

Math 115
Spring 2019
Lecture 4

? $a^2 + b^2 = c^2$?
 $y = mx + b$? $d = rt$

Feb 19-8:47 AM

Solving linear Equations:

Solve

① $-5x = 5$

$\boxed{-5}x = \frac{5}{-5}$ $\boxed{x = -1}$ $\{-1\}$

② $x - 5 = -5$

$x \boxed{-5+5} = -5+5$
 $\boxed{x = 0}$ $\{0\}$

③ $\frac{2}{3}x = \frac{2}{3}$

multiply by 3

~~$3 \cdot \frac{2}{3}x = 3 \cdot \frac{2}{3}$~~

$2x = 2$

$\boxed{\frac{2}{2}}x = \frac{2}{2}$

$\boxed{x = 1}$
 $\{1\}$

④ $x + \frac{3}{4} = -\frac{3}{4}$

$x \boxed{+\frac{3}{4} - \frac{3}{4}} = -\frac{3}{4} - \frac{3}{4}$

$x = \frac{-3-3}{4}$

$x = -\frac{6}{4}$ $\boxed{x = -\frac{3}{2}}$ $\{-\frac{3}{2}\}$

① 8 added to Some number is equal to -10.

Find the number.

Let x be the number,

$$x + 8 = -10$$

Solve it.

$$x + 8 - 8 = -10 - 8$$

$$x = -18$$

The number is -18..

Some number reduced by -8 is equal to 8. Find the number.

Let x be the number,

$$x - (-8) = 8$$

$$x + 8 = 8$$

$$x + 8 - 8 = 8 - 8$$

$$x = 0$$

The number is 0.

① 4 times Some number is equal to -20.

Find Square of the number.

Let x be the number

$$x^2 = (-5)^2 = 25$$

$$4x = -20$$

$$\frac{4}{4}x = \frac{-20}{4}$$

$$\boxed{x = -5}$$

Square of
the number
is 25.

② $\frac{1}{10}$ of Some number is equal to 40.

Find Square root of the number.

Let x be the number,

$$\hookrightarrow \sqrt{x} = \sqrt{400} = 20$$

$$\frac{1}{10} \cdot x = 40$$

because $20^2 = 400$

$$10 \cdot \frac{1}{10}x = 10 \cdot 40$$

$$x = 400$$

Square root of the
number is 20.

Solve (final Ans in Solution Set)

① $3x + 10 = -8$

$$3x = -8 - 10$$

$$\boxed{3}x = -18$$

$$x = \frac{-18}{3}$$

$$\boxed{x = -6}$$

$$\{-6\}$$

② $-2x - 12 = 24$

$$-2x = 24 + 12$$

$$\boxed{-2}x = 36$$

$$x = \frac{36}{-2}$$

$$\boxed{x = -18}$$

$$\{-18\}$$

7 less than $2x$ twice some number is equal to 29. Find the number. x

Let x be the number

$$2x - 7 = 29$$

$$2x = 29 + 7$$

$$2x = 36$$

$$x = \frac{36}{2}$$

$$x = 18$$

The number is 18.

5 more than $-3x$ -3 times some number is equal to 56. Find the number. x

Let x be the number,

$$-3x + 5 = 56$$

$$-3x = 56 - 5$$

$$-3x = 51$$

$$x = \frac{51}{-3}$$

$$x = -17$$

The number is -17.

Solve

$$-2(3x + 7) + 14 = -30$$

$$-6x \quad -14 \quad +14 = -30$$

$$\boxed{-6}x = -30$$

$$x = \frac{-30}{-6}$$

$$\boxed{x=5} \rightarrow \{5\}$$

Hint:

Always use

Dist. Prop. to
remove ().

Solve

$$5(x + 4) - 3(x - 7) = 17$$

$$\underline{5x} \quad \{+20\} \quad \underline{-3x} \quad \{+21\} = 17$$

$$2x \quad \{+41\} = 17$$

$$2x = 17 - 41$$

$$\boxed{2}x = -24$$

$$x = \frac{-24}{2}$$

$$\boxed{x = -12}$$

$$\downarrow$$

$$\{-12\}$$

4 times the sum of some number and 4, reduced by 10 is equal to 30.

