Math 115

Fall 2018

Lecture 4

$? \; a^2 + b^2 = c^2 \; ?$

$y = mx + b \quad ? \quad d = rt$

Sample questions for exam 1 (Next Thursday)

① Simplify: $\dfrac{(-8)^2 + (-6)^2}{7^2 + 1}$

$= \dfrac{64 + 36}{49 + 1} = \dfrac{100}{50} = \boxed{2}$

② Simplify: $2\frac{5}{6} - 4\frac{1}{3}$

$= \dfrac{17}{6} - \dfrac{13 \cdot 2}{3 \cdot 2}$

$= \dfrac{17}{6} - \dfrac{26}{6} = \dfrac{17-26}{6} = \dfrac{-9}{6} = \boxed{\dfrac{-3}{2}} = \boxed{-1\frac{1}{2}}$ ✓ ✓

③ Evaluate $3x - 4y^2$ for $x = -2$ and $y = 4$

$3x - 4y^2 = 3(-2) - 4(4)^2$

$= -6 - 4 \cdot 16 = -6 - 64$

$= \boxed{-70}$

④ Simplify:

$5(2x-1) - (x-12) - 7$

$= 10x - 5 - x + 12 - 7$

$= 9x + 0$

$= \boxed{9x}$

⑤ Name the property

a) $-4x + 0 = -4x$ Identity

b) $6 \cdot \frac{1}{6} = 1$ Inverse

c) $-3\left(\frac{1}{3}x + 1\right) = -3\left(\frac{1}{3}x\right) + (-3)\cdot 1$ Dist.

$= \left(-3 \cdot \frac{1}{3}\right)x + (-3)$ Associative

$= -1 \cdot x - 3$ Identity

$= -x - 3$ Inverse, Identity

⑥ Translate only: twice the square of x reduced by −8.

$2 \cdot x^2 - (-8)$

⑨ Solve

a) $x - 7 = -9$

$x = -9 + 7$

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

b) $3x + 7 = 2x - 4$

$3x - 2x = -4 - 7$

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

c) $1.2x - 4 = .2x - 4$

$1.2x - .2x = -4 + 4$

$1x = 0$ $x = 0$ $\{0\}$

d) $\frac{1}{5}x - 7 = -\frac{4}{5}x + 3$

LCD = 5

$5 \cdot \frac{1}{5}x - 35 = 5 \cdot -\frac{4}{5}x + 15$

$x - 35 = -4x + 15$

$5x = 50$

$x = 10$

$x + 4x = 15 + 35$ $\{10\}$

10) 3 less than four times some number is equal to one added to 3 times the number. Find the number.

Let x be the number,

$4x - 3 = 3x + 1$

$4x - 3x = 1 + 3$

$x = 4$

The number is 4.

(11) Solve: $4(7x-1)+3(2-5x)-4(3x+5)=-6$

$28x-4+6-15x-12x-20=-6$

$x-18=-6 \qquad x=-6+18 \qquad \boxed{x=12} \qquad \{12\}$

(12) 19 times the sum of some number and 1 is equal to 10 times the difference of twice the number and 1.

Let x be the number

$19(x+1)=10(2x-1)$

$19x+19=20x-10$

$19+10=20x-19x$

$29=x$

$x=29$

the number is 29

(13) Solve

a) $6x=-30$

$x=\frac{-30}{6} \qquad \boxed{x=-5} \qquad \{-5\}$

b) $\frac{x}{5}=-6$

$5\cdot\frac{x}{5}=5(-6) \qquad \boxed{x=-30} \qquad \{-30\}$

c) $\frac{2}{3}x=-8$

$\frac{3}{2}\cdot\frac{2}{3}x=\frac{3}{2}\cdot(-8^{4})$

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

d) $-\frac{3}{5}x=18$

$-\frac{5}{3}\cdot\frac{-3}{5}x=-\frac{5}{3}\cdot\frac{18^{6}}{1}$

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

e) $-.5x=20$

$x=\frac{20}{-.5} \qquad \boxed{x=-40} \qquad \{-40\}$

f) $9x=24+13x$

$9x-13x=24$

$-4x=24 \qquad \boxed{x=-6} \qquad \{-6\}$

(14) Solve: $\frac{1}{3}x + \frac{1}{12}x = 3 + \frac{1}{4}x$ LCD = 12

$12\cdot\frac{1}{3}x + 12\cdot\frac{1}{12}x = 12\cdot 3 + 12\cdot\frac{1}{4}x$

$4x + x = 36 + 3x$ → $2x = 36$ → $x = 18$ → $\{18\}$

$5x - 3x = 36$

(15) Solve: $4(8-3x) = 32 - 8(x+2)$

$32 - 12x = 32 - 8x - 16$ → $-4x = -16$ → $x = 4$ → $\{4\}$

$-12x + 8x = -16$

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

$2x + 3x + 3 = 5x + 4$ → $3 = 4$ False → $\phi = \{\}$ No Soln.

