Math 115

Spring 2018

Lecture 24

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

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

Class Quiz:

Factor Completely:

① $30x^3 - 120x$

$= 30x(x^2 - 4)$

$= \boxed{30x(x+2)(x-2)}$

② $x^2 - 4x - 32$

$= \boxed{(x-8)(x+4)}$

$1 \cdot -32$

$2 \cdot -16$

$\boxed{4 \cdot -8}$

③ $2ax - 2bx + ay - by$

$= 2x(a-b) + y(a-b)$

$= \boxed{(a-b)(2x+y)}$

④ $x^2 + 36$

$= x^2 + 6^2$

$A^2 + B^2$

Prime

Factor completely:

① $x^2+5x-24$

$=(x+8)(x-3)$

$-1 \cdot 24$

$-2 \cdot 12$

$-3 \cdot 8$

$-4 \cdot 6$

Solve:

② $x^2-64=0$

$x^2-8^2=0$

A^2-B^2

$(x+8)(x-8)=0$

By Z.F.P.

$x+8=0$ or $x-8=0$

$x=-8$ $x=8$

$\{\pm 8\}$

Factor Completely

③ $9y^2-64$

$=(3y)^2-(8)^2$

A^2-B^2

$=(3y+8)(3y-8)$

Solve

④ $10x^2=17x-3$

$10x^2-17x+3=0$

$P=30$

$S=-17$

$-1,-30$

$-2,-15$

$-3,-10$

$-5,-6$

30

$10x^2-2x-15x+3$

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

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

$(5x-1)(2x-3)=0$

By Z.F.P.

$5x-1=0$, $2x-3=0$

$x=\frac{1}{5}$ $x=\frac{3}{2}$

$\{\frac{1}{5},\frac{3}{2}\}$

Use A^3+B^3 or A^3-B^3 to Factor

$8x^3+27$

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

$=(2x+3)(4x^2-6x+9)$

$\{-6,2\}$

Solve

$(x+1)(x+3)=15$

Hint: FOIL & Simplify

$x^2+3x+x+3=15$

$x^2+4x+3=15$

$x^2+4x+3-15=0$

$x^2+4x-12=0$

$(x+6)(x-2)=0$

By Z.F.R.

$x+6=0$ or $x-2=0$

$x=-6$ $x=2$

Use A^3+B^3 or A^3-B^3 to Factor

$27x^3-64y^3$

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

A^3-B^3

$=(3x-4y)(9x^2+12xy+16y^2)$

$x^2+2x-48=0$

$(x+8)(x-6)=0$

By Z.F.P.

$x+8=0$ or $x-6=0$

$x=-8$ $\{-8,6\}$ $x=6$

Solve

$x^2+(x+2)^2=100$

Hint: Simplify First

$x^2+x^2+4x+4=100$

$2x^2+4x+4-100=0$

$2x^2+4x-96=0$

Divide by 2 to reduce

Use $A^2+2AB+B^2$ or $A^2-2AB+B^2$ to factor $25x^2+30x+9$.

$(5x)^2$ $+(3)^2$

$(A \pm B)^2$

$= (5x+3)^2$

$2(5x)(3)$

$2x^2 - 4x + 9x - 18$

$= 2x(x-2) + 9(x-2)$

$(x-2)(2x+9) = 0$

By Z.F.P.

$x-2=0$ $\quad 2x+9=0$

$x=2$ $\quad x=-\frac{9}{2}$

Solve

$(2x+1)(x+2)=20$

Hint: FOIL & Simplify

$2x^2+4x+x+2=20$

$2x^2+5x+2-20=0$

$2x^2+5x-18=0$

-36

$-1, 36$

$-2, 18$

$-3, 12$

$-4, 9$

$-6, 6$

$\left\{-\frac{9}{2}, 2\right\}$

Use $A^2+2AB+B^2$ or $A^2-2AB+B^2$ to factor

$49x^2 - 112xy + 64y^2$

$= (7x)^2 - 2(7x)(8y) + (8y)^2$

$= (7x-8y)^2$

$2x^2 - 12x - x + 6$

$= 2x(x-6) - 1(x-6)$

$= (x-6)(2x-1)$

Solve

$2x^2 + 6 = 13x$

$2x^2 + 6 - 13x = 0$

$2x^2 - 13x + 6 = 0$

$-12, -1$

-13

$(2x-1)(x-6)=0$

By Z.F.P.

$2x-1=0$ $\quad x-6=0$

$x=\frac{1}{2}$ $\quad x=6$

$\left\{\frac{1}{2}, 6\right\}$

Class Quiz

① Factor $2x^2 - 7x - 9$

$P = -18$

$S = -7 \rightarrow -9 \& 2$

$= 2x^2 - 9x + 2x - 9$

$= x(2x-9) + 1(2x-9)$

$= \boxed{(2x-9)(x+1)}$

② Solve $(3x-5)(x+2) = 0$

RHS = 0

LHS factored by Z.F.R.

