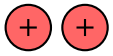
INTEGERS

A DEFINITION

Definition Positive and Negative Numbers

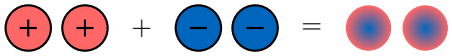
- **Positive numbers** are $+1, +2, \ldots$. We write them with a **positive sign** $(+)$ before the number:

$+2 =$ 

- **Negative numbers** are $-1, -2, \ldots$. We write them with a **negative sign** $(-)$ before the number:

$-3 =$ 

- **Positive numbers** are the opposite of **negative numbers**:



$(+2) \quad + \quad (-2) \quad = \quad 0$

-2 is the opposite of $+2$.

- Integer numbers are **positive numbers**, **negative numbers**, and zero :

$$\ldots, -3, -2, -1, 0, +1, +2, +3, \ldots$$

- Positive numbers can be written **with** or **without** a positive sign $(+)$ in front of the number:

$1 = +1 =$ 

- To avoid confusion between the sign of the number and the sign of the operation, we can use parentheses. For example, $+1 + -2$ becomes $(+1) + (-2)$.
- 0 is neither positive nor negative.

Ex: Calculate $(+1) + (-2)$.

Answer:

- $=$ 
- So, $(+1) + (-2) = -1$.

Definition Absolute Value

The **absolute value** of a number is the number without its sign.

- The absolute value of $+2 =$  is 2.
- The absolute value of $-3 =$  is 3.

B RULES OF ADDITION

Method Rules of Addition

- When you add **two positive numbers**, add their absolute values. The sum is also a positive number.

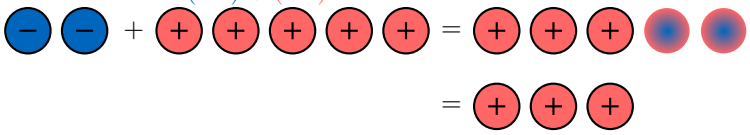
$(+2) + (+7) = +9 \quad$ as $2 + 7 = 9$

- When you add **two negative numbers**, add their absolute values. The sum is also a negative number.

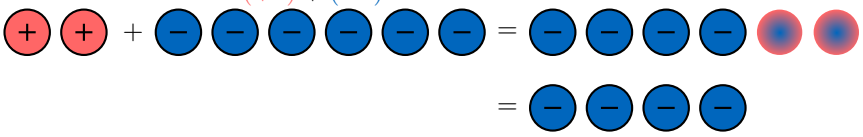
$$(-5)+(-10)=-15 \quad \text{as } 5+10=15$$

- When you add a **positive number** and a **negative number**, subtract the smaller absolute value from the larger one and use the sign of the number with the larger absolute value.

$(-2)+(+5)=+3$ as $5-2=3$



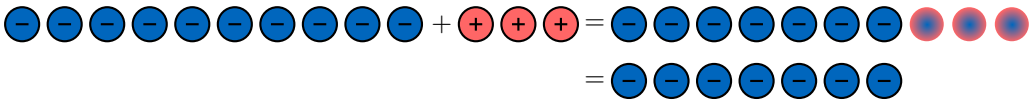
$(+2)+(-6)=-4$ as $6-2=4$



Ex: Calculate $(-10)+(+3)$

Answer:

- $(-10)+(+3)=-7$ as $10-3=7$



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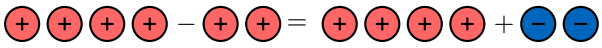
C SUBTRACTION

Definition **Subtraction**

Subtracting a number is adding its opposite.

Ex: Convert the subtraction into addition: $(+4)-(+2)$

Answer:

- $(+4)-(+2)=(+4)+(-2)$
- 

Ex: Calculate $(+4)-(-2)$

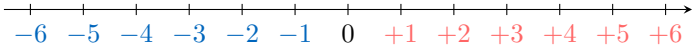
Answer:

$$\begin{aligned}(+4)-(-2)&=(+4)+(+2) && \text{(add the opposite)}\\ &=+6 && \text{(same sign: add the absolute values)}\end{aligned}$$

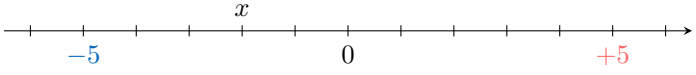
D ON THE NUMBER LINE

Definition **Number line**

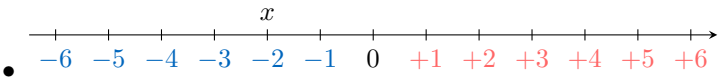
A **number line** is a straight line with markings at equal intervals to denote the numbers.



Ex: Find the value of x.



Answer:

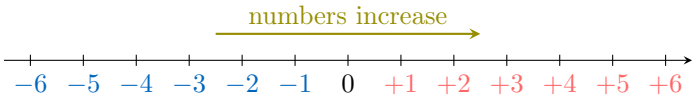
- 

- So, $x = -2$.

E ORDERING

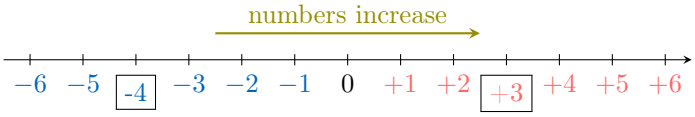
Method Compare two numbers

- When one number is positive and the other is negative, the positive number is **greater**.
- When both numbers are negative, the number closer to zero is **greater** (the number with the smaller absolute value is greater).
- When both numbers are positive, the number further from zero is **greater** (the number with the greater absolute value is greater).



Ex: Compare -4 and $+3$

Answer:

- As $+3$ is positive and -4 is negative, the positive number is greater than the negative number:$-4 < +3$
- 

F MULTIPLICATION

Definition Multiplication

- $(+) \times (+) = (+)$: a **positive** times a **positive** gives a **positive**.
- $(+) \times (-) = (-)$: a **positive** times a **negative** gives a **negative**.
- $(-) \times (+) = (-)$: a **negative** times a **positive** gives a **negative**.
- $(-) \times (-) = (+)$: a **negative** times a **negative** gives a **positive**.

Ex: Calculate $(+2) \times (-5)$

Answer: $(+2) \times (-5) = -10$ as $(+) \times (-) = (-)$

G DIVISION

Definition Division

- $(+) \div (+) = (+)$:a **positive** divided by a **positive** gives a **positive**.
- $(+) \div (-) = (-)$: a **positive** divided by a **negative** gives a **negative**.
- $(-) \div (+) = (-)$: a **negative** divided by a **positive** gives a **negative**.
- $(-) \div (-) = (+)$: a **negative** divided by a **negative** gives a **positive**.

Ex: Calculate $(+10) \div (-5)$

Answer: $(+10) \div (-5) = -2$ as $(+) \div (-) = (-)$