$5x + 3 = 5x + 4$

(17) Solve: $5x - 15 = 5(x-2) - 5$

$5x - 15 = 5x - 10 - 5$ → $-15 = -15$ True → infinite # of solutions

$5x - 15 = 5x - 15$

All Reals, $\mathbb{R}$

Simplify:

(16) $\frac{1}{4} + 2\cdot\frac{3}{8}$

$= \frac{1}{4} + \frac{3}{4} = \frac{4}{4} = 1$

(17) $3\frac{1}{5} - \frac{1}{2} \div \frac{5}{6}$

$= \frac{16}{5} - \frac{1}{2}\cdot\frac{6}{5}^{3}$

$= \frac{16}{5} - \frac{3}{5} = \frac{13}{5} = 2\frac{3}{5}$

(18) $2\frac{1}{2} - \left(\frac{1}{4}\right)^2$

$= \frac{5}{2} - \frac{1}{16} = 2\frac{7}{16}$ ✓

$= \frac{5\cdot 8}{2\cdot 8} - \frac{1}{16} = \frac{40}{16} - \frac{1}{16} = \frac{39}{16}$ ✓

(19) $7\frac{1}{4} - \frac{3}{4}\sqrt{\frac{4}{9}}$

$= \frac{29}{4} - \frac{3}{4}\cdot\frac{2}{3}$

$= \frac{29-2}{4} = \frac{27}{4}$ ✓

$= 6\frac{3}{4}$

Simplify

(20) $\dfrac{\frac{2}{5}-\frac{1}{3}}{\frac{7}{15}}$

LCD = 15

$= \dfrac{15\cdot\frac{2}{5}-15\cdot\frac{1}{3}}{15\cdot\frac{7}{15}} = \dfrac{6-5}{7} = \boxed{\frac{1}{7}}$

(21) $\dfrac{3\frac{1}{3}+2\frac{1}{2}}{1-\frac{5}{6}}$

$= \dfrac{\frac{10}{3}+\frac{5}{2}}{1-\frac{5}{6}}$

LCD = 6

$= \dfrac{6\cdot\frac{10}{3}+6\cdot\frac{5}{2}}{6\cdot 1-6\cdot\frac{5}{6}} = \dfrac{20+15}{6-5} = \dfrac{35}{1} = \boxed{35}$

Ratio & Proportion

Ratio of a to b is $\frac{a}{b}$ or a:b

Always Reduce

Ratio 10 to 2.4

$\dfrac{10}{2.4} = \dfrac{10\cdot 10}{2.4\cdot 10} = \dfrac{100}{24} = \dfrac{25}{6}$

$\frac{25}{6}$, 25 to 6, 25:6

Find the ratio of 1.5 to 20.

$$\frac{1.5}{20} = \frac{1.5(10)}{20(10)} = \frac{\cancel{15}^{3}}{\cancel{200}_{40}} = \frac{3}{40}$$

3 to 40

3:40

Find the ratio of $2\frac{1}{2}$ to $3\frac{1}{4}$.

$$\frac{2\frac{1}{2}}{3\frac{1}{4}} = 2\frac{1}{2} \div 3\frac{1}{4} = \frac{5}{2} \div \frac{13}{4} = \frac{5}{\cancel{2}} \cdot \frac{\cancel{4}^{2}}{13} = \frac{10}{13}$$

10 to 13

10:13.

Proportion is when two ratios are equal.

we can verify it by Cross-Multiplication.

$\frac{15}{4} \overset{?}{=} \frac{7}{2.4}$?

