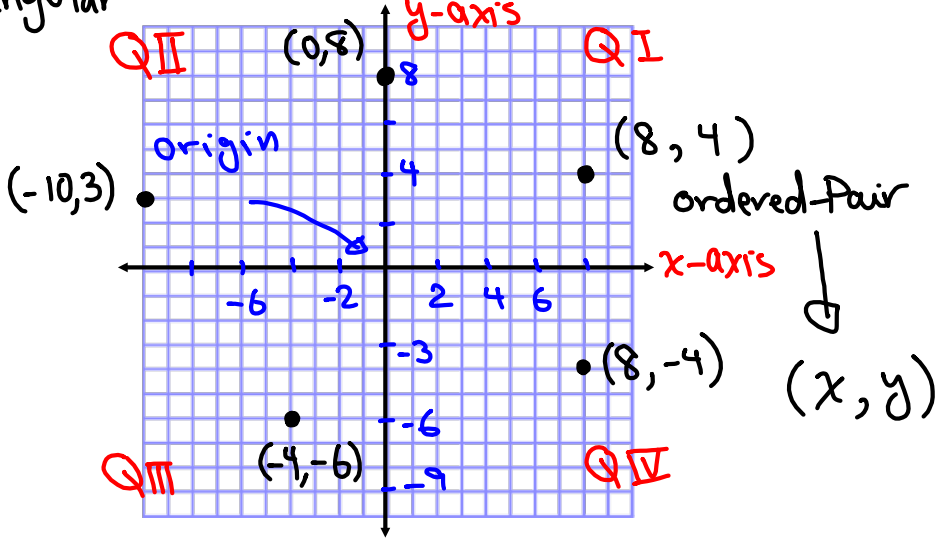
Math 115

Summer 2017

Lecture 5

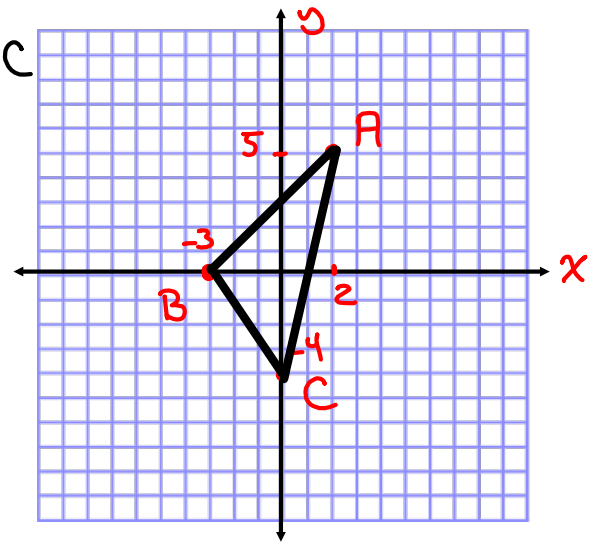
Introduction to Graphing

Rectangular Coordinate System

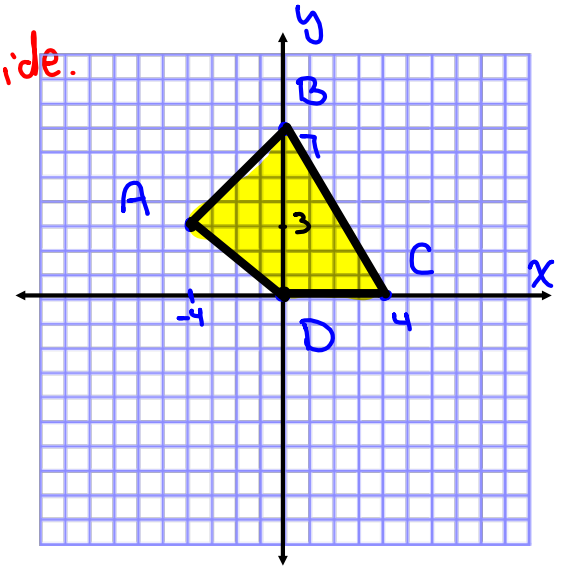


Plot A(2,5), B(-3,0), C(0,-4),

Draw triangle ABC



Draw ABCD shape where A(-4,3), B(0,7), C(4,0), and D(0,0), then shade the region inside.



