

Rearranging Formulas

1. The amount of fuel in litres, f , that is left in the tank of a certain vehicle can be found using the following formula, where d is the distance in kilometres driven since the tank was full. How far can the vehicle travel on 45 L of fuel?

$$f = -0.074d + 77.5$$

Method #1: Substitute & Rearrange

Method 2: Rearrange & Substitute

2. The equivalent temperature to convert from degrees Celsius to degrees Fahrenheit can be found using the following formula, where F is the temperature in Fahrenheit and C is the temperature in degrees Celsius. Determine the temperature in degrees Celsius if the thermostat reads 68°F .

$$F = 1.8C + 32$$

Method #1: Substitute & Rearrange

Method 2: Rearrange & Substitute

3. Rearrange each of the following equations to isolate for x .

a) $y = mx + b$

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

c) $ax + b = c - y$

d) $a = b - cx$

e) $b + y = cx - a$

f) $a + 2x = cy$

g) $a + 2x - b = c - y$

h) $\frac{x}{a} + b - y = -c$

Practice

4

Rearrange each formula to isolate the indicated variable.

a) $A = \frac{bh}{2}$; for h

b) $A = P + I$; for I

c) $V = IR$; for R

d) $F = ma$; for m

e) $Ax + By + C = 0$; for y

f) $P = 2l + 2w$; for w

g) $3x + 5y = 60$; for y

h) $0.04x + 0.02y = 375.50$; for x

i) $C = ng + f$; for g

j) $T = \frac{x}{2} + a - c$; for x

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Rearranging Formulas

1. The amount of fuel in litres, f , that is left in the tank of a certain vehicle can be found using the following formula, where d is the distance in kilometres driven since the tank was full. How far can the vehicle travel on 45 L of fuel?

$$f = -0.074d + 77.5$$

Method #1: Substitute & Rearrange

$$\begin{aligned} * \text{ sub } f &= 45 \\ 45 &= -0.074d + 77.5 \\ -77.5 & \quad -77.5 \\ \hline -32.5 &= -0.074d \\ \frac{-32.5}{-0.074} & \quad \frac{-0.074d}{-0.074} \\ 439.2 &= d \\ \therefore \text{ can travel about } & \\ & 439 \text{ km} \end{aligned}$$

Method 2: Rearrange & Substitute

$$\begin{aligned} f &= -0.074d + 77.5 \\ f - 77.5 &= -0.074d \\ \frac{f - 77.5}{-0.074} &= d \\ * \text{ now sub } f &= 45 \\ d &= \frac{45 - 77.5}{-0.074} = 439.2 \end{aligned}$$

2. The equivalent temperature to convert from degrees Celsius to degrees Fahrenheit can be found using the following formula, where F is the temperature in Fahrenheit and C is the temperature in degrees Celsius. Determine the temperature in degrees Celsius if the thermostat reads 68°F .

$$F = 1.8C + 32$$

Method #1: Substitute & Rearrange

$$\begin{aligned} * \text{ sub } F &= 68 \\ 68 &= 1.8C + 32 \\ -32 & \quad -32 \\ \hline 36 &= 1.8C \\ \frac{36}{1.8} & \quad \frac{1.8C}{1.8} \\ 20 &= C \\ \therefore \text{ temp in Celsius is } & 20^\circ\text{C} \end{aligned}$$

Method 2: Rearrange & Substitute

$$\begin{aligned} F &= 1.8C + 32 \\ F - 32 &= 1.8C \\ \frac{F - 32}{1.8} &= C \\ * \text{ now sub } F &= 68 \\ C &= \frac{68 - 32}{1.8} = 20^\circ\text{C} \end{aligned}$$

3. Rearrange each of the following equations to isolate for x.

a) $y = mx + b$

$$y - b = mx$$

$$\frac{y - b}{m} = x$$

b) $\frac{c}{a} = \frac{bx}{c} \cdot c$

$$ac = bx$$

$$\frac{ac}{b} = x$$

c) $ax + b = c - y$

$$ax = c - y - b$$

$$x = \frac{c - y - b}{a} \text{ or } \frac{c}{a} - \frac{y}{a} - \frac{b}{a}$$

d) $a = b - cx$

$$a - b = -cx$$

$$\frac{a - b}{-c} = x \text{ or } -\frac{a}{c} + \frac{b}{c}$$

e) $b + y = cx - a$

$$b + y + a = cx$$

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

f) $a + 2x = cy$

$$2x = cy - a$$

$$x = \frac{cy - a}{2}$$

g) $a + 2x - b = c - y$

$$2x = c - y - a + b$$

$$x = \frac{c - y - a + b}{2}$$

h) $\frac{x}{a} + b - y = -c$

$$x + ab - ay = -ac$$

$$x = -ac - ab + ay$$

Practice

4

Rearrange each formula to isolate the indicated variable.

a) $A = \frac{bh \cdot 2}{2}$; for h

$$2A = bh$$

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

b) $A = P + I$; for I

$$A - P = I$$

c) $V = IR$; for R

$$\frac{V}{I} = R$$

d) $F = ma$; for m

$$\frac{F}{a} = m$$

e) $Ax + By + C = 0$; for y

$$By = -Ax - C$$

$$y = \frac{-A}{B}x - \frac{C}{B}$$

f) $P = 2l + 2w$; for w

$$P - 2l = 2w$$

$$\frac{P - 2l}{2} = w \quad \text{or} \quad \frac{P}{2} - l$$

g) $3x + 5y = 60$; for y

$$5y = 60 - 3x$$

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

h) $0.04x + 0.02y = 375.50$; for x

$$0.04x = 375.50 - 0.02y$$

$$x = 9387.5 - 0.5y$$

i) $C = ng + f$; for g

$$C - f = ng$$

$$\frac{C - f}{n} = g$$

j) $T = \frac{-2x + 2a - 2c}{2}$; for x

$$2T = -x + 2a - 2c$$

$$2T - 2a + 2c = -x$$

2