Lesson 1.4:

Rewriting Equations and Formulas

Essential Question

How can you use a formula for one measurement to write a formula for a different measurement?

Solve the equation $2y + 5x = 6$ for y.

To isolate the y, we need to start by moving the terms that are furthest away from the y.

$-5x \quad -5x$

$\frac{2y}{2} = \frac{6-5x}{2}$

$y = \frac{6-5x}{2}$ Each term in the numerator is divided by the denominator.

$y = \frac{6}{2} - \frac{5x}{2}$

$y = 3 - \frac{5}{2}x$ Simplify

Solve the equation for y.

1. $5y - x = 10$

$+x \quad +x$

$\frac{5y}{5} = \frac{10+x}{5}$

$y = \frac{10+x}{5}$

$y = \frac{10}{5} + \frac{x}{5}$

$y = 2 + \frac{1}{5}x$

2. $4x - 4y = 1$

$-4x \quad -4x$

$\frac{-4y}{-4} = \frac{1-4x}{-4}$

$y = \frac{1-4x}{-4}$

$y = \frac{1}{-4} - \frac{4x}{-4}$

$y = -\frac{1}{4} - (-x)$

$y = -\frac{1}{4} + x$

3. $12 = 6x + 3y$

$-6x \quad -6x$

$\frac{12-6x}{3} = \frac{3y}{3}$

$\frac{12-6x}{3} = y$

$\frac{12}{3} - \frac{6x}{3} = y$

$4 - 2x = y$

The formula for the surface area *S* of a cone is $S = \pi r^2 + \pi r\ell$. Solve the formula for the slant height ℓ.

$S = \pi r^2 + \pi r\ell$

$-\pi r^2 \quad -\pi r^2$

$\frac{S - \pi r^2}{\pi r} = \frac{\pi r \ell}{\pi r}$

$\frac{S - \pi r^2}{\pi r} = \ell$

$\frac{S}{\pi r} - \frac{\pi r^2}{r} = \ell$

$\frac{S}{\pi r} - \pi r = \ell$

Solve the formula for the red variable.

4. Area of rectangle: $A = bh$

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

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

5. Simple interest: $I = Prt$

$\frac{I}{rt} = \frac{Prt}{rt}$

$\frac{I}{rt} = P$

6. Surface area of cylinder: $S = 2\pi r^2 + 2\pi rh$

$-2\pi r^2 \quad -2\pi r^2$

$\frac{S - 2\pi r^2}{2\pi r} = \frac{2\pi rh}{2\pi r}$

$\frac{S}{2\pi r} - \frac{2\pi r^2}{2\pi r} = h$

$\frac{S}{2\pi r} - r = h$

Key Idea

Temperature Conversion

A formula for converting from degrees Fahrenheit F to degrees Celsius C is

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

Solve the temperature formula for *F*.

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

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

$+\left(\frac{5}{9}\cdot 32\right) \qquad +\left(\frac{5}{9}\cdot 32\right)$

$C + \left(\frac{5}{9}\cdot 32\right) = \frac{5}{9}F$

$\cdot\frac{9}{5} \qquad \cdot\frac{9}{5}$

$\frac{9}{5}\left[C + \left(\frac{5}{9}\cdot 32\right)\right] = F$

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

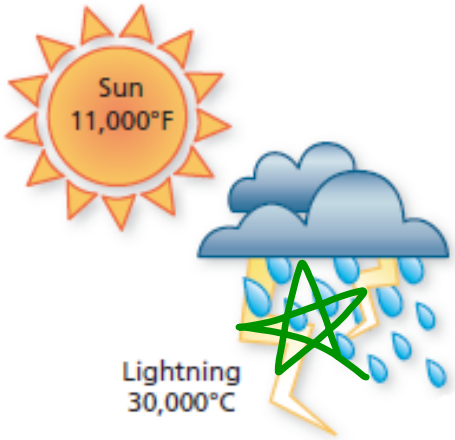
$\frac{C}{\frac{5}{9}} = \frac{\frac{5}{9}(F-32)}{\frac{5}{9}}$

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

$+32 \qquad +32$

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

Which has the greater temperature?



$\frac{9}{5}(30{,}000)+32$

$54{,}000+32$

$54{,}032°F$

7. Room temperature is considered to be 70°F. Suppose the temperature is 23°C. Is this greater than or less than room temperature?

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

$\frac{9}{5}\cdot 23+32$

$41.4+32$

$73.4°F$ Greater