Math 115

Spring 2017

Lecture 7

John paid $12 to purchase 20 items at some sale. At this rate, how much does he have to pay for 75 items?

$$\frac{\$12}{20 \text{ items}} = \frac{\$x}{75 \text{ items}}$$

Solve $\frac{12}{20} = \frac{x}{75}$

Cross-Multiply

$20x = 12(75)$

$x = \frac{12(75)}{20}$ (3, 15; 5; 1) $\Rightarrow x = 45$

He needs $45 to pay for 75 items.

7.5% of what number is 2250?

① By translation:

$\frac{7.5}{100} \cdot x = 2250$

$.075x = 2250$

$x = \frac{2250}{.075}$

$x = 30{,}000$

7.5% of 30,000 is 2250.

② By Proportion

$\frac{7.5}{100} = \frac{2250}{x}$

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

"Part comes after is"

"whole comes after of"

$\frac{7.5}{100} = \frac{2250}{x}$

Cross-multiply

$7.5x = 100(2250)$

$x = \frac{100(2250)}{7.5}$

$x = 30{,}000$

7.5% of 30,000 is 2250.

what percent of 12500 is 500?

$\frac{P}{100} \cdot 12500 = 500$

$125P = 500$

$P = 4$

4%

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

$\frac{P}{100} = \frac{500}{12500}$

$12500P = 50000$

$P = 4$

4%

A TV is on Sale at 15% off.

The original price was $750.

Find the amount of discount.

Find the Sales amount.

Amount of discount is 15% of original Price

Amount of Sale price is 85% of - - - - -

$$\text{Discount} = \frac{15}{100} \cdot 750 \Rightarrow \text{Discount} = \$112.50$$

$$\text{Sale Price} = \frac{85}{100} \cdot 750 \Rightarrow \text{Sale Price} = \$637.50$$

Original = $750

Solve:

$$-4(x-1)+10 \leq x-26$$

$$-4x+4+10 \leq x-26$$

$$-4x+14 \leq x-26$$

$$-4x-x \leq -26-14$$

$$-5x \leq -40$$

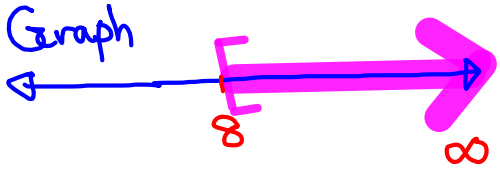
$$\frac{-5}{-5}x \geq \frac{-40}{-5}$$

$$\boxed{x \geq 8}$$

S.B.N.

$$\{ x \mid x \geq 8 \}$$

Graph



I.N.

$[8, \infty)$

Solve

$$\frac{1}{3}x - \frac{3}{4} > \frac{5}{6}x + \frac{2}{3}$$

Use LCD = 12, to clear Fractions.

$$\cancel{12}^{4} \cdot \frac{1}{\cancel{3}}x - \cancel{12}^{3} \cdot \frac{3}{\cancel{4}} > \cancel{12}^{2} \cdot \frac{5}{\cancel{6}}x + \cancel{12}^{4} \cdot \frac{2}{\cancel{3}}$$

$$4x - 9 > 10x + 8$$

$$4x - 10x > 8 + 9$$

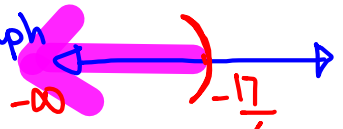
$$-6x > 17$$

$$\frac{-6}{-6}x < \frac{17}{-6}$$

$$x < \frac{-17}{6}$$

① S.B.N. $\{x \mid x < \frac{-17}{6}\}$

② Graph



③ I.N. $(-\infty, \frac{-17}{6})$

Solve $-2 < 3x + 7 \leq 19$

Hint: Isolate x in the middle

$$-2 - 7 < 3x \leq 19 - 7$$

$$-9 < 3x \leq 12$$

$$\frac{-9}{3} < x \leq \frac{12}{3}$$

$$-3 < x \leq 4$$

① S.B.N. $\{x \mid -3 < x \leq 4\}$

② Graph

③ I.N. $(-3, 4]$

$$5 < -2x - 3 \leq 9$$

Add 3 → $-4 > x \geq -6$

$$8 < -2x \leq 12$$

$$\frac{8}{-2} > \frac{-2}{-2}x \geq \frac{12}{-2}$$

I.N. $[-6, -4)$

$-6 \leq x < -4$

① S.B.N. $\{x \mid -6 \leq x < -4\}$

② Graph

$2x - 3y = 9$, write in $y = mx + b$ form.

