Math 115

Spring 2018

Lecture 4

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

Class Quiz

① Solve $4(x-3) - 8 = 20$

$4x - 12 - 8 = 20$

$4x - 20 = 20$ → $4x = 20 + 20$

$4x = 40$ → $x = \frac{40}{4}$

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

② Solve $2(x+1) - 10 = x - 8$

$2x + 2 - 10 = x - 8$ → $2x - x = -8 + 8$

$2x - 8 = x - 8$

$\boxed{x = 0}$ $\{0\}$

③ 4 more than twice some number is -10. find the number.

Let x be the number.

$2x + 4 = -10$

$2x = -10 - 4$

$2x = -14$

$x = \frac{-14}{2} \quad x = -7$

The number is -7.

Solve

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

LCD = 12

$$\overset{4}{\cancel{12}} \cdot \frac{2}{3}x - \overset{3}{\cancel{12}} \cdot \frac{1}{4} = 12 \cdot x + 12 \cdot 2$$

$$8x - 3 = 12x + 24$$

$$8x - 12x = 24 + 3$$

$$-4x = 27$$

$$x = \frac{27}{-4} \qquad x = -6\frac{3}{4}$$

$$x = -6.75$$

$$\left\{ \frac{-27}{4} \right\}$$

Solve

$$\frac{3}{5}(x+2) - 1 = \frac{1}{2}(x-3) + 1 \qquad LCD = 10$$

$$\overset{2}{\cancel{10}} \cdot \frac{3}{5}(x+2) - 10 \cdot 1 = \overset{5}{\cancel{10}} \cdot \frac{1}{2}(x-3) + 10 \cdot 1$$

$$6(x+2) - 10 = 5(x-3) + 10$$

$$6x + 12 - 10 = 5x - 15 + 10$$

$$6x + 2 = 5x - 5 \qquad \{-7\}$$

$$6x - 5x = -5 - 2$$

$$x = -7$$

Solve

$$.5(x - 2) + .2(x + 3) = 8$$

$$.5x - .5(2) + .2x + .2(3) = 8$$

$$.7x - 1.0 + .6 = 8$$

$$.7x - 1 + .6 = 8$$

$$.7x - .4 = 8$$

$$.7x = 8 + .4$$

$$.7x = 8.4$$

$$x = \frac{8.4}{.7}$$

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

Solve: $.05x + .1(2x - 3) = 1.45$

$$.05x + .2x - .3 = 1.45$$

$$.25x = 1.45 + .3$$

$$.25x = 1.75$$

$$x = \frac{1.75}{.25} \quad \boxed{x = 7} \quad \{7\}$$

The (product) of (.35) and (one more than Some number) is equal to (.1 times the number) reduced by 4.5. find the number.

Let x be the number,

$$.35 \cdot (x + 1) = .1x - 4.5$$

$$.35x + .35 = .1x - 4.5$$

$$.35x - .1x = -4.5 - .35$$

$$.25x = -4.85$$

$$x = \frac{-4.85}{.25}$$

The number is -19.4

$$x = -19.4$$

Verify the Proportion: Do Cross-Multiplication

$$\frac{10\frac{1}{2}}{7\frac{1}{4}} = \frac{42}{29}$$

$$7\frac{1}{4} \cdot 42 = 10\frac{1}{2} \cdot 29$$

True Proportion

$$7.25(42) = (10.5)(29)$$

$$304.5 = 304.5 \checkmark$$

$$\frac{3\frac{2}{3}}{4\frac{1}{2}} = \frac{10}{12}$$

$$10 \cdot 4\frac{1}{2} = 12 \cdot 3\frac{2}{3}$$

$$\overset{5}{\cancel{10}} \cdot \frac{9}{\cancel{2}} = \overset{4}{\cancel{12}} \cdot \frac{11}{\cancel{3}}$$

45 = 44   False

Not a true Proportion

Solve

$$\frac{x}{1.25} = \frac{6}{5}$$

$$5x = 6(1.25)$$

$$x = \frac{6(1.25)}{5}$$ $$\boxed{x = 1.5}$$ $\{1.5\}$

Solve

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

$\{3\}$

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

$$3x - x = 3 + 3$$

$$2x = 6$$

The $\boxed{\text{ratio of some number to 10}}$ is the same as the $\boxed{\text{ratio of 13 to 20.}}$ find the number.

Let x be the number,

$$\frac{x}{10} = \frac{13}{20}$$ $$20x = 10(13)$$

$$x = \frac{10(13)}{20}$$ $$\boxed{x = 6.5}$$

The number is 6.5

John drove 75 miles in 1.5 hrs. At this rate, how long does it take him to drive 220 miles?

$$\frac{75 \text{ miles}}{1.5 \text{ hrs}} = \frac{220 \text{ miles}}{x \text{ hrs}}$$

Solve $\frac{75}{1.5} = \frac{220}{x}$

$$75x = 1.5(220)$$

$$x = \frac{1.5(220)}{75}$$

$$\boxed{x = 4.4}$$

4.4 hrs

Formula: It is an equation with more than one variable.

$P = a + b + c$, $A = \frac{bh}{2}$

$P = 2L + 2W$, $A = LW$

$y - y_1 = m(x - x_1)$, $Ax + By = C$

$C = \pi d$ $A = \pi r^2$

- - - . .