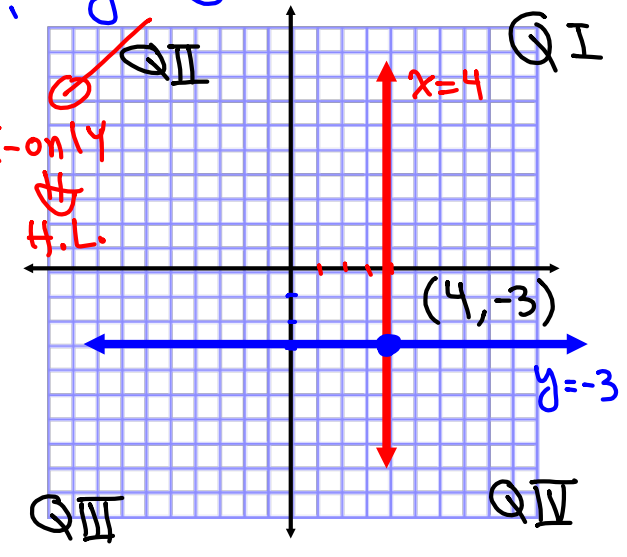
Lines

1) Vertical	2) Horizontal	3) Slant
$x = a$	$y = b$	$Ax+By=C$
$x=4$,	$y=5$	$y=mx+b$
$x=-2$,	$y=-7$	$y-y_1=m(x-x_1)$
$x-3=0$	$y+2=0$	$x+3y=-9$
	$y-3=4(x+5)$	$2x-5y=10$
	$y+2=-\frac{2}{3}(x-3)$	$y=\frac{2}{3}x-4$
		$y=-\frac{3}{5}x+7$

Draw $x=4$ & $y=-3$

x-only ⇓ V.L.

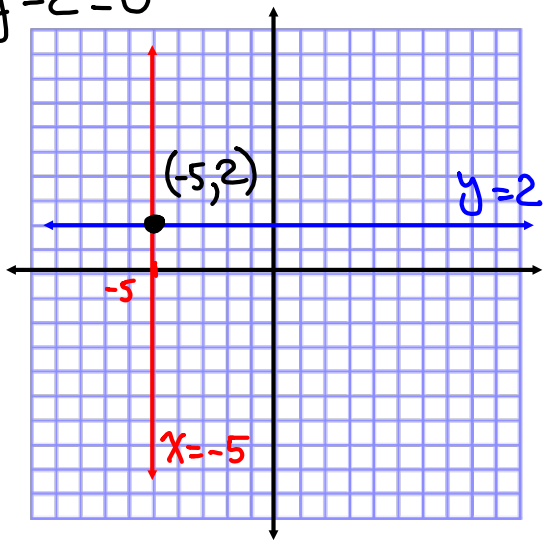
y-only ⇓ H.L.



Draw $x+5=0$, $y-2=0$

$x=-5$ ⇓ x-only V.L.

$y=2$ ⇓ y-only H.L.



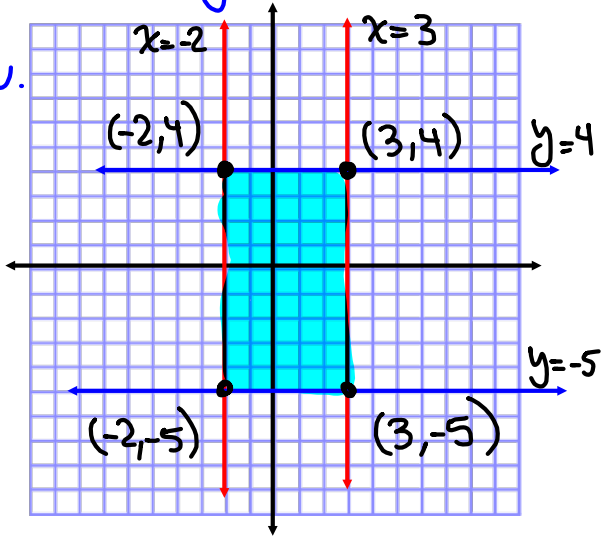
Draw $x=3$, $y=-5$, $x=-2$, and $y=4$.

Shade the region bounded by all four lines, then find its area.

