We can use a number line to add any real numbers.

* Adding a positive number by moving to the right.
* Adding a negative number by moving to left.

**0**

**1**

**2**

**3**

**4**

**5**

**6**

**7**

**8**

**9**

**-1**

**-2**

**-3**

**-4**

**-5**

**-6**

**-7**

**-8**

**-9**

**Negative Numbers**

**Positive Numbers**

**Sample Problem 1**: Use a number line to find the sum.

|  |  |  |
| --- | --- | --- |
|  | $$-6+8=2$$ | **0****1****2****3****4****5****6****7****8****9****-1****-2****-3****-4****-5****-6****-7****-8****-9****Move 8 units to the right**  |
|  | $$3+\left(-6\right)=-3$$ | **0****1****2****3****4****5****6****7****8****9****-1****-2****-3****-4****-5****-6****-7****-8****-9****Move 6 units to the left** |
|  | $$-3+4=1$$ | **0****1****2****3****4****5****6****7****8****9****-1****-2****-3****-4****-5****-6****-7****-8****-9****Move 4 units to the right**  |

**RULES OF ADDITION**: without a number line

**To add two numbers with the same sign:**

1. Add their absolute values.
2. Attach the common sign.

**To add two numbers with opposite signs:**

1. Subtract the smaller absolute value from the larger absolute value.
2. Attach the sign of the number with the larger absolute value.

**Sample Problem 2**: Find the sum.

|  |  |  |  |
| --- | --- | --- | --- |
|   a. | $1.5+\left(-1.6\right)+1.2$ | $$=-0.1+1.2$$ | $$=1.1$$ |
|  b. | $-\frac{1}{2}+4+\frac{3}{2}$ | $$=-\frac{1}{2}+\frac{3}{2}+4$$ | $$=5$$ |
|  c. | $-12+\left(-7\right)$ | $=-19$ |  |

**RULE OF SUBTRACTION**: without a number line

**To subtract** $b$ **from**$ a$**, add the opposite of** $b$ **to** $a$**:**

$$a-b=a+\left(-b\right)$$

The result is the difference of $a$ and $b$.

**Sample Problem 3**: Find the difference.

|  |  |  |  |
| --- | --- | --- | --- |
|  a. | $-6-1$ | $=-7$ |  |
|  b. | $-\frac{5}{2}-\left(-\frac{1}{2}\right)$ | $=-\frac{5}{2}+\frac{1}{2}=-\frac{4}{2}$ | $=-2$ |
|  c. | $40-21$ | $=19$ |  |

**OPPOSITES** are pair of positive real numbers with its negative. Opposites are additive inverse of each other.

**ADDITIVE INVERSE** of anumber $a$ is the number that when add to $a$ will yield zero.

$$a+\left(-a\right)=0$$

**0**

**1**

**2**

**3**

**4**

**5**

**6**

**-1**

**-2**

**-3**

**-4**

**-5**

**-6**

The opposite of $-5$ is $ 5$.

 The opposite of $6$ is $–6$.

**Sample Problem 4**: Evaluate each expression.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  a. | $1-\left(-4\right)-2+7$ | $=1+4+5$ | $=5+5$ | $=10$ |
|  b. | $-4-9+\left(-2\right)$ | $=-13-2$ | $=-15$ |  |
|  c. | $-11+\left(-15\right)+25$ | $=-25+25$ | $=-0$ |  |

**Sample Problem 5**: The average height of a NBA player is 75 inches while the height of an average man is 64 inches. What is the difference between their heights?

$$=75-64$$

$$=11 inches$$