



**Objective:** Graphing Piecewise Functions

**Homework FN8 – The Cat’s Piecewise Exploration Worksheet**

**Do Now: Sequences**

1. Arithmetic or geometric? 2. Common ratio / difference? 3. Find the next two terms.	A) $8, 2, \frac{1}{2}, \frac{1}{8} \dots$	B) 14, 23.5, 33, 42.5...
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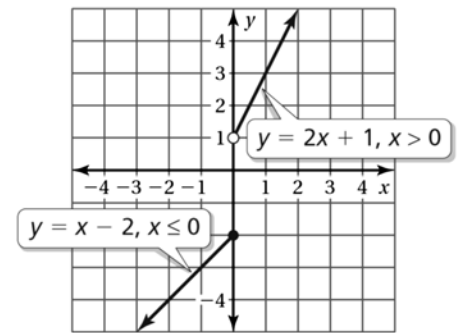
**Exam Prep:** The sequence to the right is:  $-14, -14, -14, -14 \dots$

- a) geometric w/ common ratio of 1.
- b) arithmetic w/ common difference of 1.
- c) geometric w/ common ratio of 0.
- d) arithmetic w/ common difference of 0.

A **piecewise function** is a function made up of two or more equations. Each piece applies to a different part of its domain.

$$y = \begin{cases} x - 2, & \text{if } x \leq 0 \\ 2x + 1, & \text{if } x > 0 \end{cases}$$

- The expression  $x - 2$  gives the value of  $y$  when  $x$  is less than or equal to 0.
- The expression  $2x + 1$  gives the value of  $y$  when  $x$  is greater than 0.
- Notice the Circles!!



**Practice: Graph the piecewise function and find its domain and range**

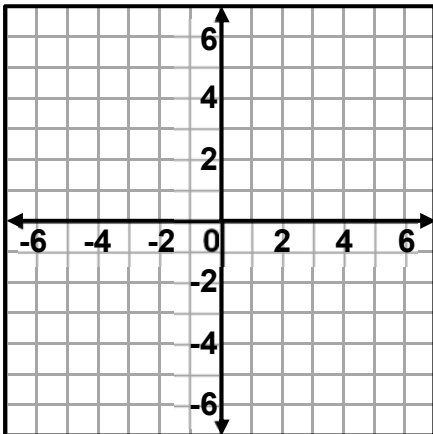
<p>1.</p> $y = \begin{cases} \frac{1}{2}x + 4, & \text{if } x < 2 \\ -\frac{1}{2}x + 2, & \text{if } x \geq 2 \end{cases}$ <p>Domain:</p> <p>Range:</p>	<p>2.</p> $y = \begin{cases} 3, & \text{if } x < -3 \\ x + 1, & \text{if } x \geq 0 \end{cases}$ <p>Domain:</p> <p>Range:</p>	<p>3.</p> $f(x) = \begin{cases} 3, & \text{if } x \leq 1 \\ 2x - 5, & \text{if } 1 < x \leq 3 \\ -x + 4, & \text{if } x < 3 \end{cases}$ <p>Domain:</p> <p>Range:</p>
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4. 
$$y = \begin{cases} -\frac{1}{3}x - 5, & \text{if } x < 0 \\ \frac{1}{3}x - 5, & \text{if } x \geq 0 \end{cases}$$

Domain:

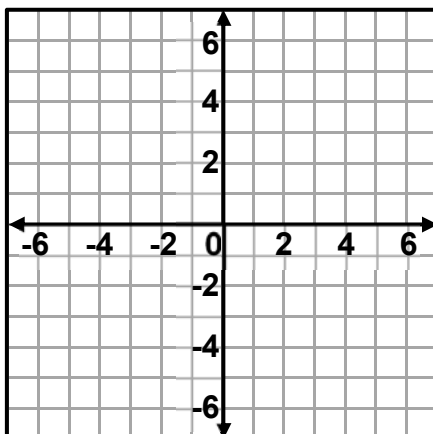
Range:



