

Additive rule of equality

A balanced equation

$$2 + 3 = 5$$

An unbalanced equation

$$2 + 3 + 2 \neq 5$$

will become balanced by
adding the right number

- In order to keep an equation balanced, we must add or subtract (divide or multiply) the same amount to both sides of the equality (equation).
- if $a = b$, then $a + c = b + c$.
- if $a = b$, then $a - c = b - c$.
- if $a = b$, then $ca = cb$.
- if $a = b$, then $\frac{a}{c} = \frac{b}{c}$. ($c \neq 0$)

ex. $3x - 5 = 7$

add 5 to both sides

then $3x - 5 + 5 = 7 + 5$, or

$$3x = 12$$

$$x = \frac{12}{3} = 4$$

ex. $3x + 5 = 17$

subtract 5 from both sides

then $3x + 5 - 5 = 17 - 5$, or

$$3x = 12, x = 4$$

ex. $3x = 12$

multiply both sides by $\frac{1}{3}$

$$\left(\frac{1}{3}\right)3x = \left(\frac{1}{3}\right)12$$

$$x = 4$$

ex. $\frac{x}{3} = 12$

multiply both sides by 3

$$(3)\frac{x}{3} = (3)12$$

$$3\cancel{x} = (3)12$$

$$x = 36$$

Solve:

1.) $3x - 5 = 10$, $x = ?$

2.) $7a + 3 = 17$, $a = ?$

3.) $5t - 7 = 13$, $t = ?$

4.) $4 \heartsuit + 4 = 32$, $\heartsuit = ?$

5.) $12 \odot - 5 = 19$, $\odot = ?$

6.) $\frac{r}{3} + 4 = 6$, $r = ?$