Recall: Evaluating Functions

1. Given $f(x) = x^2 - 4$, find $f(-2)$: _____ = _____

2. Given $g(x) = \frac{x-7}{4}$, find $g(-17)$: _____ = _____

3. Given $h(x) = x^2 + 4x - 9$ find $h(-1)$: _____ = _____

Piecewise Functions

A _____ is a function with different equations with different given domains.

Domain Restrictions

- Remember two operations that are mathematically impossible

  - Dividing by _____

  - Taking the square root of a _____

    - If your piecewise function asks you to do either of these, these numbers would be considered not in the_____

  Example: Are there any values not in the domain of the piecewise function shown below:

  $$\begin{cases} \dfrac{2}{x}, \ x < 4 \\ \sqrt{10 - x}, \ x \geq 4 \end{cases}$$

  _____

  _____

Evaluating Piecewise Functions

- To evaluate a piecewise function, _____ the value of x into the "piece" of the function in which x fits in the domain

$$f(x) = \begin{cases} x + 2 & if \ x \geq 2 \\ 2x & if \ x < 2 \end{cases}$$

Find $f(5)$:

Where does 5 fit?

$x \geq 2$ or $x < 2$

f(5) = _____ = _____

Find $f(-3)$:

Where does -3 fit?

$x \geq 2$ or $x < 2$

f(−3) = _____ = _____

Given f(x), find the value of $2f(5) - \frac{1}{2}f(-3)$. _____

$$h(x) = \begin{cases} 3x + 2 & if & x < -2 \\ 2x & if & -2 \le x \le 3 \\ -2x + 6 & if & x > 3 \end{cases}$$

Find $h(2)$:

Where does 2 fit?

$x < -2$ or $-2 \le x \le 3$ or $x > 3$

$h(2) = $ _____ = _____

Find $h(-3)$:

Where does -3 fit?

$x < -2$ or $-2 \le x \le 3$ or $x > 3$

$h(-3) = $ _____ = _____

Given h(x), find the value of $h(2) - h(-3)$._____

The piecewise function below shows the cost of buying x shirts from an online company.

$$\begin{cases} 15.00x + 25, & 0 \le x < 25 \\ 14.00x + 20, & 25 \le x < 100 \\ 12.50x, & x \ge 100 \end{cases}$$

1. Find the cost of buying 20 shirts.

2. What would be the total cost of buying 80 shirts?

3. Explain what $h(100) = 1{,}250$ means in context.

A cell phone company charges customers a monthly fee based on the number of minutes, x, they use each month. This is represented by the piecewise function below.

$$\begin{cases} 30 + .05x, & 0 \le x < 500 \\ 40 + .03x, & 500 \le x < 1{,}000 \\ 60, & x \ge 1{,}000 \end{cases}$$

1. If a customer used 400 minutes, what was their monthly bill?

2. If a customer used 900 minutes what would be their cost?

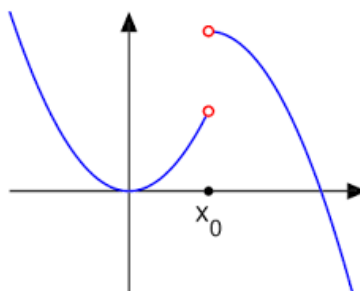3. Explain what $h(1{,}000) = 60$ means in context.

Graphs of Piecewise Functions

- The graph of a piecewise function can either be _____ or not continuous

  - If you can move your pencil across the graph without picking it up, the function is continuous

