Math 115

Spring 2017

Lecture 3

Properties of equation:

If $A = B$, then

$A + C = B + C$ Addition

$A - C = B - C$ Subtraction

$A \cdot C = B \cdot C$ Multiplication

$\frac{A}{C} = \frac{B}{C}$; $C \neq 0$ Division

Solve $x - 2 = 10$

$x - 2 + 2 = 10 + 2$ Addition

$x + 0 = 12$ Inverse

$x = 12$ Identity

↳ Just another eqn

Solution Set $\{12\}$

Solve $x + 5 = -15$

$x + 5 - 5 = -15 - 5$ Subtraction

$x + 0 = -20$ Inverse

$x = -20$ Identity → $\{-20\}$

Solve $-4x = 84$

$\frac{-4x}{-4} = \frac{84}{-4}$ Division → $\{-21\}$

$1 \cdot x = -21$ inverse

$x = -21$ Identity

Solve $\frac{1}{5}x = -10$

$5 \cdot \frac{1}{5}x = 5 \cdot (-10)$ Multiplication

$1 \cdot x = -50$ Inverse

$x = -50$ Identity → $\{-50\}$

Linear Eqn $Ax + B = C$

①

②

③ use addition / subtraction prop.

④ use multiplication / Division prop.

⑤ Final ans in Solution Set.

Solve $2x - 3 = -29$

$2x - 3 + 3 = -29 + 3$

$2x = -26$

$x = \frac{-26}{2}$ $\boxed{x = -13}$

$\{-13\}$

Solve

$-3x + 5 = -31$

$-3x + 5 - 5 = -31 - 5$

$-3x = -36$

$x = \frac{-36}{-3}$ $\boxed{x = 12}$

$\{12\}$

12 more than 5 times some number is equal to -13. Find the number.

Let x be the number,

$5x + 12 = -13$

$5x = -13 - 12$

$5x = -25$

$x = \frac{-25}{5}$ $\boxed{x = -5}$

The number is -5.

Four times some number reduced by 15 is equal to −55. Find the number.

Let x be the number,

$$4x - 15 = -55$$

$$4x = -55 + 15$$

$$4x = -40$$

$$x = \frac{-40}{4}$$

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

The number is −10.

Linear Eqn $Ax + B = C$

①

② use Distribution to remove ( ).

③ use addition / subtraction prop.

④ use multiplication / Division prop.

⑤ Final ans in Solution Set.

Solve $3(x-1) + 8 = 35$

$$3x - 3 + 8 = 35$$

$$3x + 5 = 35$$

$$3x = 35 - 5$$

$$3x = 30$$

$$x = \frac{30}{3} \Rightarrow \boxed{x = 10}$$

Final Ans. $\rightarrow \{10\}$

Solve $2(3x-7)-(x+6)=80$

$6x-14-x-6=80$

$5x-20=80$

$5x=80+20$

$5x=100$

$x=\frac{100}{5}$

$x=20$

$\{20\}$

Twice the difference of 20 and some number is equal to -40.

Find the number.

Let x be the number,

$2(20-x)=-40$

$40-2x=-40$

$-2x+40=-40$

$-2x=-40-40$

$-2x=-80$

$x=\frac{-80}{-2}$

$x=40$

The number is 40.

Solve

$4x - 12 = 2x + 8$

$4x = 2x + 8 + 12$

$4x = 2x + 20$

$4x - 2x = 20$

$2x = 20$

$x = 10$ → $\{10\}$

Solve $3x + 24 = -2x - 96$

$3x + 2x = -96 - 24$

$5x = -120$

$x = -24$

$\{-24\}$

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3 times Some number increased by 17 is equal to 13 less than the number.

Find the number. Let x be the number,

$3x + 17 = x - 13$

$3x - x = -13 - 17$

$2x = -30$

$x = -15$

The number is -15.

4 times the difference of twice Some number and 3 is equal to -12 less the number.

$4(2x-3)=-12-x$

Find the number.

Let x be the number,

$8x-12=-12-x$

A reduced by B → A-B

Difference of A and B → A-B

A less than B → B-A

A less B → A-B

$8x+x=-12+12$

$9x=0$

$x=\frac{0}{9}$

$x=0$

The number is 0.

Do not use ϕ for zero.