$15(2.4) \neq 4(7)$

$36 \neq 28$

Not a true Proportion

Your turn:

a) $\frac{9.5}{14} \overset{?}{=} \frac{28.5}{42}$

$9.5(42) \overset{?}{=} 14(28.5)$

Yes ✓

b) $\frac{\frac{4}{5}}{\frac{7}{10}} \overset{?}{=} \frac{12}{10\frac{1}{2}}$

$\frac{4}{5} \cdot 10\frac{1}{2} \overset{?}{=} \frac{7}{10} \cdot 12$

$\frac{\cancel{4}^{2}}{5} \cdot \frac{21}{\cancel{2}} \overset{?}{=} \frac{7}{\cancel{10}_{5}} \cdot \frac{\cancel{12}^{6}}{1}$

$\frac{42}{5} \overset{?}{=} \frac{42}{5}$

Yes

Solving Proportion Equation

1. Cross-Multiply
2. Solve for the variable
3. Do not forget about Solution Set.

Solve $\frac{x}{12} = \frac{-2}{5}$ $\Rightarrow$ $5x = 12(-2)$

$5x = -24$

✓ $x = \frac{-24}{5}$ ✓ $x = -4\frac{4}{5}$

✓ $x = -4.8$ $\left\{-\frac{24}{5}\right\}$

Solve

$\frac{2x-1}{10} = \frac{2}{3}$ $\Rightarrow$ $3(2x-1) = 10 \cdot 2$

$6x - 3 = 20$

$6x = 23$

$\left\{\frac{23}{6}\right\}$ $x = \frac{23}{6}$ $x = 3\frac{5}{6}$

Solve:

$\frac{x+5}{2x-1} = \frac{1}{4}$

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

$4x + 20 = 2x - 1$

$4x - 2x = -1 - 20$

$2x = -21$ $\{-10.5\}$

$x = \frac{-21}{2}$ $x = -10.5$

4 Cups of Sugar needed for 25 muffins.

At this rate, How many cups of sugar for 120 muffins? Round up to a whole #.

$$\frac{4 \text{ Sugar}}{25 \text{ Muffins}} = \frac{x \text{ Sugar}}{120 \text{ Muffins}}$$

$$\frac{4}{25} = \frac{x}{120}$$

$$25x = 4(120)$$

$$x = \frac{480}{25} \qquad x = 19.2$$

About 20 cups of Sugar

2.5 inches on the map represents 400 miles.

At this rate, find the actual distance between two cities if they are 12 inches apart on the map?

$$\frac{2.5 \text{ inches}}{400 \text{ Miles}} = \frac{12 \text{ inches}}{x \text{ Miles}}$$

$$\frac{2.5}{400} = \frac{12}{x}$$

$$2.5x = 12(400)$$

$$x = \frac{12(400)}{2.5}$$

$x = 1920$

1920 miles

Raul paid $7.50 for 24 donuts.

At this rate, How much does he have to Pay for 100 donuts?

$$\frac{\$7.50}{24 \text{ Donuts}} = \frac{\$x}{100 \text{ Donuts}} \qquad \frac{7.50}{24} = \frac{x}{100}$$

$24x = 100(7.50)$

$24x = 750$

$x = \frac{750}{24}$

$x = 31.25$

$31.25

How tall is ELAC Clock tower?

A 5.5-ft tall person had a shadow of 28 ft long.

At the same time, the clock tower had a shadow of 70 ft long.

Use these information to estimate the height of the tower. $\frac{5.5 \text{ ft tall}}{28 \text{ ft shad.}} = \frac{x \text{ ft tall}}{70 \text{ ft shad.}}$

$\frac{5.5}{28} = \frac{x}{70}$

$28x = 70(5.5)$

$28x = 385$

$x = \frac{385}{28}$ $x = 13.75$

About 14 ft tall

Annie was interested to know the # of fish at ELAC Pond.

She caught 20 fish, tagged them, and throw them back in.

A week later, she came back, and caught 30 fish but only 3 had tags.

use ratio & Proportion to find # fish.

$$\frac{x \text{ fish}}{20 \text{ Tag.}} = \frac{30 \text{ fish}}{3 \text{ tag.}}$$

$$\frac{x}{20} = \frac{30}{3}$$

$$3x = 600$$

$$x = 200$$

200 fish

Due Monday	Due to connection issue
① WP 3	You may turn in WP 1 & SG 2 on Monday
② SG 3	

Exam 1 : Next Thursday

May Dodgers Score first