

# Rearranging Formulas

Date Lesson Notes

Rearrange each formula to solve for the indicated variable:

a)  $A = lw$ , solve for  $l$

$$\frac{A}{w} = \frac{lw}{w} \quad \# \text{ Use opposite operations}$$
$$\frac{A}{w} = l$$

b)  $y = mx + b$ , solve for  $x$

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

Remember to remove brackets first!

c)  $A = P(1 + rt)$ , solve for  $t$

$$A = P + Prt$$
$$\frac{A-P}{Pr} = \frac{Prt}{Pr}$$
$$\frac{A-P}{Pr} = t$$

d)  $w = u + at^2$ , solve for  $a$

$$\frac{w-u}{t^2} = \frac{at^2}{t^2}$$
$$\frac{w-u}{t^2} = a$$

NOW YOU TRY!

a)  $y = mx + b$ , solve for  $b$

$$y - mx = b$$

b)  $I = Prt$ , solve for  $t$

$$\frac{I}{Pr} = \frac{Prt}{Pr}$$
$$\frac{I}{Pr} = t$$

c)  $d = st$ , solve for  $s$

$$\frac{d}{t} = \frac{st}{t}$$
$$\frac{d}{t} = s$$

d)  $A = \frac{bh}{2}$ , solve for  $h$

cross x

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

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## WORD PROBLEMS

### EXAMPLE 1:

The formula relating distance, speed and time is  $d = st$ . If the distance between Earth and Mars is 150 000 000 <sup>km</sup> and the speed of a space probe travels is 26 000 km/hour, how long does it take the probe to travel from Earth to Mars on average?

**Step 1:** Rearrange formula to isolate speed ( $s$ ).

**Step 2:** Substitute the known values.

**Step 3:** Solve for the value of  $s$ .

$$\begin{aligned} \textcircled{1} \quad d &= st \\ \frac{d}{s} &= \frac{st}{s} \\ \frac{d}{s} &= t \\ t &= \frac{d}{s} \end{aligned}$$
$$\begin{aligned} \textcircled{2} \quad t &= \frac{150\,000\,000 \text{ km}}{26\,000 \text{ km/h}} \\ \textcircled{3} \quad t &= 5769.23 \text{ hours} \\ \therefore \text{ it takes} & \quad 5769.23 \text{ hours} . \end{aligned}$$

### EXAMPLE 2:

The formula for finding the area of a triangle is  $A = \frac{bh}{2}$ , where  $A$  is area,  $b$  is the length of the base, and  $h$  is the height. If the area of a triangle is  $144\text{cm}^2$  and the height is 18 cm, calculate the base of the triangle.

$$\begin{aligned} \textcircled{1} \quad A &= \frac{bh}{2} \\ \frac{2A}{h} &= \frac{bh}{h} \\ \frac{2A}{h} &= b \end{aligned}$$

$$\begin{aligned} b &= \frac{2A}{h} \\ \textcircled{2} \quad b &= \frac{2(144)}{18} \\ \textcircled{3} \quad b &= \frac{288}{18} \end{aligned}$$

$$b = 16 \quad \therefore \text{ base is } 16\text{cm}.$$

### EXAMPLE 3:

The formula  $P = 2l + 2w$  is used to calculate the perimeter,  $P$ , of a rectangle. Length is represented by  $l$  and  $w$  represents the width. If the perimeter of a rectangle is 120 cm, and the width is 15 cm, calculate the length of the rectangle.

$$\begin{aligned} \textcircled{1} \quad P &= 2l + 2w \\ \frac{P - 2w}{2} &= \frac{2l}{2} \\ \frac{P - 2w}{2} &= l \end{aligned}$$

$$\begin{aligned} \frac{P - 2w}{2} &= l \\ \textcircled{2} \quad \frac{(120) - 2(15)}{2} &= l \\ \textcircled{3} \quad \frac{120 - 30}{2} &= l \\ \frac{90}{2} &= l \end{aligned}$$

$$\begin{aligned} 45 &= l \\ \therefore \text{ length is } 45\text{cm} . \end{aligned}$$