1. Pick up the new Recording Sheet. (write yesterday's assignment on it)

2. Pick up the solutions (they are green) and check your work

3. and grab a piece of candy if you like

Handout

Arithmetic Sequences

$\boxed{1}$

A

$7, \ 17, \ 27, \ 37, \ldots$

⓪ ① ② ③ ④ ⑤

$\cancel{7(10)^{n-1}}$

zero term format $t(n) = -3 + 10(n)$

first term format $t(n) = 7 + 10(n-1)$

$t(50) = -3 + 10(50)$
$= 497$

$t_{50} = 7 + 10(50-1)$
$= 497$

B

90, 85, 80, 75, ...

$t(n) = \cancel{-5n + 90}$ $95 - 5n$ ← 0 term

or $t(n) = 90 - 5(n-1)$ ← 1st term

$t(26) = 90 - 5(26-1)$

$= -35$

C

n	t(n)
1	5.75
2	6.00
3	6.25
4	6.50
5	6.75

1st $t_n = 5.75 + .25(n-1)$

0 term $t_n = 5.5 + 0.25(n)$

Is it possible for $t(n) = 42$

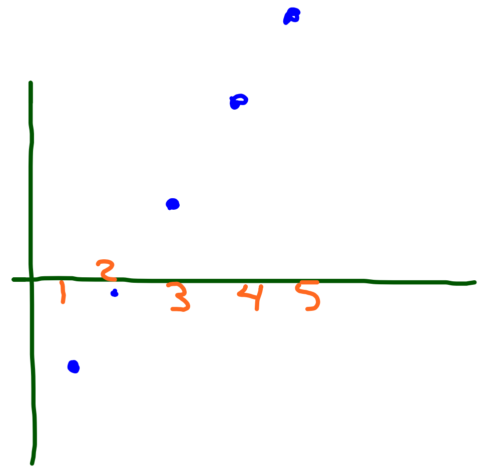
$t(n) = 3n - 7$

$42 = 3n - 7$

$+7 \qquad +7$

$49 = 3n$

$n = \frac{49}{3} \approx 16.3$



2 **Consider the sequence** $t(n) = -4, -1, 2, 5, \ldots\ldots 42$

A. Write the equation for the sequence, $t(n)$.

1st term $\quad t(n) = -4 + 3(n-1)$

$t(n) =$

B. Is it possible for $t(n)$ to equal 42 ?

$42 = -4 + 3(n-1) \qquad 49 = 3n$

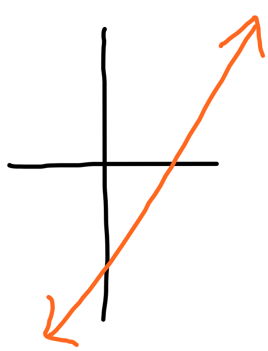
$42 = -4 + 3n - 3 \qquad n = \frac{49}{3} = 16.3$

Not whole so 42 is not a member of tn

C. For the function $f(x) = 3x - 7$, is it possible for $f(x)$ to equal 42 ?

On the other hand....

(c) Is it possible for the function $f(x) = 42$?



Yes, because the domain of $f(x) = 3x - 7$ is all real numbers

so $\frac{49}{3}$ can be an answer

3 **Complete the table for the <u>geometric</u> sequence. Then, write sequence formulas in both first term and zero term formats.**

0	
1	
2	
3	49
4	
5	
6	16807
7	

m, m, m

$49 \cdot m \cdot m \cdot m = 16807$

$49m^3 = 16807$

$\sqrt[3]{m^3} = \sqrt[3]{\frac{16807}{49}}$

$m = 7$

4 **Benjamin is stuck on the problem shown below. Examine his work so far and help him by showing and explaining the remaining steps.**

Original problem: Simplify $(3a^{-2}b)^3$.

$3(\ \ + \ \ )$

He knows that $(3a^{-2}b)^3 = (3a^{-2}b)(3a^{-2}b)(3a^{-2}b)$. Now what?

$3 \cdot 3 \cdot 3\, a^{-2} a^{-2} a^{-2} \cdot b b b$

$27a^{-6}b^3 = \boxed{\frac{27b^3}{a^6}}$

Original problem: Simplify $(3a^{-2}b)^3$.

He knows that $(3a^{-2}b)^3 = (3a^{-2}b)(3a^{-2}b)(3a^{-2}b)$. Now what?

$\downarrow$

$3 \cdot a^{-2} \cdot b \bullet 3 \cdot a^{-2} \cdot b \bullet 3 \cdot a^{-2} \cdot b$

After Test Assignment

Name _______________________ Date _____

this will count as the first assignment for the next Unit.