Find the number.

Let x be the number,

$$4(x + 4) - 10 = 30$$

$$4x + 16 - 10 = 30$$

$$4x + 6 = 30$$

$$4x = 30 - 6$$

The number is 6.

$$4x = 24$$

$$x = \frac{24}{4}$$

$$x = 6$$

-2 times the difference of some number and 5, increased by 4 times the number is equal to 10.

Find the number. Let x be the number,

$$-2(x - 5) + 4x = 10$$

$$\underline{-2x} + 10 + 4x = 10$$

$$2x + 10 = 10$$

$$2x = 10 - 10$$

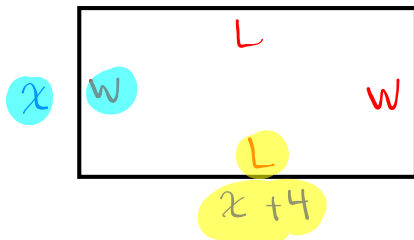
$$2x = 0$$

$$x = \frac{0}{2}$$

$$x = 0$$

The number is 0.

Find x if the Perimeter of the shape below is 28 ft. Rectangular Shape



$$P = 2L + 2W$$

$$P = 28$$

$$2L + 2W = 28$$

$$2(x+4) + 2(x) = 28$$

Solve for x .

$$2x + 8 + 2x = 28$$

$$4x + 8 = 28$$

$$4x = 28 - 8$$

$$4x = 20$$

$$x = \frac{20}{4}$$

$$x = 5$$

x is 5.

Quiz 1:

1) Simplify: $\frac{\sqrt{100} - \sqrt{36}}{(-2)^3} = \frac{10 - 6}{-8} = \frac{4}{-8} = \boxed{-\frac{1}{2}}$

2) Evaluate: $(x - y)^2 + xy$ for $x = 1$, and $y = -2$

$$= (1 - (-2))^2 + 1(-2) = (1 + 2)^2 + (-2) = 3^2 - 2 = 9 - 2 = \boxed{7}$$

3) Solve: $3x + 12 = -12$

$$3x = -12 - 12$$

$$3x = -24$$

$$x = \frac{-24}{3}$$

$$x = -8$$

$\{-8\}$

More on linear equations:

when we have (), use distribution to remove them.

when we have fractions, use LCD to clear all fractions

Solve

$$\textcircled{1} \quad 3(2x + 4) - (x - 10) = -28$$

$$6x + 12 - x + 10 = -28$$

$$5x + 22 = -28$$

$$5x = -28 - 22$$

$$5x = -50$$

$$x = \frac{-50}{5} \quad \{-10\}$$

$$\boxed{x = -10}$$

Solve

$$\frac{2}{3}x - \frac{5}{6} = \frac{1}{2}$$

$$3 = 3$$

$$6 = 3 \cdot 2$$

$$\underline{2 = 2}$$

To clear all fraction,

$$\text{LCD} = 3 \cdot 2 = 6$$

Multiply everything by LCD = 6

$$\cancel{6} \cdot \frac{2}{\cancel{3}}x - \cancel{6} \cdot \frac{5}{\cancel{6}} = \cancel{6} \cdot \frac{1}{\cancel{2}}$$

$$4x - 5 = 3$$

$$4x = 3 + 5$$

$$\boxed{4}x = 8$$

$$x = \frac{8}{4}$$

$$\boxed{x = 2}$$

$$\{2\}$$

Solve $\frac{3}{4}x + \frac{5}{6} = -\frac{3}{8}$

LCD = 24

Multiply everything
by LCD = 24 to clear
all fractions

$$\begin{aligned} 4 &= 2 \cdot 2 \\ 6 &= 2 \cdot 3 \\ 8 &= 2 \cdot 2 \cdot 2 \\ \hline \text{LCD} &= 2 \cdot 2 \cdot 3 \cdot 2 \\ &= 24 \end{aligned}$$

$$\cancel{24}^6 \cdot \frac{3}{4}x + \cancel{24}^4 \cdot \frac{5}{6} = \cancel{24}^3 \cdot \frac{-3}{8}$$

$$18x + 20 = -9$$

$$18x = -9 - 20$$

$$\boxed{18x} = -29$$

$$\boxed{x = -\frac{29}{18}}$$

$$\boxed{x = -1\frac{11}{18}}$$

$$\left\{ -\frac{29}{18} \right\} \text{ OR } \left\{ -1\frac{11}{18} \right\}$$

When we have variable on both sides of the equation, we should group all variables on the left-hand side and everything else on the right-hand side of $=$.