$-3y = -2x + 9$

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

Evaluate $\frac{-b + \sqrt{b^2 - 4ac}}{2a}$ for $a = 1$, $b = -2$, $c = -24$

$= \frac{-(-2) + \sqrt{(-2)^2 - 4(1)(-24)}}{2(1)} = \frac{2 + \sqrt{4 + 96}}{2}$

$= \frac{2 + \sqrt{100}}{2} = \frac{2 + 10}{2} = \frac{12}{2} = \boxed{6}$

Evaluate : $\frac{x - 5}{x^2 - 4}$ for $x = 0, 5, -2$.

$\frac{0 - 5}{0^2 - 4} = \frac{-5}{-4} = \boxed{\frac{5}{4}}$

$\frac{5 - 5}{5^2 - 4} = \frac{0}{25 - 4} = \frac{0}{21} = \boxed{0}$

$\frac{-2 - 5}{(-2)^2 - 4} = \frac{-7}{4 - 4}$

$= \frac{-7}{0}$

$\emptyset$

Name the Prop.

① $4(x - 2) = 4 \cdot x - 4 \cdot 2$ Distributive

② $5(7x) = (5 \cdot 7)x$ Associative

③ $-8x + 8x = 0$ Inverse

④ $\frac{2}{3}\left(\frac{3}{2}x\right) = \left(\frac{2}{3} \cdot \frac{3}{2}\right)x$

$= 1 \cdot x = x$

Associative
Inverse
Identity

Whole numbers $0, 1, 2, 3, 4, \ldots$

Integers $\ldots, -5, -4, -3, -2, -1, 0, 1, 2, 3, \ldots$

Consecutive integers

$23, 24, 25, 26, \ldots$

$99, 100, 101, 102, 103, \ldots$

$-33, -32, -31, -30, -29, \ldots$

$x, x+1, x+2, x+3, \ldots$

Find two consecutive integers such that their sum is 51.

First: x

Second: $x+1$

First + Second = 51

$x + x+1 = 51$

$2x + 1 = 51$

$2x = 50$

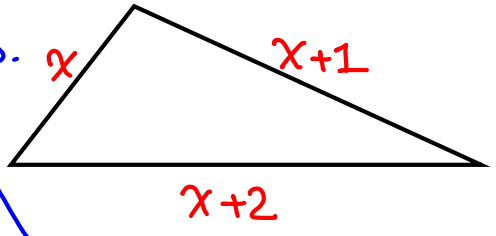
$x = 25$

25 & 26

Perimeter of a triangle is 54 ft.

Three sides are three consecutive integers.

Find all three sides.



$P = 54$

$a + b + c = 54$

$x + x+2 + x+1 = 54$

$3x + 3 = 54$

$3x = 51$

$x = 17$

17 ft, 18 ft, and 19 ft.

A rectangular garden has a perimter of 42m.

Length and width are two cons. integers.

Find its dimensions and find its Area.

$P = 2L + 2W$

$A = LW$

$W = x$

$L = x+1$

$P = 42$

$2L + 2W = 42$

$2(x+1) + 2(x) = 42$

$2x + 2 + 2x = 42$

$4x + 2 = 42$

$4x = 40$

$x = 10$

10m by 11m

$A = 10(11) = 110 m^2$

Consecutive even integers

6, 8, 10, 12, ----

90, 92, 94, ----

−32, −30, −28, −26, ---

$x, x+2, x+4, x+6, \ldots$; x must be even

Find two cons. even integers with the Sum of 82

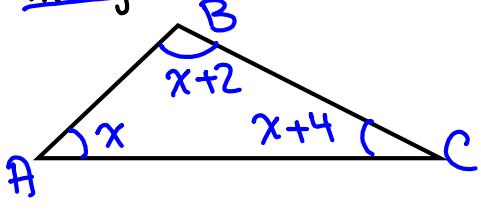
↳ x & $x+2$

$x + x + 2 = 82$

$2x = 80 \rightarrow x = 40$

40 & 42

the measure of all three interior angles in triangle ABC are three cons. even integers. Find all three angles.