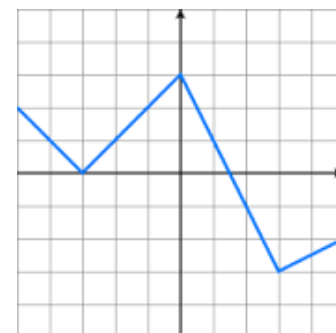   - Decide whether or not each graph below is continuous or not continuous:
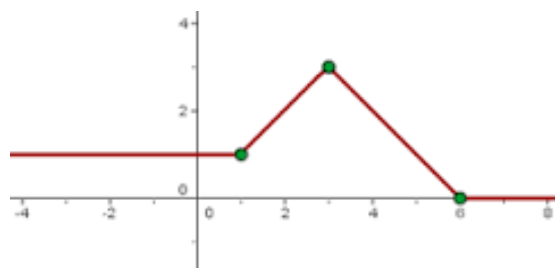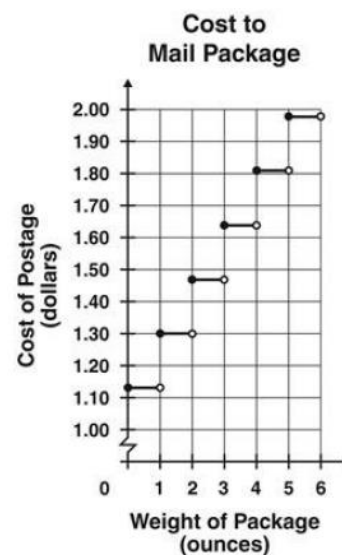
Continuous	Continuous	Continuous
Not Continuous	Not Continuous	Not Continuous

Step Functions

- A common type of piecewise functions is the _____ function. The step function has all constant pieces. Step functions are

  _____.

  - Step functions are commonly used when calculating things like cell phone bills, taxi rides, parking deck costs, etc.

Cost to Mail Package

Use the graph of the step function to the right to answer the questions below:

1. How much would it cost to ship a package weighing 4 ounces? _____

2. What would be the cost of shipping a package weighing 0.8 ounces? _____

3. What would be the total cost of shipping both a 5-ounce package and a 3.4-ounce package? _____
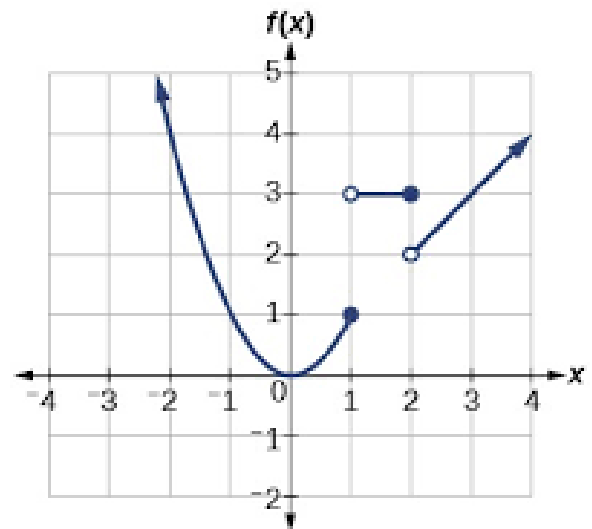
Domain and Range of Piecewise Graphs

- When finding domain and range for a piecewise functions, you can either identify the domain/range as a whole, or identify the domain/range for each _____ or each "piece" of the function

- How many "steps" does this piecewise function have? _____
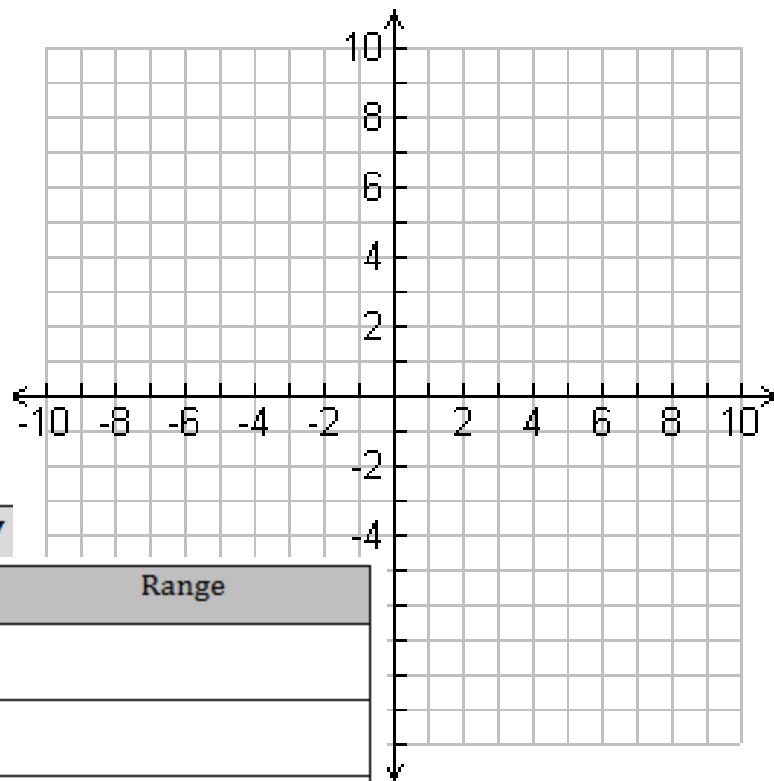
- Find the domain and range of each:

