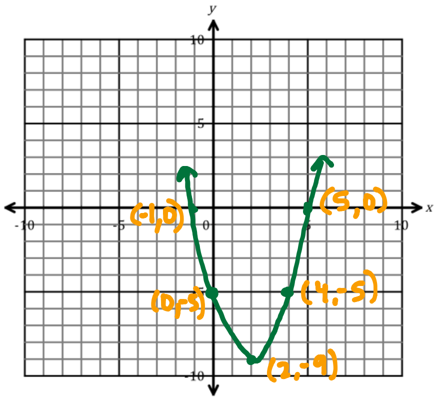
NOTES: SECONDARY 2 HONORS

GRAPH QUADRATIC FUNCTIONS GIVEN KEY FEATURES/DOMAIN AND RANGE (2.8, 2.9)

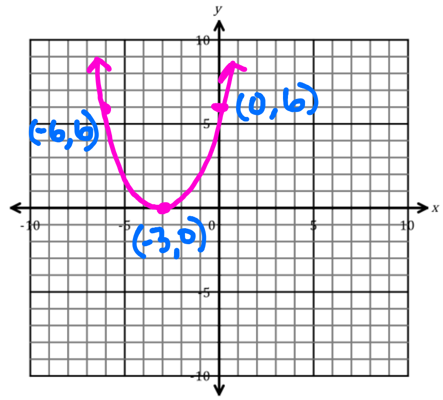
Example #1

Sketch the graph of the quadratic function given the *x*- and *y*-intercept(s), and the minimum point. Label all of the key features on your graph.

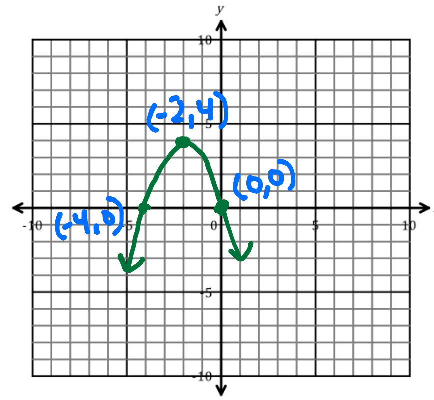
1. *x*–intercept(s): (-1, 0) & (5, 0)
   y–intercept: (0, -5)
   minimum: (2, -9)



2. x-intercept: (-3,0)
   y-intercept: (0,6)
   minimum: (-3,0)



3. x-intercept: (0,0) & (-4,0)
   y-intercept: (0,0)
   maximum: (-2,4)

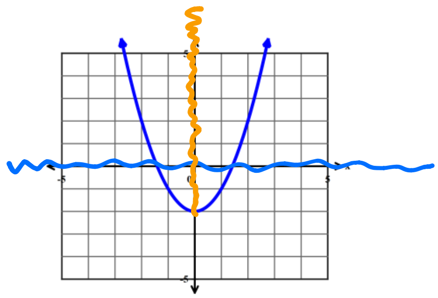


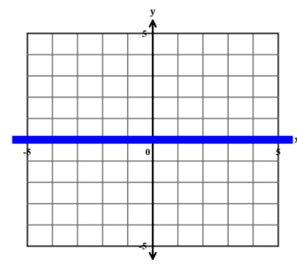
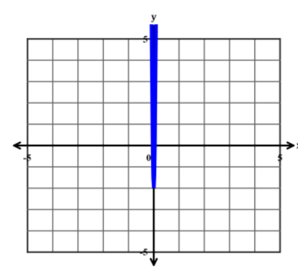
Vocabulary

- The **domain** is the set of all possible input values where the graph is defined.
- The variable (usually x) that represents the **domain** is the independent variables.
- The **range** is the set of all possible output values on the graph.
- The variable (usually y) that represents the **range** is the dependent variable.
- The **domain** and **range** are written from the least to greatest value.
- When modeling real world situations, the **domain** and **range** are values that make sense for the problem.

Example #2

Find the domain and range of the function $f(x) = x^2 - 2$ graphed below.

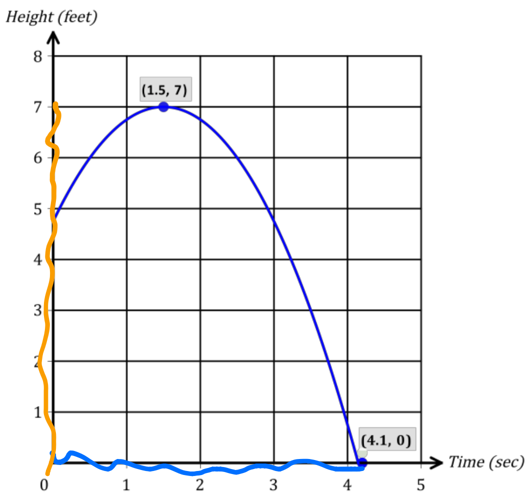


Domain 1. List all of the x-values of the function. Left $\longrightarrow$ Right	If you were to flatten the function against the x-axis you would see something like this:  The function is defined for all the x-values.
2. Write the domain in interval notation.	The domain is: *all real numbers* $\mathbb{R}$ or $(-\infty, \infty)$
Range 1. List all of the y-values of the function graphed. Bottom $\longrightarrow$ Top	If you were to flatten the function against the y-axis you would see this: 
2. Write the range in interval notation.	The function is defined for all y values greater than or equal to –2 The range is $y \geq -2$ or $[-2, \infty)$.

