

1.4 Rewrite Formulas and Equations

EXAMPLE 1 Rewrite a formula with two variables

Solve the formula $C = 2\pi r$ for r . Then find the radius of a circle with a circumference of 44 inches.

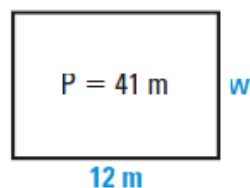
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$$C = \cancel{2\pi} r$$
$$\frac{C}{2\pi}$$

$$r = \frac{C}{2\pi}$$

$$\rightarrow r = \frac{44}{2\pi} = \frac{22}{\pi} \text{ in}$$

Solve the formula $P = 2l + 2w$ for w . Then find the width of a rectangle with a length of 12 meters and a perimeter of 41 meters.



$$P = 2l + 2w$$

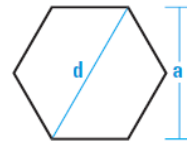
$$\frac{P - 2l}{2} = \frac{2w}{2}$$

$$\frac{1}{2}P - l$$

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

$$\frac{41 - 2(12)}{2} = \frac{41 - 24}{2} = \frac{17}{2} = 8.5 \text{ m}$$

The formula for the distance d between opposite vertices of a regular hexagon is $d = \frac{2a}{\sqrt{3}}$ where a is the distance between opposite sides. Solve the formula for a . Then find a when $d = 10$ centimeters.



$$\sqrt{3}d = \frac{2a}{\sqrt{3}}$$

$$\frac{d\sqrt{3}}{2} = \frac{2a}{2}$$
$$a = \frac{d\sqrt{3}}{2}$$

$$a = \frac{10\sqrt{3}}{2}$$

$$a = 5\sqrt{3} \text{ cm}$$

EXAMPLE 3 Rewrite a linear equation

Solve $9x - 4y = 7$ for y . Then find the value of y when $x = -5$.

$$\begin{aligned} \cancel{9x} - 4y &= 7 && \text{---} \\ -4y &= 7 - 9x && \text{---} \\ \frac{-4y}{-4} &= \frac{7 - 9x}{-4} && \text{---} \\ y &= \frac{7 - 9x}{-4} = -\frac{7 - 9x}{4} && \text{---} \\ &= \frac{9x - 7}{4} && \text{---} \\ y &= \frac{9(-5) - 7}{4} && \text{---} \\ &= \frac{-45 - 7}{4} = -\frac{52}{4} && \text{---} \\ &= -13 && \text{---} \end{aligned}$$

EXAMPLE 4 Rewrite a nonlinear equation

Solve $2y + xy = 6$ for y . Then find the value of y when $x = -3$.

$$2y + xy = 6$$
$$(2+x)y = 6$$
$$y = \frac{6}{2+x}$$
$$y = \frac{6}{2+(-3)} = \frac{6}{-1} = -6$$

Solve the equation for y . Then find the value of y when $x = 2$.

$$4y - xy = 28$$

$$4y - xy = 28$$

$$\frac{(4-x)y}{(4-x)} = \frac{28}{(4-x)}$$

$$y = \frac{28}{4-x} = \frac{28}{4-2} = \frac{28}{2} = 14$$