	Domain	Range
Step 1		
Step 2		
Step 3		

- Is this function continuous? _____

f(x) graph shown to the right.

Graph the Piecewise Function Below, and then identify the key features of the function.

$$f(x) = \begin{cases} x^2, & x < 2 \\ 6, & x = 2 \\ 10 - x, & 2 < x \le 6 \end{cases}$$

Find the domain and range of each step:

x	**y**	**x**	**y**

	Domain	Range
Step 1		
Step 2		
Step 3		

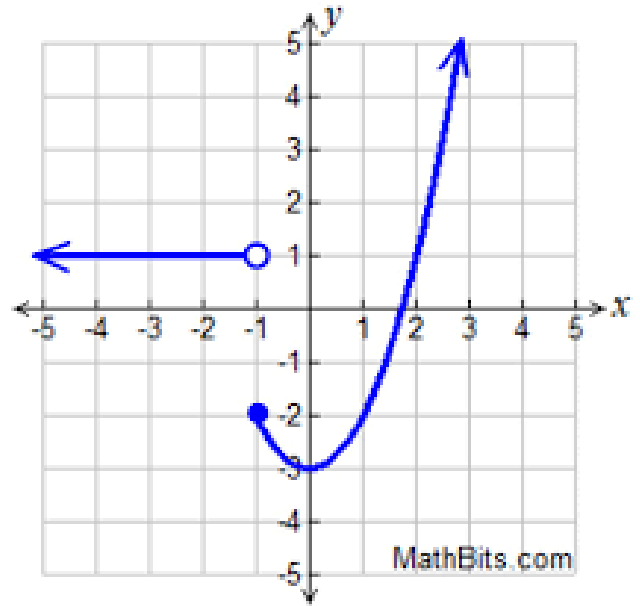- Is this function continuous? _____

Given the Piecewise Graph, create a piecewise function to match.

- How many steps does this piecewise function have?

  _____

  - Domain Step 1: _____

  - Domain Step 2: _____

Piecewise Function:

$$f(x) = \Bigg\{$$

Given the Piecewise Graph, create a piecewise function to match.

- How many steps does this piecewise function have? _____

  - Domain Step 1: _____

  - Domain Step 2: _____

  - Domain Step 3: _____

Piecewise Function:

$$f(x) = \Bigg\{$$
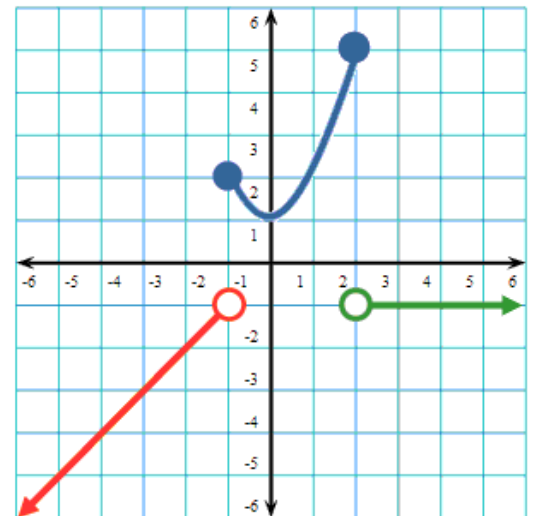
Write a piecewise function to represent the following scenarios:

- A parking garage charges $6 an hour for the first 4 hours that a car is parked. After that, the garage charges an additional $3 an hours. Write a piecewise function for the cost of parking a car in the garage for x hours.

- A delivery service charges $11 for a package that weighs 2 pounds or less. The service charges $3 for each additional pound. Write a piecewise function that represents the cost of delivering a package weighing x pounds.