$L=9$, $W=5$

$A=LW$

$A=45$ units^2



Slant lines:

Standard Form $Ax + By = C$

Slope-Int Form $y = mx + b$

Point-Slope Form $y - y_1 = m(x - x_1)$

$2x - 7y = 21$ Standard , $y = \frac{-3}{5}x + 4$, Slope-Int

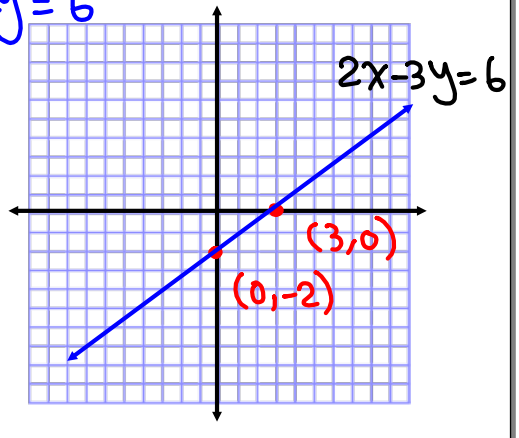
$y + 7 = \frac{-1}{2}(x - 4)$ Point-Slope

Graphing Standard form eqn of Slant line: $2x - 3y = 6$

x	y
0	
	0

Intercept Method

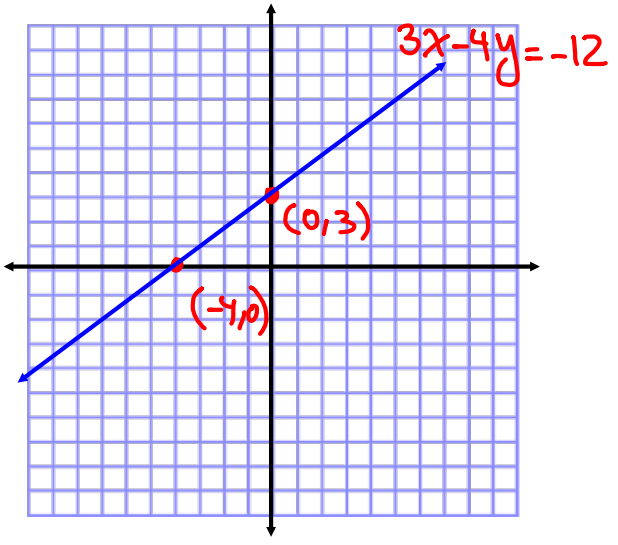
x	y
0	-2
3	0



Graph using intercept Method:

$3x - 4y = -12$

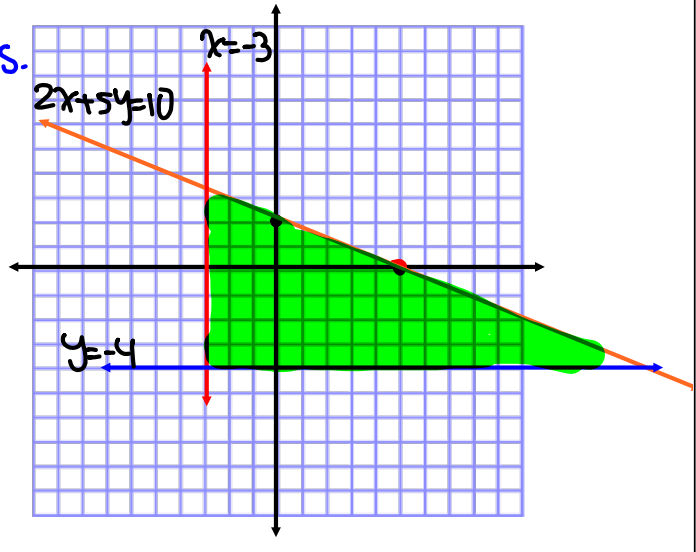
x	y
0	3
-4	0



Graph $2x + 5y = 10$, $x = -3$, and $y = -4$. Shade the region that is bounded by all three lines.

