

## 1.1 One Step Equations

Solve for x.

$$1. \quad \begin{array}{r} x + 18 = 25 \\ \underline{-18 \quad -18} \\ \boxed{x = 7} \end{array}$$

Check:

$$\begin{aligned} (7) + 18 &= 25 \\ 25 &= 25 \\ &\quad \checkmark \end{aligned}$$

$$2. \quad \begin{array}{r} x - 36 = 20 \\ \underline{+36 \quad +36} \\ \boxed{x = 56} \end{array}$$

Check:

$$\begin{aligned} (56) - 36 &= 20 \\ 20 &= 20 \\ &\quad \checkmark \end{aligned}$$

$$3. \quad \begin{array}{r} 5x = 35 \\ \underline{\div 5 \quad \div 5} \\ \boxed{x = 7} \end{array}$$

Check:

$$\begin{aligned} 5(7) &= 35 \\ 35 &= 35 \end{aligned}$$

$$4. \quad \begin{array}{r} \overset{(-8)}{\cancel{(-8)}} \left( \frac{x}{\cancel{-8}} \right) = (48) \cdot (-8) \\ \underline{\hspace{1.5cm}} \\ \boxed{x = -384} \end{array}$$

Check:

$$\begin{aligned} \frac{(-384)}{-8} &= 48 \\ 48 &= 48 \\ &\quad \checkmark \end{aligned}$$

## 1.2 Multi-Step Equations

Solve for x.

$$\begin{array}{r}
 1. \quad 15 - 4x = 25 \\
 \underline{-15} \quad \underline{-15} \\
 -4x = 10 \\
 \underline{-4} \quad \underline{-4} \\
 x = -\frac{5}{2} = -2.5
 \end{array}$$

Check:

$$\begin{array}{l}
 15 - 4\left(-\frac{5}{2}\right) = 25 \\
 15 + 10 = 25 \\
 25 = 25 \quad \checkmark
 \end{array}$$

$$\begin{array}{r}
 2. \quad -8 - 2x - 6x = 24 \\
 \underline{-8} \quad \underline{-8} \\
 -8x = 32 \\
 \underline{-8} \quad \underline{-8} \\
 x = -4
 \end{array}$$

Check:

$$\begin{array}{l}
 -8 - 2(-4) - 6(-4) = 24 \\
 -8 + 8 + 24 = 24 \\
 0 + 24 = 24 \\
 24 = 24 \quad \checkmark
 \end{array}$$

$$\begin{array}{r}
 3. \quad 4 - 5(2x - 6) = 24 \\
 4 - 10x + 30 = 24 \\
 \underline{34} \quad \underline{-34} \\
 -10x = -10 \\
 \underline{-10} \quad \underline{-10} \\
 x = 1
 \end{array}$$

Check:

$$\begin{array}{l}
 4 - 5(2(1) - 6) = 24 \\
 4 - 5(2 - 6) = 24 \\
 4 - 5(-4) = 24 \\
 4 + 20 = 24 \\
 24 = 24 \quad \checkmark
 \end{array}$$

# 1.1/1.2 Write the equation and Solve for x.

1) Melanie has blue marbles to put in flower vases. A bag comes with <sup>Total</sup> 200 marbles. Melanie needs to fill 18 vases. How many marbles should you divide from the bag to fill the vases without any waste?

$$\frac{200}{x} = 18$$

2) There were a total of 24 basketball games in the season. The season is played for 6 months. How many basketball games were played each month, if each month has the same number of games?

$$6x = 24$$

3) Alyssa has some black balloons. Tom has 8 more black balloons than Alyssa. If Tom has 30 balloons, how many black balloons does Alyssa have?

+8      A      T = 30      X

$$x + 8 = 30$$

4) Nancy has saved 3900 cents from selling lemonade. How many dollars does Nancy have?

dollars = 100 cents      X

$$100x = 3900$$

5) Tom earns \$12.50 an hour cleaning houses. If he starts work at 8:00 am and wants to make \$150 total, how long does he have to work and when does he get off work?

$$12.50x = 150$$

6) Sam and Sara found the same amount of seashells on the beach. Sara dropped 2 and they broke. If they found 30 seashells together, how many seashells did Sara find?

-2      +

$$x + (x - 2) = 30$$

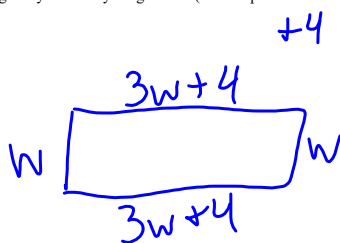
Sam      Sara

7) In an isosceles triangle, one angle is 65 degrees, and the other two angles are different but are the equal to each other. What is the measure of the unknown two angles? (Remember that the angles in a triangle add up to 180 degrees.)



$$\begin{aligned} \text{angle} + \text{angle} + \text{angle} &= 180 \\ 65 + x + x &= 180 \\ \boxed{65 + 2x} &= \boxed{180} \end{aligned}$$

8) A garden is  $w$  feet wide, and its length is 4 more than 3 times the width. If you only have 50 feet of brick to lay around the garden, how wide and long can you make your garden? (Draw a picture. Perimeter =  $s + s + s + s$ )