Solve

$$3x + 17 = x + 3$$

$$3x - x = 3 - 17$$

$$\boxed{2x} = -14$$

$$\rightarrow x = \frac{-14}{2}$$

$$\boxed{x = -7}$$

$$\{-7\}$$

Solve $4x + 23 = -17 - x$

$$4x + x = -17 - 23$$

$$\boxed{5x} = -40$$

$$x = \frac{-40}{5}$$

$$\rightarrow \boxed{x = -8}$$

$$\rightarrow \{-8\}$$

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

Distribute & Simplify each side

$$4x - 4 + 6x + 12 = 5x + 15 - 4$$

$$10x + 8 = 5x + 11$$

$$10x - 5x = 11 - 8$$

$$5x = 3$$

$$\boxed{x = \frac{3}{5}}$$

$$\boxed{x = .6}$$

OR

$$\left\{ \frac{3}{5} \right\} \text{ or } \left\{ .6 \right\}$$

Solve $\frac{2}{3}(x - 4) + \frac{3}{4} = \frac{1}{2}(x + 3)$

1) Use LCD to clear fractions

$$12 \cdot \frac{2}{3}(x - 4) + 12 \cdot \frac{3}{4} = 12 \cdot \frac{1}{2}(x + 3)$$

$$\left\{ \begin{array}{l} 3 = 3 \\ 4 = 2 \cdot 2 \\ 2 = 2 \\ \text{LCD} = 3 \cdot 2 \cdot 2 \\ = 12 \end{array} \right.$$

$$8(x - 4) + 9 = 6(x + 3)$$

2) Distribute to remove ().

$$8x - 32 + 9 = 6x + 18$$

$$8x - 23 = 6x + 18$$

3) Variables on the left, everything else on the right

$$8x - 6x = 18 + 23$$

$$2x = 41$$

$$\boxed{x = \frac{41}{2}}$$

$$\boxed{x = 20 \frac{1}{2}}$$

$$\boxed{x = 20.5}$$

$$\left\{ \frac{41}{2} \right\}$$

Solve

$$5(2x + 3) - 2(5x - 7) = -29$$

$$\cancel{10x} + 15 - \cancel{10x} + 14 = -29$$

$$29 = -29$$

False \Rightarrow No Solution $\Rightarrow \emptyset$

Do not place \emptyset
in a Solution Set

~~$\{\emptyset\}$~~

$$0 = -29 - 29$$

$$0 = -58$$

Solve

$$7(3x + 4) - (x + 8) = 5(4x - 2) + 30$$

$$\underline{21x} \quad (+28) \quad \underline{-x} \quad (-8) = 20x \quad (-10) \quad (+30)$$

$$20x \quad (+20) = (20x) + 20$$

$$20x \quad -20x = 20 - 20$$

$$0 = 0$$

True \Rightarrow infinite number of
Solutions

All Real numbers

\mathbb{R}

Solve

$$.1x + .05(x + 4) = .2$$

To remove
decimal,
first convert
to fractions

$$\frac{1}{10}x + \frac{5}{100}(x + 4) = \frac{2}{10}$$

Use LCD = 100 to clear fractions.

$$\cancel{100} \cdot \frac{1}{\cancel{10}}x + \cancel{100} \cdot \frac{5}{\cancel{100}}(x + 4) = \cancel{100} \cdot \frac{2}{\cancel{10}}$$

$$10x + 5(x + 4) = 20$$

$$\underbrace{10x} + \underbrace{5x} + \underbrace{20} = 20$$

$$\begin{aligned} 15x &= 20 - 20 \\ 15x &= 0 \\ x &= \frac{0}{15} \quad \boxed{x=0} \end{aligned} \quad \{0\}$$