$3x - 5 = 0$ $\quad x = 5/3$

$x + 2 = 0$ $\quad x = -2$

$\boxed{\{-2, 5/3\}}$

③ Solve $x^2 = 20x - 100$

$x^2 - 20x + 100 = 0$

$P = 100$

$S = -20$

$-10 \& -10$

$x^2 - 10x - 10x + 100$

$x(x-10) - 10(x-10)$

$(x-10)(x-10) = 0$

By Z.F.P.

$\boxed{x = 10}$

$\{10\}$ Repeated

The product of two consecutive integers is 56. Find all such integers.

$x \& x+1$

$x(x+1) = 56$

$x^2 + x = 56$

$x^2 + x - 56 = 0$

$(x+8)(x-7) = 0$

By Z.F.P.

$x + 8 = 0$ $\quad x - 7 = 0$

$x = -8$ $\quad x = 7$

x	$x+1$
7	8
-8	-7

7 & 8 or -8 & -7

The sum of squares of two cons. odd integers is 34. Find all such integers.

x & $x+2$

$x^2 + (x+2)^2 = 34$

$(x+2)(x+2)$

$x^2 + x^2 + 4x + 4 = 34$

$2x^2 + 4x + 4 - 34 = 0$

$2x^2 + 4x - 30 = 0$

Divide by 2 to reduce

$x^2 + 2x - 15 = 0$

$(x+5)(x-3) = 0$

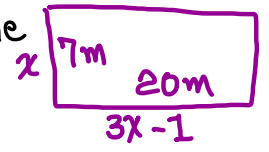
-5 $\quad$ 3

x	$x+2$
3	5
-5	-3

3 & 5 or -5 & -3

The length of a rectangle is 1 m shorter than 3 times its width.

① Draw & label such rectangle



② Find an expression for its area

$A = LW$ $\quad$ $A = x(3x-1)$ $\quad$ $A = 3x^2 - x$

③ Find its dimensions if the area is 140m^2.

$A = 140$

$3x^2 - x = 140$

$3x^2 - x - 140 = 0$

-420

$P = -420$, $S = -1$

1, −420

2, −210

3, −140

10, −42

20, −21

$3x^2 + 20x - 7x - 140$

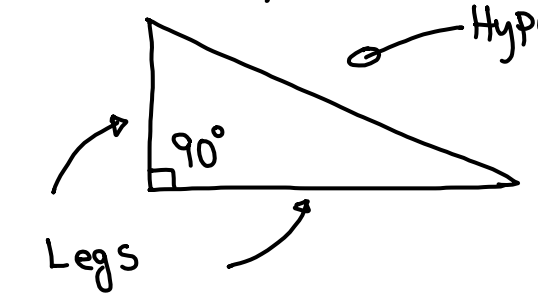
$x(3x+20) - 7(3x+20)$

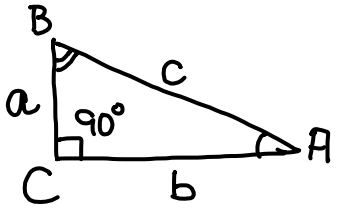
$(3x+20)(x-7) = 0$

$x \neq \#$ $\quad$ $x = 7$

7m by 20m

Right Triangle

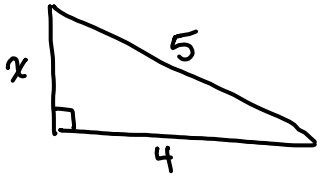




$a^2 + b^2 = c^2$

Pythagorean thrm.

Find x:



$x^2 + 4^2 = 5^2$

$x^2 + 16 = 25$

$x^2 + 16 - 25 = 0$

$x^2 - 9 = 0$

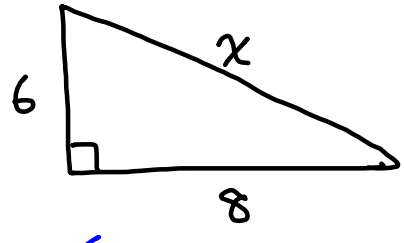
$(x+3)(x-3) = 0$

By Z.F.P.

-3 ~~-3~~ 3

$\{3\}$

Find x



Right Triangle

Pythagorean Thrm

$a^2 + b^2 = c^2$

$6^2 + 8^2 = x^2$

$100 = x^2$

$0 = x^2 - 100$

$x^2 - 100 = 0$

$(x+10)(x-10) = 0$

~~$x = -10$~~ $x = 10$

Factoring Project
Due Monday

Next two SG
Due Tuesday

Word Problem: Money ~~Due Monday.~~