

Day 3

### 1.3 Solving Equations

A variable expression:  $x + 3$  (simplify)

An equation:  $x + 3 = 2$  (solve)

If there's variables on both sides of the equation:

- 1.) If there's parentheses - distribute
- 2.) move the letters to one side (left) and constants to the right using addition and subtraction (inverse operations)

3.) multiply or  $\div$   
if a fraction is multiplied by the variable, multiply by the reciprocal on both sides

$$\textcircled{\text{ex}} \quad \cancel{\frac{3}{2}} \cdot \cancel{\frac{2}{3}} x = -\cancel{8}^4 \cdot \frac{3}{2}$$

$$x = -12$$

$\textcircled{\text{ex 2}}$

$$\begin{array}{r|l} 8x + 12 = 5x - 21 \\ -5x & -5x \end{array}$$

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$$\begin{array}{r|l} 3x + 12 = -21 \\ -12 & -12 \end{array}$$

$$\begin{array}{r|l} 3x = -33 \\ 3 & 3 \end{array}$$

$$\textcircled{x = -11}$$

ex 3

$$2 - 3(x+4) = 8$$

$$2 - 3x - 12 = 8$$

$$\begin{array}{r} -3x - 10 = 8 \\ +10 \quad +10 \end{array}$$

$$\begin{array}{r} -3x = 18 \\ -3 \quad -3 \end{array} \quad \{-6\}$$

$$x = -6$$

ex 4

$$4w - 2(1-w) = -38$$

$$4w - 2 + 2w = -38$$

$$\begin{array}{r} 6w - 2 = -38 \\ +2 \quad +2 \end{array}$$

$$\begin{array}{r} 6w = -36 \\ 6 \quad 6 \end{array}$$

$$w = -6$$

ex 5

$$6(n-4) = 3n$$

$$\begin{array}{r} 6n - 24 = 3n \\ -6n \quad -6n \end{array}$$

$$\begin{array}{r} -24 = -3n \\ -3 \quad -3 \end{array}$$

$$8 = n$$

Solve a formula for the indicated variable.

①  $2 \cdot A = \frac{1}{2}bh \cdot 2$  solve for  $h$ .

$$\frac{2A}{b} = \frac{bh}{b}$$

$$\boxed{\frac{2A}{b} = h} \quad \text{or} \quad \boxed{h = \frac{2A}{b}}$$

②  $\frac{V}{\pi h} = \frac{\pi r^2 h}{\pi h}$

solve for  $r$   
(volume of a cylinder)

$$\sqrt{\frac{V}{\pi h}} = \sqrt{r^2}$$

$$\boxed{\sqrt{\frac{V}{\pi h}} = r}$$

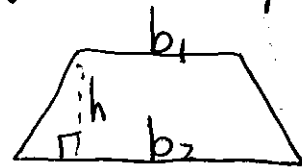
③  $2 \cdot A = \frac{1}{2}h(b_1 + b_2) \cdot 2$  solve for  $b_1$

$$\frac{2A}{h} = \frac{h}{h}(b_1 + b_2)$$

$$\frac{2A}{h} = b_1 + b_2$$

$$-b_2 \qquad -b_2$$

$$\boxed{\frac{2A}{h} - b_2 = b_1}$$



Solve each for x.  
Find any restrictions.

①  
Factor  
out  
an "x"

$$\frac{ax}{x} + \frac{bx}{x} - 15 = 0$$

$$x(a+b) - 15 = 0$$

+15    +15

$$x \frac{(a+b)}{(a+b)} = \frac{15}{(a+b)}$$

$$x = \frac{15}{a+b}$$

IF there's  
variables in the  
denominator  
they cannot = 0

restrictions:

a + b cannot both be zero  
and cannot be opposites

$$a \neq 0 + b \neq 0$$

$$a \neq -b$$

②

$$\frac{d}{-b} = \frac{2x}{a} + \frac{b}{-b}$$

$$\frac{a}{2}(d-b) = \frac{\cancel{x}}{\cancel{a}} \cdot \frac{\cancel{a}}{\cancel{x}}$$

$$\frac{a}{2}(d-b) = x$$

no restrictions

**Practice 1-3****Solving Equations**

Solve each formula for the indicated variable.

1.  $V = \frac{\pi}{3}r^2h$ , for  $h$

2.  $S = L(1 - r)$ , for  $r$

3.  $S = lw + wh + lh$ , for  $w$

Solve for  $x$ . State any restrictions on the variables.

4.  $\frac{4}{9}(x + 3) = g$

5.  $a(x + c) = b(x - c)$

6.  $\frac{x + 3}{t} = t^2$

- X 7. Two brothers are saving money to buy tickets to a concert. Their combined savings is \$55. One brother has \$15 more than the other. How much has each saved?
- X 8. The sides of a triangle are in the ratio 5 : 12 : 13. What is the length of each side of the triangle if the perimeter of the triangle is 15 in.?
- X 9. Find three consecutive numbers whose sum is 126.

Solve each equation.

10.  $\frac{1}{2}(x - 3) + \left(\frac{3}{2} - x\right) = 5x$

11.  $5w + 8 - 12w = 16 - 15w$

12.  $7y + 5 = 6y + 11$

13.  $1.2(x + 5) = 1.6(2x + 5)$

14.  $t - 3\left(t + \frac{4}{3}\right) = 2t + 3$

15.  $0.5(c + 2.8) - c = 0.6c + 0.3$

16.  $3(x + 1) = 2(x + 11)$

17.  $\frac{u}{5} + \frac{u}{10} - \frac{u}{6} = 1$

- X 18. Mike and Adam left a bus terminal at the same time and traveled in opposite directions. Mike's bus was in heavy traffic and had to travel 20 mi/h slower than Adam's bus. After 3 hours, their buses were 270 miles apart. How fast was each bus going?
- X 19. Two trains left a station at the same time. One traveled north at a certain speed and the other traveled south at twice the speed. After 4 hours, the trains were 600 miles apart. How fast was each train traveling?
- X 20. Find four consecutive odd integers whose sum is 336.
- X 21. The length of a rectangle is 5 cm greater than its width. The perimeter is 58 cm. Find the dimensions of the rectangle.

