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.

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

**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.

|  |  |  |  |
| --- | --- | --- | --- |
|  | $$1.4+\left(-2.6\right)+3.1$$ | $$=-1.2+3.1$$ | $$=1.9$$ |
|  | $$-\frac{1}{2}+3+\frac{1}{2}$$ | $$=-\frac{1}{2}+\frac{1}{2}+3$$ | $$=3$$ |
|  | $$-11+\left(-7\right)$$ | $$=-18$$ |  |

**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.

|  |  |  |  |
| --- | --- | --- | --- |
|  | $$-7-6$$ | $$=-13$$ |  |
|  | $$-\frac{5}{4}-\left(-\frac{1}{4}\right)$$ | $$=-\frac{5}{4}+\frac{1}{4}=-\frac{4}{4}$$ | $$=-1$$ |
|  | $$20-21$$ | $$=-1$$ |  |

**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.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | $$3-\left(-4\right)-2+8$$ | $$=3+4+6$$ | $$=7+6$$ | $$=13$$ |
|  | $$-9-2+\left(-6\right)$$ | $$=-11-6$$ | $$=-17$$ |  |
|  | $$-12+\left(-11\right)+17$$ | $$=-23+17$$ | $$=-6$$ |  |

**Sample Problem 5**: The average height of a NBA player is 79 inches while the height of an average man is 69 inches. What is the difference between their heights?

$$=79-69$$

$$=10 inches$$