will continue to out earn Sherri.

4) A pool is filled with algae (about 2,500 square feet worth of algae). Gerry adds an algicide that reduces the amount of algae by 50% per hour.

   Decreasing the amount of algae by 50% per hour also means that 50% of the algae will remain (100-50=50). So, our decay factor will be .5.

   $f(x) = .5^x \cdot 2500$

5) Ashley's company doesn't like using as much chemical as Gerry's company. She also has a job that requires her to get rid of some nasty pool water. Ashley decides to drain the 2,500 gallon pool. The amount of water in the pool decreases by 75% per hour.

   Decreasing the amount of water by 75% per hour means that 25% of the water will remain (100-75=25). So, our decay factor will be .25.

   $g(x) = .25^x \cdot 2500$

6) Ashley needs to refill her pool. The water in the pool increases by 3 gallons per minute.

   The pool refilling at a rate of 3 gallons per minute is arithmetic. We know that the pool is empty once it starts refilling. So, the initial value is zero.

   $h(x) = 3x$

Write an explicit equation for each recursive function.

1) $f(x) = f(x-1) + 6, f(1) = 7$

$\qquad f(0) = 7 - 6 = 1$

$\qquad f(x) = 6x + 1$

2) $f(x) = f(x-1) \cdot 6, f(1) = 7$

$\qquad f(0) = 7 \div 6 = \dfrac{7}{6}$

$\qquad f(x) = 6^x \cdot \dfrac{7}{6}$

3) $f(x) = f(x-1) - 6, f(1) = 7$

$\qquad f(0) = 7 + 6 = 13$

$\qquad f(x) = -6x + 13$

4) $f(x) = f(x-1) \cdot \dfrac{1}{6}, f(1) = 7$

$\qquad f(0) = 7 \div \dfrac{1}{6} = 42$

$\qquad f(x) = \left(\dfrac{1}{6}\right)^x \cdot 42$

Write a recursive function for each explicit function.

1) $f(x) = 9x - 12$

$\qquad f(x) = f(x-1) + 9$

$\qquad f(0) = -12$

2) $f(x) = -9x + 12$

$\qquad f(x) = f(x-1) - 9$

$\qquad f(0) = 12$

3) $f(x) = 9^x \cdot \dfrac{1}{12}$

$\qquad f(x) = f(x-1) \cdot 9$

$\qquad f(0) = \dfrac{1}{12}$

4) $f(x) = \left(\dfrac{1}{9}\right)^x \cdot -12$

$\qquad f(x) = f(x-1) \cdot \dfrac{1}{9}$

$\qquad f(0) = -12$

<u>Other important notes from today:</u>

Fill in the blanks for each table, then write the recursive and explicit equation for each sequence.

1) .

x	y
1	4
2	16
3	64
4	256
5	1,024

Recursive:

$f(0) = 1$

$f(x) = f(x-1) \cdot 4$

Explicit:

$f(x) = 4^x$

5	11

2) .

x	y
1	3
2	5
3	7
4	9

Recursive:

$f(0) = 1$

$f(x) = f(x-1) + 2$

Explicit:

$f(x) = 2x + 1$

3) .

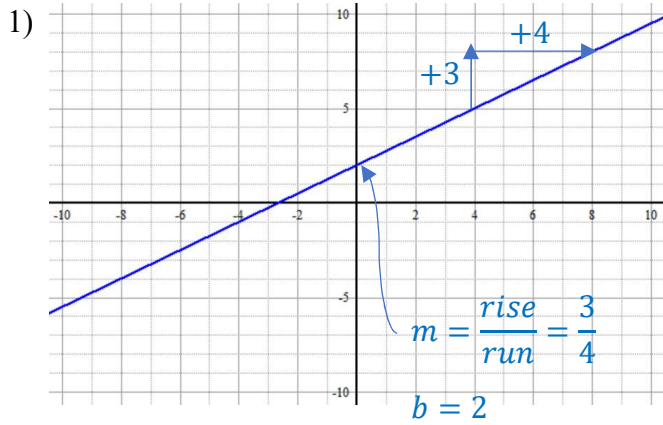| x	y
1	-64
2	-16
3	-4
4	-1
5	$-\dfrac{1}{4}$

Recursive:

$f(0) = -256$

$f(x) = f(x-1) \cdot \dfrac{1}{4}$
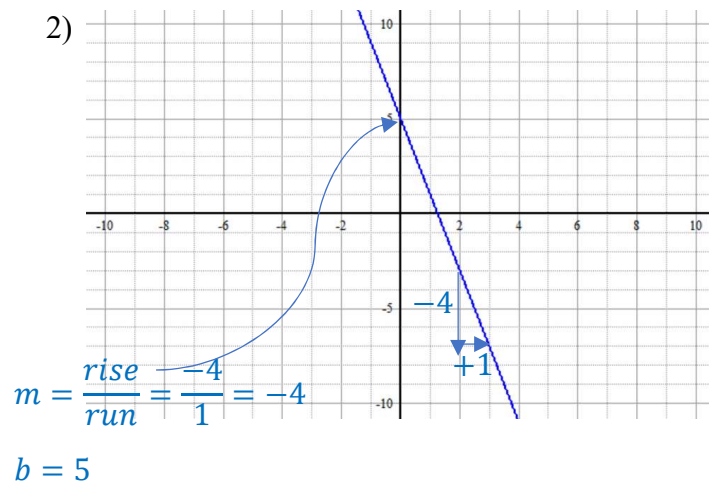
Explicit:

$f(x) = \left(\dfrac{1}{4}\right)^x \cdot (-256)$

Write each equation of the line in $y = mx + b$ form.

1)

$$m = \frac{rise}{run} = \frac{3}{4}$$

$$b = 2$$

Equation: $y = \frac{3}{4}x + 2$

2)

$$m = \frac{rise}{run} = \frac{-4}{1} = -4$$

$$b = 5$$

Equation: $y = -4x + 5$