Fact: $m\angle A + m\angle B + m\angle C = 180°$

$x + x+2 + x+4 = 180°$

$3x + 6 = 180$

$3x = 174$

$x = 58$

58°, 60°, and 62°

Find two consecutive even integers such that the difference of 3 times the smaller one and the larger one is 42.

$3 \cdot \text{Smaller} - \text{larger} = 42$

Smaller $\rightarrow x$

Larger $\rightarrow x+2$

$3 \cdot x - (x+2) = 42$

$3x - x - 2 = 42$

$2x = 44$

$x = 22$

22 & 24

Check

$3 \cdot 22 - 24 = 66 - 24 = 42$

Find three consecutive even integers such that the sum of the first one and 3 times the second one is equal to 98 more than the third one.

First $\rightarrow x$

Second $\rightarrow x+2$

Third $\rightarrow x+4$

$\text{First} + 3\{\text{Second}\} = \text{Third} + 98$

$x + 3(x+2) = x + 4 + 98$

$x + 3x + 6 = x + 102$

$4x + 6 = x + 102$

$4x - x = 102 - 6$

$3x = 96$

$x = 32$

32, 34, and 36

Consecutive odd integers:

1, 3, 5, 7, ----

105, 107, 109, 111, ----

$-51, -49, -47, -45, -43, \cdots$

$x, x+2, x+4, x+6, \cdots$; x must be odd.

Find two consecutive odd integers with the total of 36.

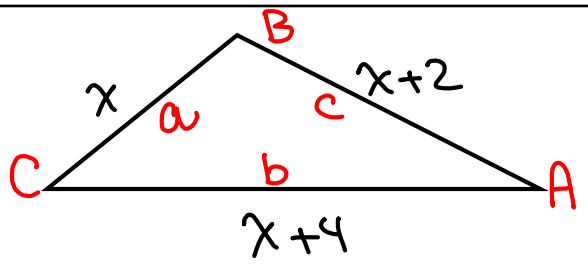
→ x & $x+2$

$x + x+2 = 36$

$2x = 34 \rightarrow x = 17$

17 & 19

The perimeter of a rose garden in a triangle shape is 75 ft. Sides are 3 Cons. odd integers. Draw & label then find all three sides.



$P = 75$

$a+b+c = 75$

$x + x+4 + x+2 = 75$

$3x+6 = 75$

$3x = 69$

$x = 23$

23 ft, 25 ft, and 27 ft

I paid $152.25 for a microwave.
this included 8.75% Sales tax.
what was the price of the microwave?

Price of Microwave $\rightarrow x$

Amount of Sales tax $\rightarrow$ 8.75% of x

Total Cost $\rightarrow$ 152.25

$x + 8.75\%\text{ of } x = 152.25$

$x + .0875x = 152.25$

$1.0875x = 152.25$

$\rightarrow x = \frac{152.25}{1.0875}$

$x = 140$

$140

Solve for π : $V = \frac{4\pi r^3}{3}$

Hint: clear fraction

LCD = 3

$3V = 4\pi r^3$

Divide by $4r^3$

$\frac{3V}{4r^3} = \frac{4\pi r^3}{4r^3}$

$$\frac{3V}{4r^3} = \pi$$

Solve for r: $A = P + Prt$

$A - P = Prt$

$\frac{A-P}{Pt} = \frac{Prt}{Pt}$

$$\frac{A-P}{Pt} = r$$

Exam I:
Tuesday

Due Tomorrow
SG 5

Also work on
SG 6 & SG 7
WP 5 & WP 6

Expect a Quiz tomorrow.