1) Find the missing terms of the sequence and write a sequence formula in both *zero term* and *first term* format.

a) ____, ____, 125, ____, ____, ... (hint: the multiplier is 1.25)

first term format: $t_n =$ ________________ zero term format: $t_n =$ ________________

b) 4000, 1000, 250, ____, ____, ...

first term format: $t_n =$ ________________ zero term format: $t_n =$ ________________

After Test Assignment

Name Key Date ____

this will count as the first assignment for the next Unit.

1. Find the missing terms of the sequence and write a sequence formula in both *zero term* and *first term* format.

a) 80, 100, 125, 156.25, 195.3125, ... (hint: the multiplier is 1.25)

first term format: $t_n = 80(1.25)^{n-1}$ zero term format: $t_n = 64(1.25)^n$

b) 4000, 1000, 250, 62.5, 15.625, ...

$\frac{1000}{4000} = \frac{1}{4}$ $\frac{250}{1000} = \frac{1}{4}$

first term format: $t_n = 4000\left(\frac{1}{4}\right)^{n-1}$ zero term format: $t_n = 16{,}000\left(\frac{1}{4}\right)^n$

or $4000(0.25)^{n-1}$

2. Several customers at a fancy restaurant were reporting food poisening. A biologist named Tina was recording bacteria growth on the cooking surfaces. She is trying to predict the amount of bacteria after 20 hours. Unfortunately she lost the count after the first hour and forgot to record count at six hours.

a) Determine the missing counts.

b) Write a sequence formula, using the notation, "$t_n =$" that models the growth after n hours.

c) Use your formula to calculate the predicted bacteria counts after 20 hours.

hours	# bacteria
1	
2	10
3	25
4	62.5
5	156.25
6	

(2) Several customers at a fancy restaurant were reporting food poisening. A biologist named Tina wa recording bacteria growth on the cooking surfaces. She is trying to predict the amount of bacteria hours. Unfortunately she lost the count after the first hour and forgot to record count at six hours.

a) Determine the missing counts.

hours	# bacteria
1	4
2	10
3	25
4	62.5
5	156.25
6	390.625

b) Write a sequence formula, using the notation, "$t_n =$" that models the growth after n hours.

$$t_n = 4(2.5)^{n-1}$$

c) Use your formula to calculate the predicted bacteria counts after 20 hours.

$$t_{20} = 4(2.5)^{20-1} = 145{,}519{,}152$$

(3) Challenge:
Determine a formula for the geometric sequence:

n	t_n
1	
2	68
3	
4	~~768.08~~ 786.08
5	

$$68 \cdot r \cdot r = 786.08$$

$$68r^2 = 786.08$$

$$r^2 =$$

$$r = 3.4$$

Four Day Unit

Transfer Skill Review from Alg/Geom

before starting Chapter 2

Today's AIM:

- Percent Growth
  (as related to sequences and exponential functions)
  requires geometric thinking

- A few tidbits about negative exponents

Notes

Percent Growth (or decay)

example (A)

Grow by 15 %

$t_n = \cancel{120(1.15)(n-1)}$
$120(1.15)^{n-1}$

120, __, __, __

multiplier: 1.15

100% + 15%
115%
1.15

$\underline{120}$, ___, ___, ___, ___

$120 \times 1.15 = 138$

$\underset{1}{\underline{120}}, \underset{2}{\underline{138}}, \underset{3}{\underline{158.7}}, \underset{4}{\underline{182.505}}, \ldots$

$t_n =$

example (B)

10,000 zero term

3% decrease

$100\% - 3\%$

97%

mult .97

10,000 , ___ , ___ , ___

$t(n) = 10000(.97)^n$

$f(x) = 10000(.97)^x$

example (C)

t=weeks

Start with 1000 at 6.5% growth

must be the zero term

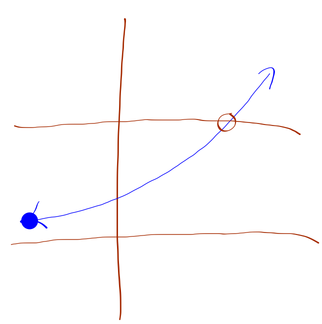
Write a formula.

$f(t) = 1000(1.065)^t$

How many weeks would it take to reach 80,000

$1000(1.065)^t = 80{,}000$

$\underbrace{1.065^t}_{Y_1} = \underbrace{80}_{Y_2}$



In about 69.6 weeks