

Topic 6 Rewriting Formulas

Florida
Standards

Learning Standard
MACC.912.A-CED.1.4

EXAMPLE 1 Rewriting a Formula

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 .

SOLUTION

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

Write the formula.

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

Subtract πr^2 from each side.

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

Simplify.

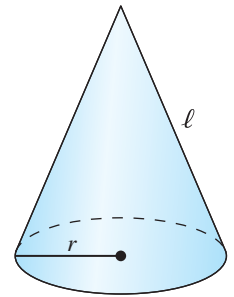
$$\frac{S - \pi r^2}{\pi r} = \frac{\pi r\ell}{\pi r}$$

Divide each side by πr .

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

Simplify.

The rewritten formula is $\ell = \frac{S - \pi r^2}{\pi r}$.



EXAMPLE 2 Rewriting the Temperature Formula

The formula for converting from degrees Fahrenheit F to degrees Celsius C is $C = \frac{5}{9}(F - 32)$. Solve the formula for F .

SOLUTION

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

Write the formula.

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

Multiply each side by $\frac{9}{5}$.

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

Simplify.

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

Add 32 to each side.

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

Simplify.

The rewritten formula is $F = \frac{9}{5}C + 32$.

Exercises Within Reach®

1. **Temperature** The formula $K = C + 273.15$ converts temperatures from Celsius C to Kelvin K .

- Solve the formula for C .
- Convert 300 K to Celsius.

2. **Interest** The formula for simple interest is $I = Prt$.

- Solve the formula for t .
- Use the new formula to find the value of t (in years) in the table.

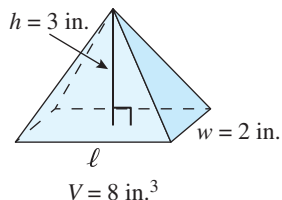
I	\$75
P	\$500
r	5%
t	

3. **Distance** The formula for the distance d is $d = rt$, where r is the rate and t is the time.

- Solve the formula for r .
- A car travels 180 miles in 3 hours. Use the new formula to find the rate the car is moving.

4. **Volume** The formula for the volume V of a rectangular pyramid is $V = \frac{1}{3}\ell wh$, where ℓ is the length of the base, w is the width of the base, and h is the height of the pyramid.

- Solve the formula for ℓ .
- Use the new formula to find the length of the base of the rectangular pyramid.

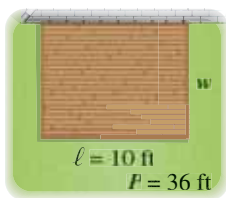


5. **Profit** The total profit P for a company is given by $P = R - C$, where R is the total revenue and C is the total cost.

- Solve the formula for C .
- In a year, a company has a total profit of \$68 thousand and a total revenue of \$83 thousand. Use the new formula to find the total cost for the company.

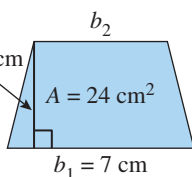
6. **Perimeter** The perimeter P of a rectangle is given by $P = 2\ell + 2w$, where ℓ is the length and w is the width.

- Write the formula for w .
- Use the new formula to find the width of the rectangular deck.



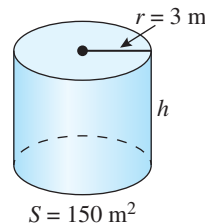
7. **Area** The formula for the area A of a trapezoid is $A = \frac{1}{2}(b_1 + b_2)h$, where b_1 is one base, b_2 is the other base, and h is the height.

- Solve the formula for b_2 . $h = 4 \text{ cm}$
- Use the new formula to find the other base of the trapezoid.



8. **Surface Area** The formula for the surface area S of a right cylinder is $S = 2\pi r(h + r)$, where r is the radius and h is the height.

- Solve the formula for h .
- Use the new formula to find the height of the right cylinder.



9. **Force** Newton's law of gravitation is given by the formula

$$F = G \left(\frac{m_1 m_2}{d^2} \right)$$

where F is the force between two objects of masses m_1 and m_2 , G is the gravitational constant, and d is the distance between the two objects. Solve the formula for m_1 .

10. **Revenue** The total revenue R for a benefit concert is given by $R = Ap_1 + Cp_2$, where A is the number of adult tickets sold, C is the number of child tickets sold, p_1 is the price per adult ticket, and p_2 is the price per child ticket. Solve the formula for p_2 .

11. **Sale Price** The sale price S (in dollars) of an item is given by the formula $S = L - rL$, where L is the list price (in dollars) and r is the discount rate (in decimal form).

- Solve the formula for L .
- The discount rate of the shirt is 30%. Use the new formula to find the list price.



12. **Surface Area** The formula for the surface area S of a rectangular prism is $S = 2\ell w + 2\ell h + 2wh$, where ℓ is the length, w is the width, and h is the height.

- Solve the formula for h .
- A rectangular prism has a surface area of 236 square millimeters, a length of 8 millimeters, and a width of 5 millimeters. Use the new formula to find the height.