Example #3

The path of a ball thrown straight up can be modeled by the equation $h(t) = -t^2 + 3t + 4.75$ where ***h(t)*** is the *height* of the ball and ***t*** is the time in seconds.

What is the real world domain and range for the situation?

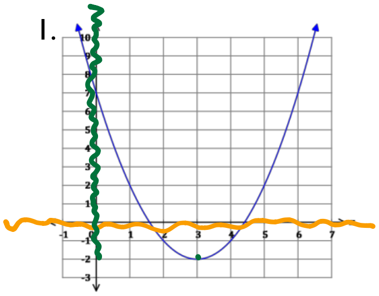


Domain 1. Find all the values that would make sense for the situation.	The domain represents the observation time of the ball. At $t = 0$ observation begins. The ball will hit the ground at 4.1 seconds. Once the ball hits the ground observation ends. The domain will be 0 t 4.1 seconds.
2. Write the domain in interval notation.	The domain is [0, 4.1] seconds.
Range 1. Find all the values that would make sense for the situation.	The ball will not go lower than the ground so the height must be greater than or equal to zero. The ball will go no higher than its maximum height so the height must be less than or equal to 7 feet. The range will be $0 \le h \le 7$ feet.
2. Write the range in interval notation.	The range is [0, 7] feet.

Identify the domain and range of each function.

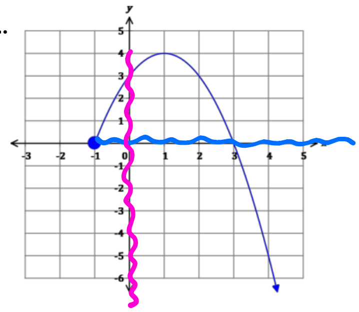
Discrete

1.



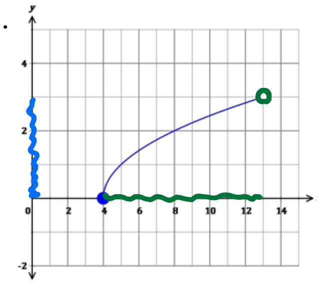
Domain: $(-\infty, \infty)$
Range: $[-2, \infty)$

2.



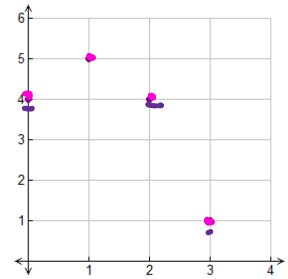
Domain: $[-1, \infty)$
Range: $(-\infty, 4]$

3.



Domain: $[4, 13)$
Range: $[0, 3)$

4.



Domain : $\{0, 1, 2, 3\}$
Range : $\{1, 4, 5\}$

Determine a *reasonable* **domain** and **range** for each situation. Write using interval notation and include units of measure. *answers will vary*

5. Temperatures during a year

D: [0,365] days

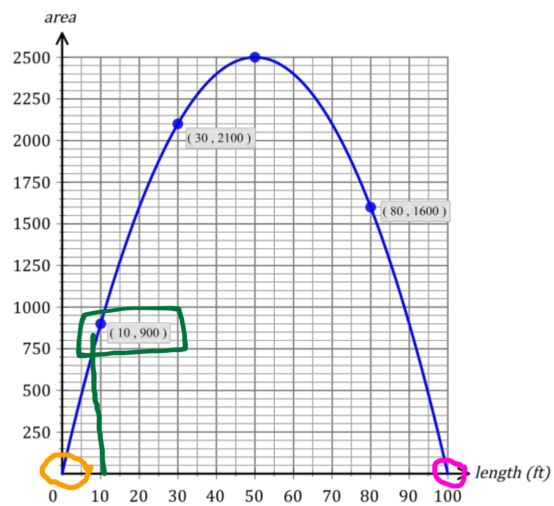
R: [-40,120] degrees

6. Someone diving into a swimming pool

D: [0,6) seconds

R: [-12,15] feet

7. The graph represents a rectangular area that can be enclosed by 100 feet of fencing.



a) What is the **domain** of the function?

fence

D: [0,100] feet of fencing

b) What is the **range** of the function?

area

R: [0,2500] ft^2 of area.

c) What does the *y*-intercept represent?

There is 0 ft^2 of area when there is 0 ft of fence.

d) What does the *x*-intercept represent?

There is 0 ft^2 of area when there is 100 ft of fencing.

e) What is the amount of area enclosed if one side of the rectangle is 10 ft.

900 ft^2

f) What is the maximum area that can be enclosed and what is the corresponding length of one side of the rectangle.

The maximum area is 2500 ft^2 when the length of one side is 50 ft.