

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

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

**Arithmetic Sequence**

$$a_n = a_1 + d(n-1)$$

**Geometric Sequence**

$$a_n = a_1(r)^{n-1}$$

**Exponential Equation**

$$y = ab^x$$

Determine if you should write an arithmetic, geometric, or exponential equation to solve the problem. Then solve.

1. Your brother tells you a secret. You see no harm in telling two friends. After this second "passing" of the secret, 4 people now know the secret (your brother, you and two friends). If each of these friends now tells two new people, after the third "passing" of the secret, eight people will know. Write an **equation** to express the "passing" of the secret. If this pattern of spreading the secret continues, how many people will know the secret after 10 such "passings"?

Arithmetic Sequence,  
Geometric Sequence,  
Or Exponential Equation?

$$y = a(b)^x$$

$$y = 1(2)^x$$

0	1	2	3	4
1	2	4	8	16

$$y = 1(2)^{10} = 1024 \text{ people}$$

2. After making his first deposit, Paul has \$758 in his checking account. The next month, the balance is \$836. The balance after the third month is \$914. Write a **sequence** to represent this scenario.

Arithmetic Sequence,  
Geometric Sequence,  
Or Exponential Equation?

1	2	3
758	836	914

$$a_n = 758 + 78(n-1)$$

$$= 758 + 78n - 78$$

$$a_n = 78n + 680$$

3. The table shows the number of people at a school who caught the flu each month after the flu shot was given. Write a **sequence** to represent the scenario. How many people will catch the flu 10 months after the shot was given?

Month	1	2	3	4	5
# of People	30	25	20	15	10

Arithmetic Sequence

$$a_n = 30 - 5(n-1)$$

$$a_n = 30 - 5n + 5$$

$$a_n = -5n + 35$$

$$a_{10} = -5(10) + 35$$

$$a_{10} = -15$$

↳ can't have -15 people

4. Alexis was working in the biology lab on her cell project. She started her experiment with 500,000 cells. Every day, the cells die by a third. Write an **equation** to represent how many cells would be left after each day. How many days will Alexis have until there are less than 100 cells left?

Exponential Equation

$$y = 500,000 \left(\frac{1}{3}\right)^x$$

7	228.62
8	76.21

← 8 days

5. It's time to call the exterminator! You found out that the number of termites under your house is tripling every week. If you have 8 termites on week 1, find the following:

Geometric Sequence

- a. A **sequence** to show the growth of termites.
- $$a_n = 8(3)^{n-1}$$

- b. The number of termites after 12 weeks (yikes!!).

$$a_{12} = 8(3)^{11} = 1417176 \text{ termites}$$



6. The following table represents how the amount of caffeine in your system each hour after drinking a grande coffee.

Exponential Equation

a. Write an equation based on the information:

$$y = 330 \left(\frac{1}{2}\right)^x$$

b. How many hours would it take to have less than 1mg of caffeine left in your system?

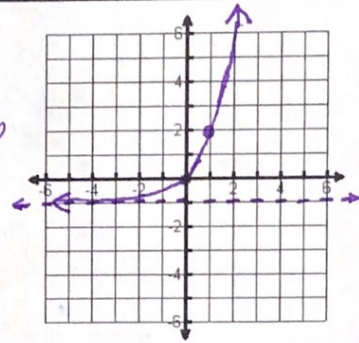
9 days

x	c(x)
0	330
1	165
2	82.5
3	41.25
4	20.625

7.  $y = (3)^x - 1$

Asymptote:  $y = -1$

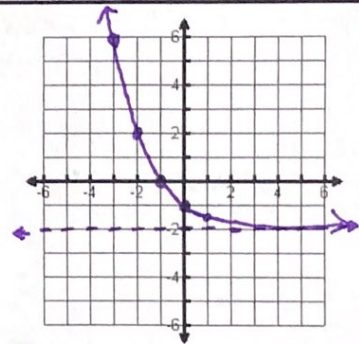
x	y
-3	$-27/27 \approx -0.96$
-2	$-8/9 \approx -0.88$
-1	$-2/3 \approx -0.66$
0	0
1	2



8.  $y = \left(\frac{1}{2}\right)^x - 2$

Asymptote:  $y = -2$

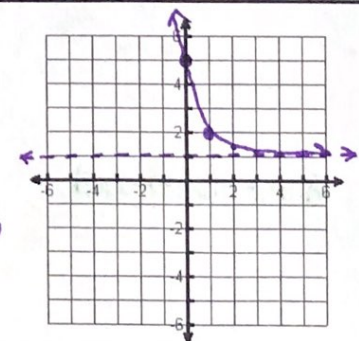
x	y
-3	6
-2	2
-1	0
0	-1
1	-3/2



9.  $y = 4\left(\frac{1}{4}\right)^x + 1$

Asymptote:  $y = 1$

x	y
0	5
1	2
2	$5/4 = 1.25$
3	$17/16 = 1.0625$
4	$49/16 = 1.015$



10.  $y = -(3)^x - 4$

Asymptote:  $y = -4$

x	y
-4	-4.01
-3	-4.04
-2	$-81/9 = -4.1$
-1	$-13/3 = -4.3$
0	-5
1	-7

