Remember to take notes and load the notes from class together with your homework solutions.

Section 1.4 in the book:

Homework Q1:

$3y^2 - 12y = 27$ quadratic equation b/c of y^2

make it look like $ax^2 + bx + c = 0$

$3y^2 - 12y - 27 = 27 - 27$ (subtract 27)

$3y^2 - 12y - 27 = 0$

divide the largest common factor: $3 = 3 \cdot 1$, $12 = 3 \cdot 4$, $27 = 3 \cdot 9$

$\frac{3}{3}y^2 - \frac{12y}{3} - \frac{27}{3} = \frac{0}{3}$ (d ivide each term by 3)

$1y^2 - 4y - 9 = 0$

$a = 1$, $b = -4$, $c = -9$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ quadratic formula

$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(-9)}}{2 \cdot 1}$ (replace a,b,c)

$x = \frac{4 \pm \sqrt{16 + 36}}{2}$ apply basic operations

$x = \frac{4 \pm \sqrt{52}}{2}$ add

$x = \frac{4 \pm \sqrt{4 \cdot 13}}{2}$ $4 \cdot 13 = 52$

$x = \frac{4 \pm \sqrt{4}\sqrt{13}}{2}$ $\sqrt{ab} = \sqrt{a}\sqrt{b}$

$x = \frac{4 \pm 2\sqrt{13}}{2}$ apply $\sqrt{4} = 2$

$x = \frac{2(2 \pm \sqrt{13})}{2}$ factor 2 from each term in top

$x = 2 \pm \sqrt{13}$ cancel the 2 in top and 2 in bottom

$x = 2 + \sqrt{13}, 2 - \sqrt{13}$ $\Leftarrow$ answers in boxes on MyOpenMath!

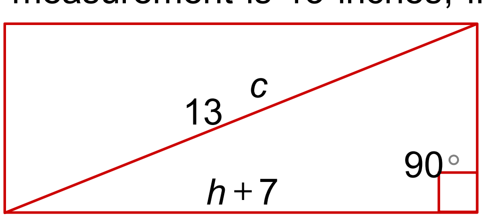
reminder: $\sqrt{52} = \sqrt{2 \cdot 26}$ $\Leftarrow$ not useful b/c neither 2 nor 26 is a perfect square

$= \sqrt{4 \cdot 13}$ $\Leftarrow$ better b/c 4 is a perfect square and $\sqrt{4} = 2$

$= \sqrt{4}\sqrt{13} = 2\sqrt{13}$

Homework Question 2:

A rectangle is drawn so the width is 7 inches more than the height. If the diagonal measurement is 13 inches, find the height.



$h =$ height

b

width is 7 more than height

a

Pythagorean Theorem:

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

$\cancel{(h+7)^2 = h^2 + 7^2}$

$(h+7)^2 + h^2 = 13^2$

$h^2 + 2 \cdot h \cdot 7 + 7^2 + h^2 = 169$

$h^2 + 14h + 49 + h^2 = 169$

$(x+a)(x+b)$

$FOIL = x^1 \cdot x^1 + xb + ax + ab$

$= x^{1+1} + (a+b)x + ab$

$= x^2 + (a+b)x + ab$

In box put 5.

$2h^2 + 14h + 49 = 169$

$2h^2 + 14h + 49 - 169 = 0$

$2h^2 + 14h - 120 = 0$

$\frac{2}{2}h^2 + \frac{14h}{2} \frac{-120}{2} = \frac{0}{2}$

$h^2 + 7h - 60 = 0$

two numbers that multiply to -60
same two numbers add to
factors of -60: $-5(12) = -60!$ *done*
$-5 + 12 = 7$! done!

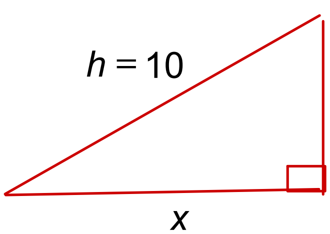
$(h-5)(h+12) = 0$

$h - 5 = 0 \qquad h + 12 = 0$

$h = 5 \qquad h = -12$

h=height of rectangle..can't be -12..no good!
so h must be 5!

Question 3: h↓
The hypotenuse of a right traingle is 10 inches long. The difference of the other two sides is 2 inches. Find the missing sides. Use exact values.



$x+2$

"difference is 2 inches of sides"

side 1-side2=2
side1=2+side2

$(x+2) - x = \cancel{x} + 2 - \cancel{x} = 2!$

Graphics cards in computers use triangles to render video game worlds.

$x - y = 2 \rightarrow x = y + 2$

or

Pythagorean Theorem:

$x^2 + (x+2)^2 = 10^2$ (x+2) and it's squared...(x+2) quantity squared

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

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

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

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

divide by 2

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

multilpy to -48 and add to 2:
$-48 = (-6) \cdot 8$
and $-6 + 8 = 2$

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

$x - 6 =$ factor, x+8=factor

$x = 6 \qquad x = -8$

x=horizontal leg=6
can't be -8
so vertical leg is
$6 + 2 = 8$

in the two boxes we input shorter leg=6 and longer leg=8

Example 2 in book:

$4x^2 = 12$

seprate: $(3)^2 = 9 \Leftarrow$

$(-3)^2 = 9$

divide by 4: $\frac{4x^2}{4} = \frac{12}{4}$

$(ab)^2 = a^2 b^2$

simplify 4/4=1: $x^2 = 3$

b/c only x^2 is on the LHS, take roots: $\sqrt{x^2} = \pm\sqrt{3}$

$x = +\sqrt{3},\ x = -\sqrt{3}$

$(\sqrt{3})^2 = (3^{1/2})^2 = 3^{2/2} = 3^1 = 3$

$(-\sqrt{3})^2 = (-1\cdot\sqrt{3})^2 = (-1)^2(\sqrt{3})^2 = 1\cdot 3 = 3$

$(x-3)^2 = 7$

on LHS we have $(x-3)^2$ (no binomial like x^2 +4x or x^2 +5x+6)

square root both sides: $\sqrt{(x-3)^2} = \pm\sqrt{7} \Leftarrow$ + and - both!

on the LHS, we get $(x-3) = \pm\sqrt{7}$ (on RHS, keep $\sqrt{7}$ ..not a simple value)

add 3 to both sides: $x - 3 + 3 = +3 \pm \sqrt{7}$

$x = 3 \pm \sqrt{7} \Leftarrow$ this is not $3\sqrt{7}$

it's $3+\sqrt{7},\ 3-\sqrt{7}$

y? b/c 3 and $\sqrt{7}$ are unlike terms!

3 and $-\sqrt{7}$ are unlike terms!