

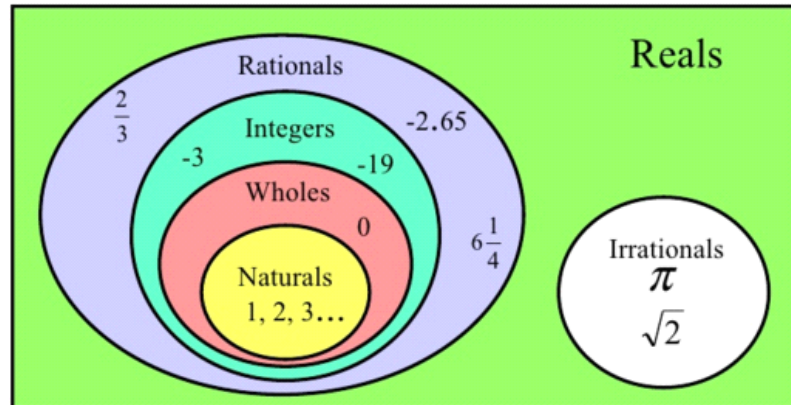
# Unit 1: Linear & Quadratic Functions

## Lesson 1: Domain & Range

**Domain:** The domain of a relation is the complete set of possible values of the independent ( $x$ ) variable.

**Range:** The range of a relation is the complete set of possible values of the dependent ( $y$ ) variable.

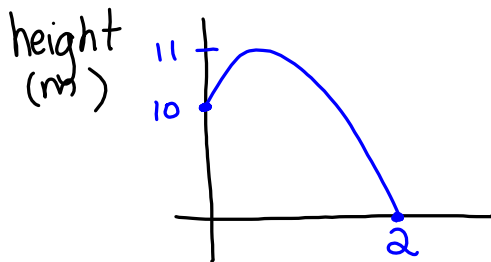
Number Systems



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**Example 1:** A diver jumps from the top of a 10 m cliff. He jumps 1 m into the air, does a front flip and then falls and hits the water 2 seconds after starting his jump.

- a) Sketch a height vs. time graph for the function that models the diver's jump.



- b) What is the domain and range for the function representing the diver's jump?

Domain is the time between 0 to 2 seconds

Range is the height between 0 and 11 m.

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**Different ways to describe domain and range**

**WORDS:** We use words all the time, so this is a very natural way to describe domain and range.

**For example:** The domain is the time from 0 seconds to 2 seconds.

**INEQUALITY STATEMENT:** This is a more formal way of showing what we put in words.

**For example**  $0 \leq t \leq 2$

greater than , less than , equal to

**SET BUILDER NOTATION:** The most formal mathematics way of showing domain and range.

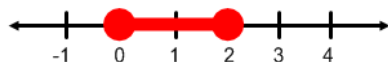
**For example:**  $\{x \in \mathbb{R} | 0 \leq x \leq 2\}$

"all real numbers"

"such that"

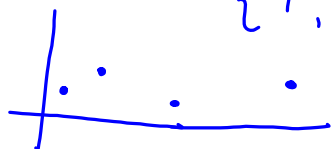
**NUMBER LINE:** People like seeing pictures, so we sometimes show a line.

**For example:**



**LIST OF NUMBERS:** Only use this method when we have a finite set of points so we can actually list all numbers.

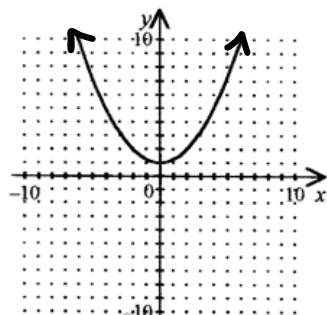
$\{1, 2, 4, 7\}$



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**Example 2:**

**Ex.**

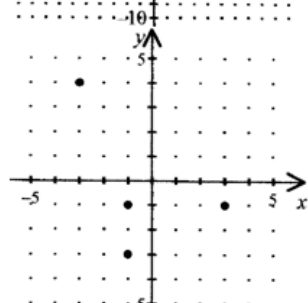


$$D = \{x \in \mathbb{R}\}$$

$$R = \{y \in \mathbb{R} | 1 \leq y\}$$

$$\text{or } \{y \in \mathbb{R} | y \geq 1\}$$

**Ex.**

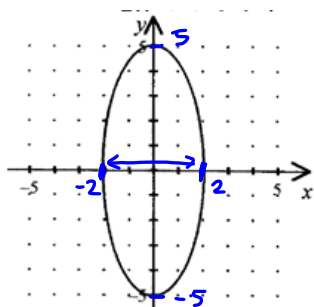


$$D = \{-3, -1, 3\}$$

$$R = \{-3, -1, 4\}$$

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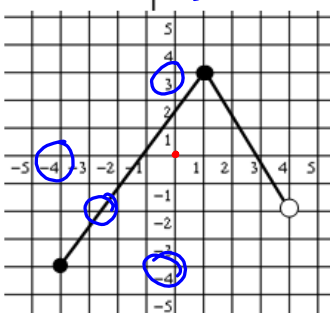
Ex.



$$D = \{x \in \mathbb{R} \mid -2 \leq x \leq 2\}$$

$$R = \{y \in \mathbb{R} \mid -3 \leq y \leq 3\}$$

Ex.

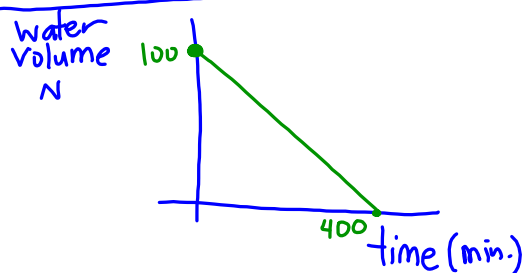


$$D = \{x \in \mathbb{R} \mid -4 \leq x < 4\}$$

$$R = \{y \in \mathbb{R} \mid -4 \leq y \leq 3\}$$

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**Example 3:** A pool at a fitness centre is being drained. The number of kilolitres of water,  $N$ , in the pool after an elapsed time  $t$ , in minutes, is given by the formula  $N = 100 - 0.25t$ . State the domain and range for this function.



$$D: \{x \in \mathbb{R} \mid 0 \leq x \leq 400\}$$

$$R: \{y \in \mathbb{R} \mid 0 \leq y \leq 100\}$$

$$N = 100 - 0.25t$$

$$0 = 100 - 0.25t$$

$$-100 = -0.25t$$

$$\frac{-100}{-0.25} = t$$

$$400 = t$$

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