Mini-Lecture 1.3

Using Formulas to Solve Problems

Learning Objectives:

1. Solve for a variable in a formula.
2. Use formulas to solve problems.

Preparing for Formulas:

Given the decimal 0.985, approximate by

i) Truncating to two decimal places

0.98

ii) Rounding to one decimal place

1.0

Examples:

1. Solve the formula for the indicated variable.

a) $V = \frac{1}{3}Bh$ for h

$3V = Bh$

$\frac{3V}{B} = \frac{Bh}{B}$

$\frac{3V}{B} = h$

b) $A = P + Prt$ for t

$A - P = Prt$

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

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

c) $A = \frac{1}{2}h(B + b)$ for B

$2A = h(B+b)$

$2A = Bh + bh$

$\frac{2A - bh}{h} = \frac{Bh}{h}$

$B = \frac{2A - bh}{h}$ *

$B = \frac{2A}{h} - \frac{bh}{h}$

$B = \frac{2A}{h} - b$ *

d) $6x - 8y = -24$ for y

$-8y = -24 - 6x$

$\frac{-8y}{-8} = \frac{-24}{-8} - \frac{6x}{-8}$

$y = 3 + \frac{3x}{4}$

$y = \frac{3}{4}x + 3$

2. **Cylinders** The surface area, A, of a right circular cylinder is given by the formula $A = 2\pi rh + 2\pi r^2$ where r is the radius of the base and h is the height of the cylinder.

a) Solve the formula for h.

$A = 2\pi rh + 2\pi r^2$

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

$A - 2\pi r^2 = 2\pi rh$

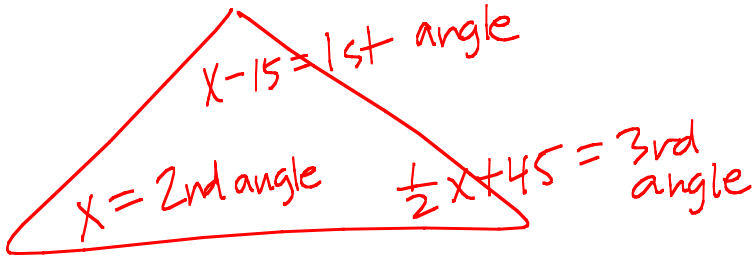
$\frac{A - 2\pi r^2}{2\pi r} = \frac{2\pi rh}{2\pi r}$

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

b) Determine the height of a cylinder whose radius measures $\frac{3}{2}$ inches and whose surface area is 30 in^2. Round your answer to the nearest tenth of an inch.

$$h \approx \frac{30 - 2(3.14)\left(\frac{3}{2}\right)^2}{2(3.14)\left(\frac{3}{2}\right)} = \frac{15.87}{9.42} = 1.68 \approx 1.7 \text{ in.}$$

3. **Angles of a Triangle** The sum of the measures of the interior angles of a triangle is 180°. The measure of the first angle is 15° less than the second. The measure of the third angle is 45° more than half of the second. Find the measure of each interior angle of the triangle.



$$x + x - 15 + \tfrac{1}{2}x + 45 = 180$$

$$2x + 30 + \tfrac{1}{2}x = 180$$

$$2^{\cdot 2}x + \tfrac{1}{2}^{\cdot 2}x = 150^{\cdot 2}$$

$$4x + x = 300$$

$$5x = 300$$

$$x = 60$$

2nd angle is 60°

1st angle is 45°

3rd angle is 75°