$2x+5y=10$

x	y
0	2
5	0



Slope m is ratio of Rise to Run

$m = \frac{2}{3}$ ← Rise, ← Run

2 units up & 3 units right

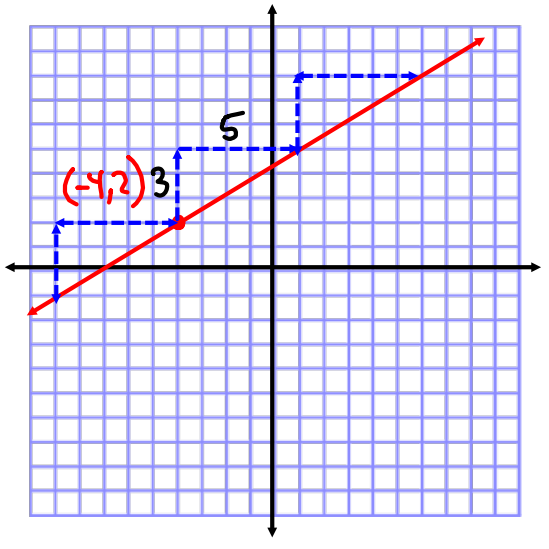
$m = -\frac{3}{5} = \frac{-3}{5}$ ← Rise, ← Run

3 units down & 5 units right.

$m = 4 = \frac{4}{1}$ ← Rise, ← Run

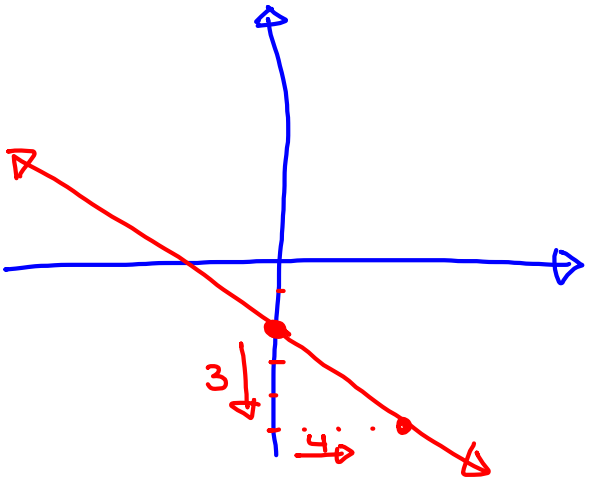
$m = -2 = \frac{-2}{1}$ ← Rise, ← Run

Draw a line that contains $(-4,2)$ with slope $\frac{3}{5}$.

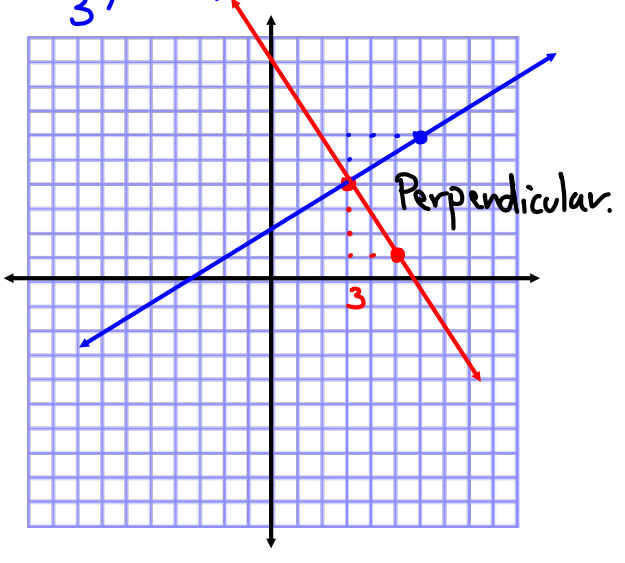


Draw a line that contains $(0, -2)$ with

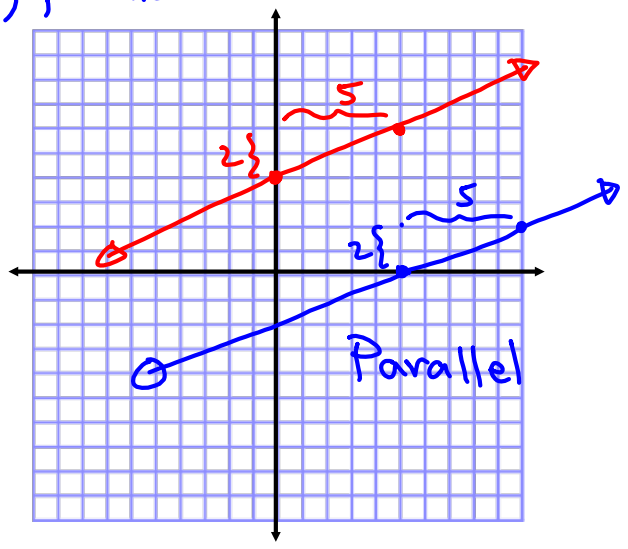
Slope $\frac{-3}{4}$ $\frac{\text{Rise}}{\text{Run}}$



Draw two lines that contain $(3, 4)$, one with slope $\frac{2}{3}$, and another one with slope $\frac{-3}{2}$.