+4      3 · w

$$P = s + s + s + s$$

$$50 = \underbrace{w}_{m} + \underbrace{3w + 4}_{m} + \underbrace{w}_{m} + \underbrace{3w + 4}_{m}$$

$$\boxed{50 = 8w + 8}$$

### 1.3 Solving Equations with Variables on both sides

1.  $3x - 7 = 4x - 5$

$$\begin{array}{r} \textcircled{-3x} \quad \quad \quad \textcircled{-3x} \\ \hline -7 = x - 5 \\ +5 \quad \quad \quad +5 \\ \hline \boxed{-2 = x} \end{array}$$

Check:

$$\begin{aligned} 3(-2) - 7 &= 4(-2) - 5 \\ -6 - 7 &= -8 - 5 \\ -13 &= -13 \checkmark \end{aligned}$$

2.  $8x - 5 + 5x = -7 + 9x - 10$

$$\begin{array}{r} 13x - 5 = \textcircled{9x} + 17 \\ \textcircled{-9x} \quad \quad \quad \textcircled{-9x} \\ \hline 4x - 5 = -17 \\ \textcircled{+5} \quad \quad \quad +5 \\ \hline 4x = -12 \\ \textcircled{4} \quad \quad \quad \textcircled{4} \\ \hline \boxed{x = -3} \end{array}$$

Check:

$$\begin{aligned} 8(-3) - 5 + 5(-3) &= -7 + 9(-3) - 10 \\ -24 - 5 - 15 &= -7 - 27 - 10 \\ -29 - 15 &= -34 - 10 \\ -44 &= -44 \checkmark \end{aligned}$$

$\leftarrow -5$

3.  $3 - (6 - 4x) = 4x + 5(2x + 1)$

$$\begin{array}{r} 3 - 6 + 4x = 4x + 10x + 5 \\ \textcircled{-3} \quad \textcircled{+4x} = 14x + 5 \\ \textcircled{-4x} \quad \quad \quad \textcircled{-4x} \\ \hline -3 = 10x + 5 \\ \textcircled{-5} \quad \quad \quad \textcircled{-5} \\ \hline -8 = 10x \\ \textcircled{10} \quad \quad \quad \textcircled{10} \\ \hline \boxed{-\frac{4}{5} = x} \end{array}$$

## 1.4 Absolute Value and Equations

Evaluate:

1.  $|-31|$

31

2.  $|4|$

4

3.  $|-2(-8)|$

$$\begin{array}{r} |16| \\ 16 \end{array}$$

4.  $7 - |-5|$

$$\begin{array}{r} 7 - 5 \\ 2 \end{array}$$

5.  $9|9 - 7|$

$$\begin{array}{r} 9|2| \\ 9 \cdot 2 \\ 18 \end{array}$$

6.  $2|-6 + 1| - 3$

$$\begin{array}{r} 2|-5| - 3 \\ 2 \cdot 5 - 3 \\ 10 - 3 \\ 7 \end{array}$$

Solve for x.

7.  $|x| = 5$

Case 1 Case 2

$$\underline{x = 5} \quad \underline{x = -5}$$

8.  $|x| = -2$

No solution

9.  $|2x| = 18$

Case 1	Case 2
$\frac{2x}{2} = \frac{18}{2}$	$\frac{2x}{2} = \frac{-18}{2}$
$x = 9$	$x = -9$

10.  $|x - 5| = 15$

Case 1	Case 2
$x - 5 = -15$	$x - 5 = 15$
+5 +5	+5 +5
$x = -10$	$x = 20$

11.  $|-4x + 2| = 14$

Case 1	Case 2
$-4x + 2 = 14$	$-4x + 2 = -14$
$\frac{-4x + 2}{-4} = \frac{14}{-4}$	$\frac{-4x + 2}{-4} = \frac{-16}{-4}$
$x = -3$	$x = 4$

12.  $|6x + 4| + 2 = 22$

get absolute value bars alone first

$$\begin{array}{r} |6x+4| + 2 = 22 \\ -2 \quad -2 \\ \hline |6x+4| = 20 \end{array}$$

Case 1	Case 2
$6x + 4 = 20$	$6x + 4 = -20$
$\frac{6x + 4}{-4} = \frac{20}{-4}$	$\frac{6x + 4}{-4} = \frac{-24}{-4}$
$x = \frac{16}{6}$	$x = -4$

## 1.5 Literal Equations

1.  $3x + 5y = 10$  *Solve for y*

$$\begin{array}{r} -3x \\ \hline 5y = -3x + 10 \\ \hline y = \frac{-3}{5}x + \frac{10}{5} \\ \hline y = -\frac{3}{5}x + 2 \end{array}$$

2.  $4x - 6y = -18$

$$\begin{array}{r} -4x \\ \hline -6y = -4x - 18 \\ \hline y = \frac{-4}{-6}x + \frac{-18}{-6} \\ \hline y = \frac{2}{3}x + 3 \end{array}$$

3.  $-x - 3y = 9$

$$\begin{array}{r} +x \\ \hline -3y = x + 9 \\ \hline y = \frac{-1}{3}x - 3 \end{array}$$

4.  $-8x - 2y = -10$

$$\begin{array}{r} +8x \\ \hline -2y = 8x - 10 \\ \hline y = -4x + 5 \end{array}$$

5.  $2(A) = \frac{(w+k)h}{2}$  solve for w

$$\begin{array}{r} 2A = \frac{(w+k)h}{2} \\ \hline \frac{2A}{h} = \frac{w+k}{2} \\ \hline \frac{2A}{h} - \frac{k}{2} = w \end{array}$$

6.  $P = 2l + 2w$  solve for w

$$\begin{array}{r} -2l - 2l \\ \hline P - 2l = 2w \\ \hline \frac{P - 2l}{2} = w \end{array}$$