$2x + 4y = 8$

Solve for y.

$2x + 4y = 8$

Isolate y

$4y = -2x + 8$

Divide by 4

$$\frac{4}{4}y = \frac{-2}{4}x + \frac{8}{4}$$

$$y = -\frac{1}{2}x + 2$$

Solve for y: $2x - 3y = 9$

$-3y = -2x + 9$

Divide by -3

$$\frac{-3}{-3}y = \frac{-2}{-3}x + \frac{9}{-3}$$

$$y = \frac{2}{3}x - 3$$

Solve for L: $P = 2L + 2W$

Isolate L

$$P - 2W = 2L$$

$$\frac{P - 2W}{2} = L$$

Solve for C:

$$P = a + b + C$$

$$P - a - b = C$$

Solving Basic percent problem by Proportion: $\frac{P}{100} = \frac{Part}{whole}$

"whole comes after of"

12% of what number is 36?

$12x = 100(36)$ $\frac{P}{100} = \frac{Part}{whole}$

$x = 300$ $\frac{12}{100} = \frac{36}{x}$

12% of 300 is 36.

18.5% of 420 is what number?

$$\frac{P}{100} = \frac{Part}{whole}$$

$$\frac{18.5}{100} = \frac{x}{420}$$

$$100x = 18.5(420)$$

$$x = \frac{18.5(420)}{100}$$

$$\boxed{x = 77.7}$$

18.5% of 420 is 77.7.

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what percent of 850 is 204?

$$\frac{P}{100} = \frac{Part}{whole}$$

$$\frac{P}{100} = \frac{204}{850}$$

$$850P = 100(204)$$

$$P = \frac{100(204)}{850}$$

$$P = 24$$
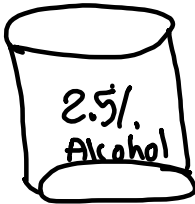
24% of 850 is 204.

A drink is labeled at 2.5% alcohol.

How much alcohol is in 16 oz drink?

what is 2.5% of 16 oz?

2.5%
Alcohol

$$\frac{P}{100} = \frac{Part}{whole}$$

$$\frac{2.5}{100} = \frac{x}{16}$$

.4 oz of alcohol.

$$100x = 16(2.5)$$

$$x = \frac{16(2.5)}{100} \qquad x = .4$$

A TV is marked for $800.
Sales tax is 8.5% of purchase price.

find the total cost.

Total cost = Purchase price + Amount of Tax.

Amount of tax is 8.5% of Price

$$\frac{P}{100} = \frac{Part}{whole}$$

$$\frac{8.5}{100} = \frac{Tax}{Price}$$

Tax → $68

Price → $800

Total Cost → $868

$$\frac{8.5}{100} = \frac{Tax}{800}$$

$$100\,Tax = 8.5(800)$$

$$Tax = 68$$

Due Tomorrow

  WP ch. 2 → use proportion

  WP ch. 3

Type of equations

1) when there is a finite # of Solutions ⟹ Conditional

2) when there are infinite # of Solutions ⟹ Identity

3) when there is no Solution ⟹ Contradiction

Solve: $\frac{3}{4}(x+5) - \frac{1}{2}x = 6$

$LCD = 4$

$4 \cdot \frac{3}{4}(x+5) - \overset{2}{4} \cdot \frac{1}{2}x = 4 \cdot 6$

$3(x+5) - 2x = 24$

$3x + 15 - 2x = 24$

$x = 24 - 15$

$\boxed{x = 9} \rightarrow \{9\}$

Conditional Eqn.

Solve $3(2x-4)-4(x+5) = 2x-32$

$6x \boxed{-12} -4x \boxed{-20} = 2x-32$

$2x - 32 = 2x - 32$

$2x - 2x = -32 + 32$

$0 = 0$ True

infinite # of Solutions $\Rightarrow$ All Real numbers

Equation is an identity. $\Rightarrow$ $\mathbb{R}$

Solve

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

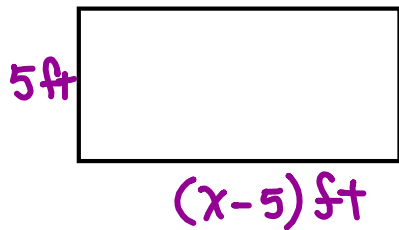$\boxed{6} -12x +10x \boxed{+5} = \boxed{-6} -2x \boxed{-5}$

$-2x + 11 = -11 - 2x$

$-2x + 2x = -11 - 11$

$0 = -22 \rightarrow$ false

Equation is Contradiction.

No Solution

$\emptyset$ $\{ \}$

find Area & Perimeter

$A = LW$, $P = 2L + 2W$

5ft

(x-5) ft

$A = (x-5) \cdot 5$

$= 5(x-5)$

$\boxed{A = (5x - 25) \, ft^2}$

$P = 2(x-5) + 2(5)$

$= 2x - 10 + 10$

$\boxed{P = (2x) \, ft}$

$= 2x + 0 = 2x \, ft$

Due tomorrow

WP 2

WP 3

work on SG 4 (should be collected at the end of class.