Draw two lines with Same slope $\frac{2}{5}$, one contains (0,4), another one contains (5,0).



Solve for y:

$3x + 2y = 4$

$2y = -3x + 4$

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

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

$4x - 3y = 9$

$-3y = -4x + 9$

$y = \frac{-4}{-3}x + \frac{9}{-3}$

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

Solve for y, Simplify

$y+3=\frac{2}{3}(x-6)$

$y+3=\frac{2}{3}x-\frac{2}{3}\cdot 6^{2}$

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

$y=\frac{2}{3}x-4-3$

$\boxed{y=\frac{2}{3}x-7}$

$4x-5y\leq 10$

$-5y\leq -4x+10$

$\frac{-5}{-5}y\geq\frac{-4}{-5}x+\frac{10}{-5}$

$\boxed{y\geq\frac{4}{5}x-2}$

Solve $3x+8\leq 5x+12$

$3x-5x\leq 12-8$

$-2x\leq 4$

$\frac{-2}{-2}x\geq\frac{4}{-2}$

$\boxed{x\geq -2}$

1) S.B.N. $\{x\mid x\geq -2\}$

2) graphing

3) I.N. $[-2,\infty)$

Solve $-5 \le 3x + 1 < 16$

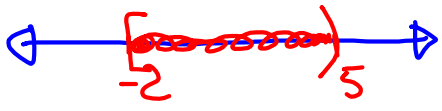
$-5 - 1 \le 3x + 1 - 1 < 16 - 1$

$-6 \le 3x < 15$

$\frac{-6}{3} \le \frac{3}{3}x < \frac{15}{3}$

$-2 \le x < 5$

① S.B.N. $\{x \mid -2 \le x < 5\}$

② Graph 

③ I.N. $[-2, 5)$

Solve $\frac{1}{4}x - \frac{5}{6} > \frac{2}{3}x + \frac{1}{2}$ Hint: use LCD to clear fractions.

LCD = 12

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

$3x - 10 > 8x + 6$

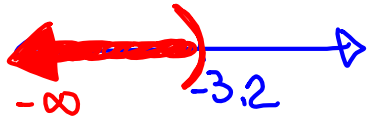
$3x - 8x > 6 + 10$

$-5x > 16$

$x < \frac{16}{-5}$

$x < -3.2$

① S.B.N. $\{x \mid x < -3.2\}$

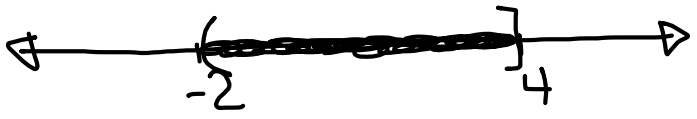
② Graph 

③ I.N. $(-\infty, -3.2)$

$-2 < x \leq 4$

① Write in S.B.N. $\{x \mid -2 < x \leq 4\}$

② Graph



③ I.N. $(-2, 4]$

Is 0 a Solution for $\sqrt{x} - \sqrt{x+4} = 2$?

$\sqrt{0} - \sqrt{0+4} = 2$

$\sqrt{0} - \sqrt{4} = 2$

$0 - 2 = 2$

NO false

Is -3 a Solution of $|2x - 4| = 10$?

$|2(-3) - 4| = 10$

$|-6 - 4| = 10$

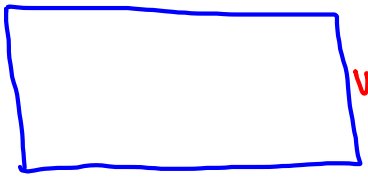
$|-10| = 10$

$10 = 10$ ✓

-3 is a Solution.

Perimeter of a rectangle is 148 ft.

Its length is 2 ft longer than 3 times its width. Find the measure of its length.



$P = 148$

$2L + 2W = 148$

$2(3x+2) + 2(x) = 148$

$x = 18$

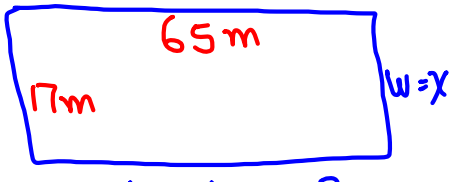
$L = 3x + 2$

$L = 3(18) + 2$

$= 56$

56 ft.

