**REAL NUMBERS** are the set of numbers that is formed by combining the rational numbers and the irrational numbers.

**Irrational Numbers**

**Real Numbers**

**Rational Numbers**

**Non-Integers**

**Integers**

**Negative Numbers**

**Whole Numbers**

**Zero**

**Natural Numbers**

$$1, 2, 3, 4, 5, 6, 7, 8,…$$

$$0$$

$$0, 1, 2, 3, 4, 5, 6,…$$

$$…, -5, -4, -3,-2$$

$$…,-3,-2, -1, 0, 1, 2, 3,…$$

$$-\frac{3}{4},\frac{27}{11}, 9i$$

$$\frac{3}{4},\frac{27}{11}, 9i\frac{3}{4},\frac{27}{11}, 9i$$

$$\frac{3}{4},\frac{27}{11}, 9i, -2, -1, 0, 1, 2, 3$$

$$π, e, \frac{22}{7}, \sqrt{2}, \sqrt{3}, \sqrt{7}$$

$$π, e, \frac{22}{7}, \sqrt{2}, \sqrt{3}, \sqrt{7},\frac{3}{4},\frac{27}{11}, 9i, -2, -1, 0, 1, 2, 3 $$

**IRRATIONAL NUMBERS** are the set of all numbers whose decimal representation are neither terminating nor repeating. It cannot be expressed as a quotient of integers.

**RATIONAL NUMBERS** are the set of all numbers which can be expressed in the form: $\frac{a}{b}$, where $a$ and $b$ are integers and $b$ is not equal to $0$, written $b\ne 0$. It can be expressed as terminating or repeating decimals.

**NON-INTEGERS** are the set of all numbers that is neither a positive whole number, nor a negative whole number, nor zero. These include decimals, fractions, and imaginary numbers.

**INTEGERS** are the set of numbers formed by positive whole numbers, negative whole numbers, and zero.

**NEGATIVE NUMBERS** are numbers less than zero and usually mean a value that is a deficit or shortage.

**WHOLE NUMBERS** are the set of numbers formed by adding 0 to the set of natural numbers.

**ZERO** denotes the absence of all magnitude or quantity.

**NATURAL NUMBERS** are used for counting.

**Sample Problem 1**: Determine which of the numbers given below are:

$-0.2          1          0.\overbar{4}          0.71771777177771…$$ π          3          7          41          56$

1. **Integers** $1,  3,  7,  41,  56$
2. **Rational Numbers** $-0.2,  1,  0.\overbar{4},  3,  7,  41,  56$
3. **Irrational Numbers** $0.71771777177771…,   π$
4. **Real Numbers** $-0.2,  1,0.\overbar{4},  3,  7,  41,  56,  0.71771777177771…,   π$
5. **Natural Numbers** $1,3,  7,  41,  56$
6. **Non-integers** $-0.2,0.\overbar{4}$

**NUMBER LINE** is used to show the sets of natural numbers, whole numbers, and integers. Also, it can be used to show the set of rational numbers. The point that corresponds to a number is the **graph** of the number, and drawing the point is called **graphing** the number or **plotting** the point.

**0**

**1**

**2**

**3**

**4**

**5**

**6**

**7**

**8**

**9**

**-1**

**-2**

**-3**

**-4**

**-5**

**-6**

**-7**

**-8**

**-9**

**Negative Numbers**

**Positive Numbers**

**Natural Numbers**

**Whole Numbers**

**Integers**

**Sample Problem 2**: Graph the numbers $-2.4$ and $\frac{3}{2}$ on the number line.

**0**

**1**

**2**

**3**

**4**

**-1**

**-2**

**-3**

**-4**

$$-2.4$$

$$\frac{3}{2}$$

**Sample Problem 3**: Graph the numbers $-4$ and $-6$ on the number line and write two inequalities that compare the two numbers.

**-4**

**-3**

**-2**

**-1**

**0**

**-5**

**-6**

**-7**

**-8**

$$-6$$

$$-4$$

$-6<-4$$-4>-6$

**Sample Problem 4**: Graph the numbers $-1, 3, 0,  2, \frac{3}{4}, -\frac{1}{2}$ and $-2.6$ on the number line and write the numbers in increasing order.

**0**

**1**

**2**

**3**

**4**

**-1**

**-2**

**-3**

**-4**

$$-1$$

$$0$$

$$3$$

$$2$$

$$\frac{3}{4}$$

$$\frac{-1}{2}$$

$$-2.6$$

$$-2.6,  -1,  -\frac{1}{2},  0,  \frac{3}{4},  2,  3$$

**ABSOLUTE VALUE** of a real number is the distance between the origin and the point representing the real number. The symbol$ \left|x\right| $represents the absolute value of a number$ x$.

**0**

**1**

**2**

**3**

**4**

**5**

**6**

**-1**

**-2**

**-3**

**-4**

**-5**

**-6**

**5 units**

**5 units**

|  |  |
| --- | --- |
| $$\left|-5\right|=5$$The distance of -5 to the origin is 5 units. | $$\left|5\right|=5$$The distance of 5 to the origin is 5 units. |

**Sample Problem 5**: Evaluate and graph the numbers $\left|2.5\right|$ and $\left|-\frac{1}{2}\right|$ on the number line.

$$2.5$$

$$\frac{1}{2}$$

$\frac{1}{2} $**units**

**2.5 units**

**0**

**1**

**2**

**3**

**4**

**-1**

**-2**

**-3**

**-4**

$\left|2.3\right|=2.3 units$$\left|-\frac{1}{2}\right|=\frac{1}{2}units$