Solve

$3(2x-1)-2(3x+4)=11$

$6x-3-6x-8=11$

$-11=11$

False → No Solution → ϕ or $\{\}$ ← Empty Set

(No Variable)

Solve

$4(x-1)+3(2x+4)=2(5x-3)+14$

$4x-4+6x+12=10x-6+14$

$10x+8=10x+8$

$10x-10x=8-8$

$0=0$ True (but no variable)

Infinitely many Solns.

All Reals

All real numbers

$\mathbb{R}$

Linear Eqn $Ax+B=C$

① Use LCD to clear fractions, or decimals.

② Use Distribution to remove ( ).

③ use addition / subtraction prop.

④ use multiplication / Division prop.

⑤ Final ans in Solution Set.

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

LCD = 6

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

$4x-3=5$

$4x=8$

$x=2$

$\{2\}$

Solve $\frac{2}{5}x - \frac{3}{4} = \frac{1}{2}x + \frac{7}{10}$

LCD=20

$20 \cdot \frac{2}{5}x - 20 \cdot \frac{3}{4} = 20 \cdot \frac{1}{2}x + 20 \cdot \frac{7}{10}$

$8x - 15 = 10x + 14$

$8x - 10x = 14 + 15$

$-2x = 29$

$x = \frac{29}{-2}$

$x = \frac{-29}{2}$

$x = -14\frac{1}{2}$

$x = -14.5$

$\left\{-\frac{29}{2}\right\}$

$\frac{1}{3}$ times the Sum of some number and 8 is equal to

$\frac{3}{4}$ times the difference of the number and 8.

Find the number. Let x be the number,

$\frac{1}{3}(x + 8) = \frac{3}{4}(x - 8)$

LCD=12

$12 \cdot \frac{1}{3}(x + 8) = 12 \cdot \frac{3}{4}(x - 8)$

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

$4x + 32 = 9x - 72$

$4x - 9x = -72 - 32$

$-5x = -104$

$x = \frac{-104}{-5}$

$x = 20.8$

The number is 20.8

Solve $1.2x - 3.75 = 2x + 5$

Method I: keep the decimal

$1.2x - 2x = 5 + 3.75$

$-.8x = 8.75$

$x = \frac{8.75}{-.8}$

$\boxed{x = -10.9375}$ $\{-10.9375\}$

Method II: Remove decimal point by using power of 10.

Multiply by $10^2 = 100$ → 2 decimal places

$1.2x - 3.75 = 2x + 5$

$100(1.2x) - 100(3.75) = 100(2x) + 100(5)$

$100(1.2x) - 100(3.75) = 100(2x) + 100(5)$

$120x - 375 = 200x + 500$

$120x - 200x = 500 + 375$

$-80x = 875$

$x = \frac{875}{-80}$

$\boxed{x = -10.9375}$

$\{-10.9375\}$

Solve

$.05x + .1(2x+1) = 3.1$

$.05x + .2x + .1 = 3.1$

$.25x = 3.1 - .1$

$.25x = 3$

$x = \frac{3}{.25}$

$x = 12$

$\{12\}$

Solve

$.05x + .25(2x - 1) = 6.9$

Multiply by $10^2 = 100$

$100 \cdot 0.05x + 100 \cdot 0.25(2x-1) = 100 \cdot 6.9$

$5x + 25(2x-1) = 690$

$5x + 50x - 25 = 690$

$55x = 690 + 25$

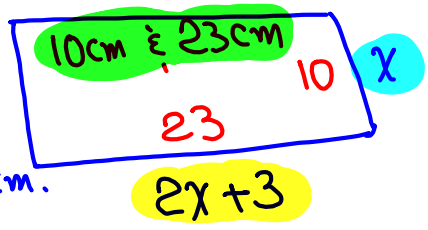
$55x = 715$

$x = \frac{715}{55}$

$x = 13$

$\{13\}$

The length of a rectangle 3 cm longer than twice its width. Draw & label Such rectangle. Find L & W if the perimeter is 66cm.



$P = 66$

$2L + 2W = 66$

$2(2x+3) + 2(x) = 66$

$4x + 6 + 2x = 66$

$6x + 6 = 66$

$6x = 60$

$x = 10$

SG 2 IS DUE.