The length of a rectangular pool is 3 m shorter than 4 times its width. The perimeter is 164 m. Find its area.



$P = 164$

$2L + 2W = 164$

$2(4x-3) + 2x = 164$

$x = 17$

$L = 4x - 3$

$L = 4(17) - 3$

$L = 65$

$A = LW$

$A = 1105\ m^2$

2.5 inches on the map is 400 miles in actual distance. Two Cities are 8 inches apart on the map. Find actual distance using Proportion.

$$\frac{2.5 \text{ inches}}{400 \text{ Miles}} = \frac{8 \text{ inches}}{x \text{ Miles}}$$

$$2.5x = 8(400)$$

$$x = \frac{8(400)}{2.5} \qquad x = 1280$$

1280 miles

what percent of 400 is 700?

$$\frac{P}{100} = \frac{700}{400}$$

$$400P = 100(700)$$

$$P = 175$$

175%

175% of 400 is 700.

Simplify

$$-\frac{3}{4}(8x^2 - 4x + \frac{4}{3}) + 7x^2 - 3x + 1$$

$$= \frac{-3}{\cancel{4}} \cdot \overset{2}{\cancel{8}}x^2 - \frac{3}{\cancel{4}} \cdot (-\cancel{4}x) - \frac{3}{4} \cdot \frac{4}{3} + 7x^2 - 3x + 1$$

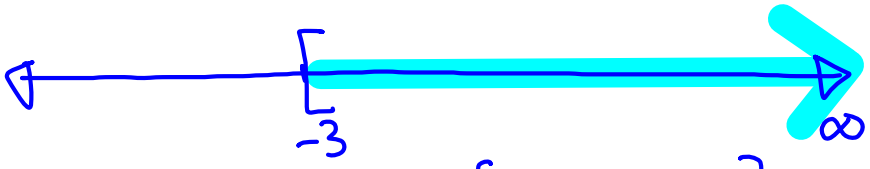
$$= -6x^2 + 3x - 1 + 7x^2 - 3x + 1 = \boxed{x^2}$$

Graph $[-4, 6)$ on the number-line Sys.

S.B.N. $\{x \mid -4 \leq x < 6\}$

Graph $[-3, \infty)$ on the number line System.

Give your answer in S.B.N.



$\{x \mid x \geq -3\}$

John has 79 Coins.

Nickels, Dimes, and Quarters only.

The number of dimes is twice the # of nickels.

The number of quarters is 1 more than three times the # of nickels.

How much money does John have?

Nickels	Dimes	Quarters.
x	$2x$	$3x+1$

Nickels	Dimes	Quarters.	
x	$2x$	$3x+1$	$=79$

$x + 2x + 3x + 1 = 79$

$\vdots$

$x = 13$

13 Nickels

26 Dimes

40 Quarters

$13(.05) + 26(.10) + 40(.25) =$ **$13.25**

Exam I:

Part I: Show work

Part II: Multiple Choice

Consecutive Integers:

12, 13, 14, 15, ----

27, 28, 29, 30, ----

-15, -14, -13, -12, ----

x , $x+1$, $x+2$, $x+3$, ---

109 , 110 , 111 , 112, ---

Find two consecutive integers such that their sum is 51.

First $\rightarrow x$

Second $\rightarrow x+1$

First + Second = 51

$x + x+1 = 51$

$x = 25$

25 & 26

Find two cons. integers such that

4 times the first one is equal to 108 reduced by 3 times the second one.

First $\rightarrow x$

Second $\rightarrow x+1$

$4 \cdot \text{First} = 108 - 3 \cdot \text{Second}$

$4x = 108 - 3(x+1)$

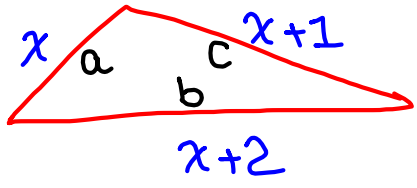
$x = 15$

15 & 16

Perimeter of a triangle is 72 in.

Three sides are three consecutive integers.

Find all three sides.



$P = 72$

$a + b + c = 72$

$x + (x+2) + (x+1) = 72$

$x = 23$

23 in., 24 in., and 25 in.

