2.8 Rewrite Equations & Formulas

The equation $ax + b = c$ is called a **literal equation** because the coefficients & constants have been replaced by letters.

When you solve a literal equation, you can use the result to solve any equation that has the same form.

1. a) Solve $ax + b = c$ for x.

$$ax + b = c$$
$$-b \quad -b$$
$$\frac{ax}{a} = \frac{c - b}{a}$$
$$\boxed{x = \frac{c-b}{a}}$$

b) Use the solution to solve $2x + 5 = 11$.

$a x + b = c$

$$x = \frac{c-b}{a}$$
$$x = \frac{11-5}{2}$$
$$x = \frac{6}{2}$$
$$\boxed{x = 3}$$

2. a) Solve $a - bx = c$ for x.

$-a \quad -a$

$-bx = c - a$

$\frac{-bx}{-b} = \frac{c-a}{-b}$

$$\boxed{x = \frac{c-a}{-b}}$$

b) Use the solution to solve $12 - 5x = -3$.

$a - bx = c$

$x = \frac{c-a}{-b}$

$x = \frac{-3-12}{-5}$

$x = \frac{-15}{-5}$

$$\boxed{x = 3}$$

3. a) Solve $\frac{x}{b} + c = a$ for x.

$-c \quad -c$

$b \cdot \frac{x}{b} = (a-c) \cdot b$

$$\boxed{x = b(a-c)}$$

b) Use the solution to solve $\frac{x}{4} + 7 = 2$.

$\frac{x}{b} + c = a$

$x = b(a-c)$

$x = 4(2-7)$

$x = 4(-5)$

$$\boxed{x = -20}$$

An equation in two variables...

$-5a + 3b = -35$

$4x + 3y = 12$

$-7m - 3n = 8$

or a formula in two or more variables...

$A = \frac{1}{2}bh$ (Area of △)

$C = \frac{5}{9}(F - 32)$ (Temperature)

$d = rt$ (distance = rate × time)

can be rewritten so that one variable is a function of the other variable(s).

4. Write $3x + 2y = 8$ so that y is a function of x.

In other words...SOLVE FOR Y.

$+3x + 2y = 8$

$-3x \qquad -3x$

$\frac{2y}{2} = \frac{8}{2} - \frac{3x}{2}$

$y = 4 - \frac{3}{2}x$

5. Write $-2x + 3y = 6$ so that y is a function of x.

$+2x \qquad +2x$

$\frac{3y}{3} = \frac{6}{3} + \frac{2x}{3}$

$y = 2 + \frac{2}{3}x$

Solve for x.

6. $\frac{8x}{8} = \frac{y}{8}$

$x = \frac{y}{8}$

7. $\frac{-6(x-c)}{-6} = d \cdot -6$

$x - c = -6d$

$+c \quad +c$

$x = -6d + c$

Solve for w.

8. $bw + c = d$

$-c \quad -c$

$\frac{bw}{b} = \frac{d-c}{b}$

$w = \frac{d-c}{b}$

OR

$\frac{bw}{b} = \frac{d}{b} - \frac{c}{b}$

$w = \frac{d}{b} - \frac{c}{b}$

9. $\frac{w}{2} + z = -y$

$-z \quad -z$

$2 \cdot \frac{w}{2} = -y - z \cdot 2$

$w = 2(-y-z)$

10.a) Solve the formula of the area of a triangle for the height (h).

div. frac. → mult. by reciprocal

$\frac{2}{1} \cdot A = \frac{1}{2} bh \cdot \frac{2}{1}$

$\frac{2A}{b} = \frac{bh}{b}$

$\frac{2A}{b} = h$

b) Use the rewritten formula to find the height of a triangle with a base of 12 m and an area of 48 m^2. $A = 48$ $b = 12$

$\frac{2 \cdot 48}{12} = h$

$8m = h$

11.a) Solve the formula of the area of a rectangle for the length (l).

$\frac{A}{w} = \frac{lw}{w}$

$\frac{A}{w} = l$

b) Use the rewritten formula to find the length of a rectangle with a width of 13 cm and an area of 351 cm^2. $A = 351$ $w = 13$

$\frac{351}{13} = l$

$27cm = l$

12.a) What is the formula for the perimeter of a rectangle?

$P = l + w + l + w$

$P = 2l + 2w$

b) Solve the formula for the width (w).

$P = 2l + 2w$

$-2l \quad -2l$

$\frac{P - 2l}{2} = \frac{2w}{2}$

$\frac{P - 2l}{2} = w$

13.a) Rewrite the formula for temperature by solving for F.

$\frac{9}{5} \cdot C = \frac{9}{5}(F - 32) \cdot \frac{5}{9}$

$\frac{9}{5}C = F - 32$

$+32 \quad +32$

$\frac{9}{5}C + 32 = F$

b) Find the temperature for Saturday in degrees Fahrenheit if it's 14 C°.

$14 = C$

$\frac{9}{5} \cdot 14 + 32 = F$

$57.2^\circ F$