5. 
$$y = \begin{cases} 2x + 3, & \text{if } x < 1 \\ 4x - 6, & \text{if } x \geq 1 \end{cases}$$

Domain:

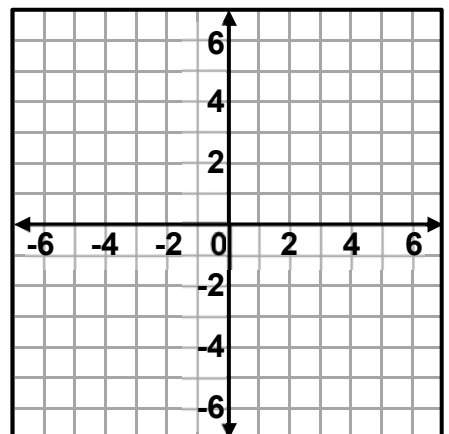
Range:



6. 
$$f(x) = \begin{cases} -x, & \text{if } x \leq -2 \\ 2, & \text{if } -2 < x < 1 \\ 2x - 3, & \text{if } x \geq 1 \end{cases}$$

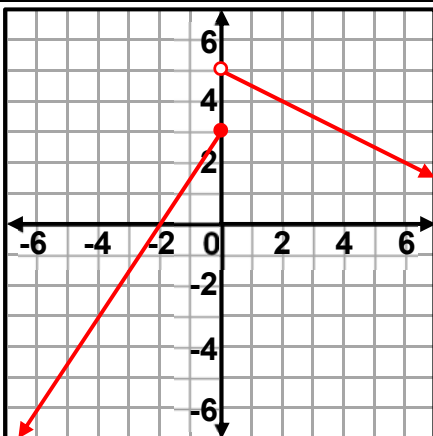
Domain:

Range:

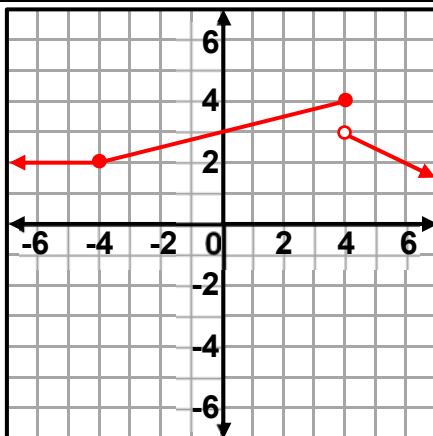


Practice: Write the piecewise function

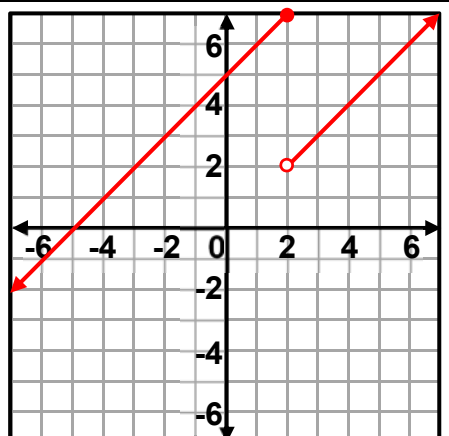
1.  
 $f(x) =$



2.  
 $y =$



3.  
 $f(x) =$



Application: A step function is a piecewise function defined by constant values over its domain. The graph of a step function consists of a series of line segments.

You rent a karaoke machine for 5 days. The rental company charges \$50 for the first day and \$25 for each additional day. Write and graph a step function that represents the relationship between the number of days  $x$  and the total cost of renting the karaoke machine.

Time (days)	Total Cost
$0 < x \leq 1$	50
$1 < x \leq 2$	75
$2 < x \leq 3$	100
$3 < x \leq 4$	125
$4 < x \leq 5$	150

$$f(x) = \begin{cases} 50, & \text{if } 0 < x \leq 1 \\ 75, & \text{if } 1 < x \leq 2 \\ 100, & \text{if } 2 < x \leq 3 \\ 125, & \text{if } 3 < x \leq 4 \\ 150, & \text{if } 4 < x \leq 5 \end{cases}$$

Karaoke Machine Rental