Find two Consecutive integers such that the difference between 5 times the Smaller one and 3 times the larger one is equal to 91.

Smaller → x

Larger → $x+1$

$5 \cdot \text{Smaller} - 3 \cdot \text{larger} = 91$

$5x - 3(x+1) = 91$

$x = 47$

47 & 48

Consecutive Even Integers:

18, 20, 22, 24, ...

82, 84, 86, 88, ...

100, 102, 104, 106, ...

-34, -32, -30, -28, ...

x, $x+2$, $x+4$, $x+6$ $\quad x \rightarrow$ event

Find two consecutive even integers such that their sum is 78.

First $\rightarrow x$

Second $\rightarrow x+2$

First + Second = 78

$x + x+2 = 78$

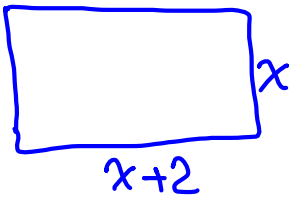
$\vdots$

$x = 38$

38 & 40

The dimensions of a rectangle are two cons. even integers.

Find its area if the perimeter is 44m.



$2L + 2W = 44$

$2(x+2) + 2(x) = 44$

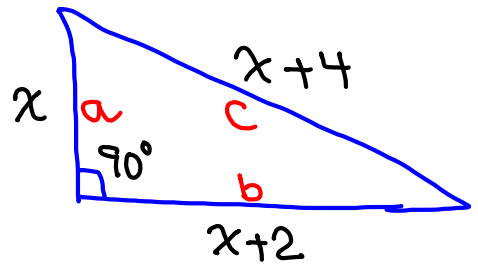
$\vdots$

$x = 10$

10m by 12m.

$A = 120\ m^2$

Use the right triangle below with Perimeter 24 cm and Sides are three Cons. even integers. Find its area.



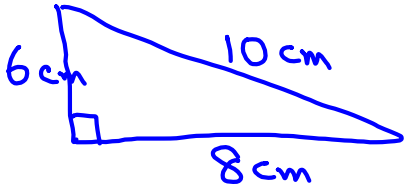
$P = 24$

$a+b+c=24$

$x+x+2+x+4=24$

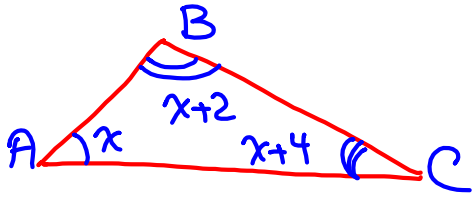
$\vdots$

$\boxed{x=6}$



$A = \frac{b \cdot h}{2} = \frac{8 \cdot 6}{2} = \boxed{24\ cm^2}$

In triangle ABC, the measure of three angles are three Cons. even integers. Find all three angles. Hint: The sum of all three interior angles in any triangle is 180°.



$A + B + C = 180°$

$x+x+2+x+4=180$

$\vdots$

$x=58$

$\{58°, 60°, \text{and } 62°\}$

Consecutive odd integers:

13, 15, 17, 19, ----

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

57, 59, 61, 63, ----

$-43, -41, -39, -37, \cdots$

x , $x+2$, $x+4$, $x+6$, ---- x must be odd.

Find two cons. odd integers such that their sum is 100.

First $\rightarrow x$

Second $\rightarrow x+2$

$x + x + 2 = 100$

$\vdots$

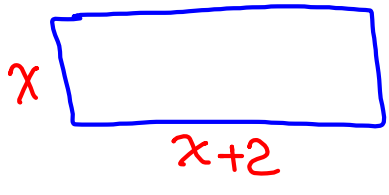
$x = 49$

49 & 51

Dimensions: Cons. odd

Perimeter 72 ft.

Find the length



$2L + 2W = 72$

$2(x+2) + 2(x) = 72$

$\vdots$

$x = 17$

the length is 19 ft.

Find two cons. odd integers such that 5 times the smaller one is equal to twice the larger one increased by 53.

Smaller $\rightarrow x$

Larger $\rightarrow x+2$

$5 \cdot \text{Smaller} = 2 \cdot \text{larger} + 53$

$5x = 2(x+2) + 53$

$\vdots$

$\boxed{x = 19}$

{19 & 21

Agenda for Tuesday:

1) Collect WP 6 @ 6:00AM
2) lecture on Graphs
3) More word problems

Exam 1 : Wednesday