




Objective: Graphing Piecewise Functions

Homework FN8 – The Cat's Piecewise Exploration Worksheet

Do Now: Sequences

<ol style="list-style-type: none"> 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) $14, 23.5, 33, 42.5, \dots$
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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.



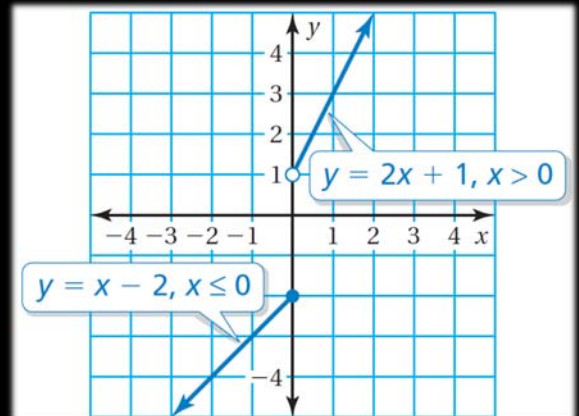
Take your linear equations and put them together or I will crap on you.

WHAT YOU KNOW: $y = mx + b$ (AGAIN!) and Domains with interval notation

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

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

Domain:

Range:

2.
$$y = \begin{cases} 3, & \text{if } x < -3 \\ x + 1, & \text{if } x \geq 0 \end{cases}$$

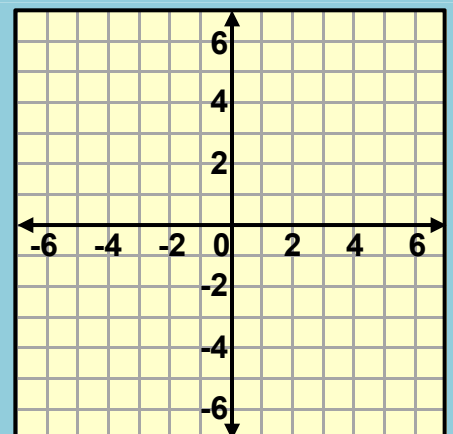
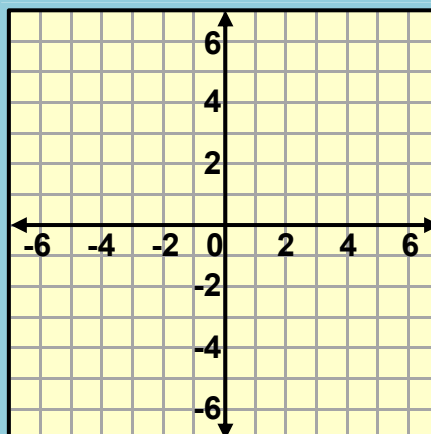
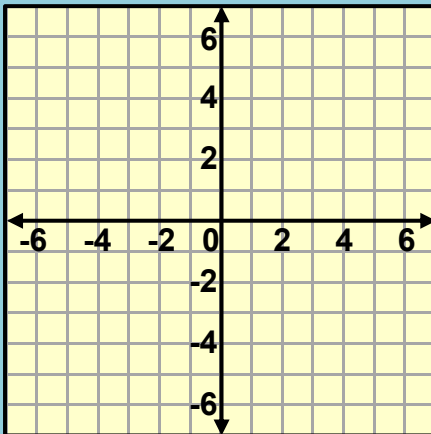
Domain:

Range:

3.
$$f(x) = \begin{cases} 3, & \text{if } x \leq 1 \\ 2x - 5, & \text{if } 1 < x \leq 3 \\ -x + 4, & \text{if } x < 3 \end{cases}$$

Domain:

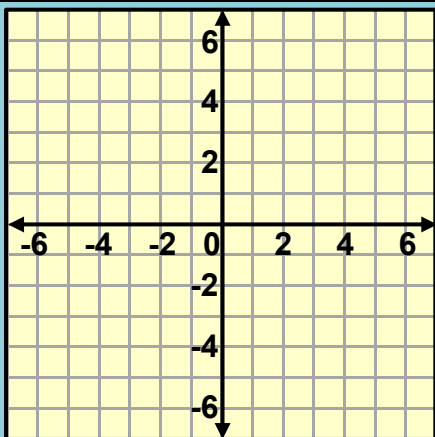
Range:



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:

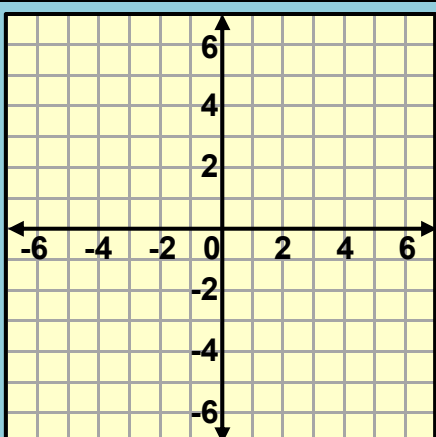
Range:



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

Domain:

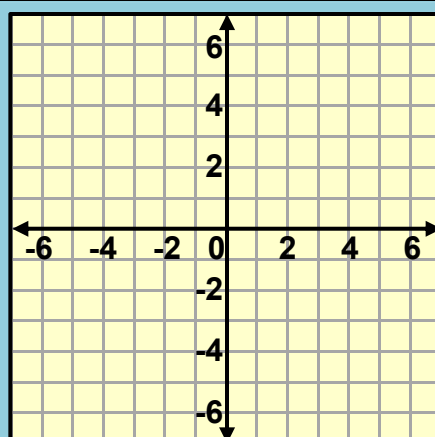
Range:



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

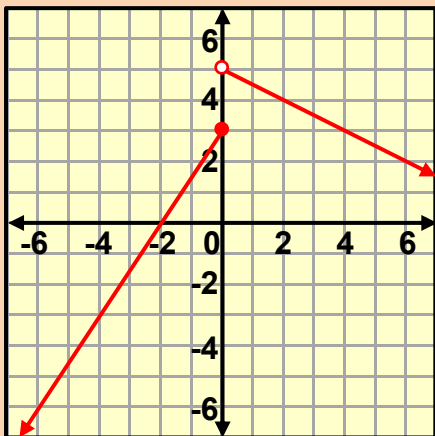
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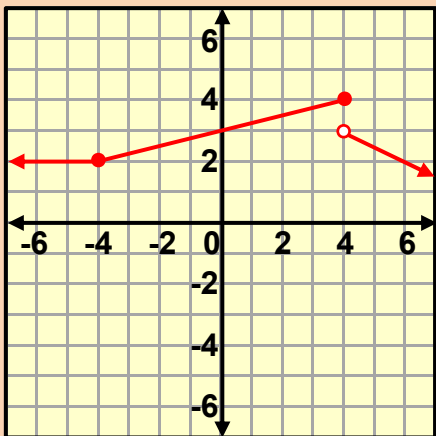


Practice: Write the piecewise function

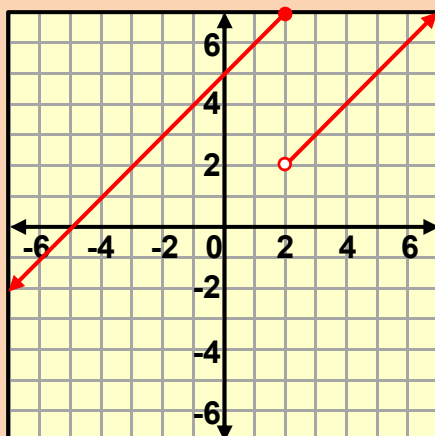
1. $f(x) =$



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

