Essential Question: How can we distinguish between arithmetic and geometric sequences?

Do Now:

- i) Identify each sequence as arithmetic, geometric or neither.
- ii) If arithmetic, identify the common difference. If geometric, identify the common ratio.

A. 12, 18, 27, 40.5, ...

geometric

1.5

B. -123, -137, -151, -165, ...

arithmetic

d = -14

C. 3, 7, 15, 31, ...

neither

D. 1, $\frac{1}{4}$, $\frac{1}{16}$, $\frac{1}{64}$, ...

geometric

r= 4

STOP HERE



1. For letters A. and B. above, write an equation that can be used to find the **nth** term of the sequence. $a_1 = 12$ $a_2 = -123$

12, 18, 27, 40.5, ... r = 1.5

 $-123, -137, -151, -165, \dots$ d = -14

A. $a_n = 12(1.5)^{n-1}$

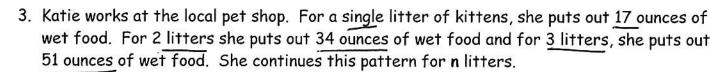
- B. an = -123 -14 (n-1)
- 2. Using your equation, find the 10th term in each sequence.

$$a_{10} = 12(1.5)^{10-1}$$

$$= 12(1.5)^{9}$$

$$= 461.3203125$$

$$a_{10} = -123 - 14(10 - 1)$$
 $a_{10} = -123 - 14(9)$
 $a_{10} = -249$



a) Write an equation that can be used to find the number of ounces of wet food (an).

Katie will put out for litters of kittens.

$$\frac{n}{a_n} \frac{1}{17} \frac{2}{34} \frac{3}{51}$$

$$a_1 = 17$$

ounces 7 b) How much wet food will Katie put out if there are 8 litters of kittens in the store?

$$a_8 = 17 + 17(8-1)$$

4. A soup kitchen makes 16 gallons of soup every two weeks. Each day they serve 25% of the soup that remains from the previous day. The table below shows how much soup (f(n), remains after n)days.

(-i `	<i></i>		
# days	'n	1	2	3
	f(n)	12	9	6.75

Soup in a Write an equation that can be used to find the number of gallons of soup remaining after n days.

$$f(n) = 12(.75)^{n-1}$$

b) How many gallons of soup remain after the 12^{th} day? Round your answer to the nearest tenth.

$$f(12) = 12(.75)^{12-1}$$

 $f(12) = 12(.75)^{11}$
 $f(12) = .5$

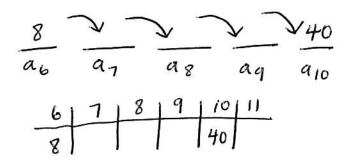
c) On what day is there about 2 gallons of soup left?

$$7$$

$$2 = 12(.75)^{n-1}$$
First, put this in the calculator
$$y = 12(.75)^{x-1}$$

Then, look at the y column in the table of values. when is it closest to 2? The 7th day

5. Write an explicit rule for an arithmetic sequence if $a_6 = 8$ and $a_{10} = 40$.



To find the common difference, subtract the numbers and divide by the number of places. Find the R.O.C.

$$\frac{\Delta y}{\Delta x} = \frac{40 - 8}{10 - 6} \rightarrow \frac{32}{4} \rightarrow 8$$

$$d = 8$$

Find the 20th term

$$a_n = -32 + 8(n-1)$$

 $a_{20} = -32 + 8(20-1)$
 $a_{20} = 120$

6. Write an explicit rule for a geometric sequence if $a_3 = 10$ and $r = \frac{1}{2}$.

