Name:_____ Date:_____

SOLUTION for Pre-Calculus 11 HW 4.1 Solving Quadratic Equations by Factoring

1. Solve for "x" from each of the following:

a. $(x+9)(x+21)=0$

$x+9=0 \quad x+21=0$

$x=-9 \quad x=-21$

b. $4(x-3)(x+3)=0$

$x-3=0 \quad x+3=0$

$x=3 \quad x=-3$

c. $(x+81)(x-29)=0$

$x+81=0 \quad x-29=0$

$x=-81 \quad x=29$

e. $(2x-5)\left(x-\frac{1}{2}\right)=0$

$2x-5=0 \quad x-0.5=0$

$2x=5 \quad x=0.5$

$s=\frac{5}{2}$

f. $x(3x+1)=0$

$x=0 \quad 3x+1=0$

$3x=-1$ q

$x=\frac{-1}{3}$

g. $2(5-2x)\left(\frac{1}{3}-x\right)=0$

$5-2x=0 \quad \frac{1}{3}-x=0$

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

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

2. Factor each of the following expressions. Show all your steps and work:

a. $x^2+8x+12=0$

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

$x+6=0 \quad x+2=0$

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

b. $x^2+17x+72=0$

$(x+8)(x+9)=0$

$x+8=0 \quad x+9=0$

$x=-8 \quad x=-9$

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

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

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

$x=3 \quad x=-5$

d. $x^2-7x-170=0$

$(x-17)(x+10)=0$

$x-17=0 \quad x+10=0$

$x=17 \quad x=-10$

e. $x^2-64=0$

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

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

$x=8 \quad x=-8$

f. $100-x^2=0$

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

$10-x=0 \quad 10+x=0$

$10=x \quad x=-10$

g. $(2x-1)^2-16=0$

$(2x-1-4)(2x-1+4)=0$

$2x-5=0 \quad 2x+3=0$

$2x=5 \quad 2x=-3$

$x=2.5 \quad x=-1.5$

h. $2x^2-11x+15=0$

$1 \rightarrow -5=-5$

$2 \rightarrow -3=-6 \Rightarrow -11$

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

$2x-5=0 \quad x-3=0$

$2x=5 \quad x=3$

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

i) $13x^2+8x-5=0$

$13 \rightarrow 1=13$

$1 \rightarrow -5=-5 \Rightarrow 8$

$(13x-5)(x-1)=0$

$13x-5=0 \quad x-1=0$

$13x=5 \quad x=1$

$x=\frac{5}{13}$

j) $2x^2-25x-13=0$

$1 \rightarrow 1=1$

$2 \rightarrow -13=-26 \Rightarrow -25$

$(2x-1)(x-13)=0$

$2x-1=0 \quad x-13=0$

$2x=1 \quad x=13$

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

k) $2x^2-7x+6=0$

$1 \rightarrow -3=-3$

$2 \rightarrow -2=-4 \Rightarrow -7$

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

$2x-3=0 \quad x-2=0$

$2x=3 \quad x=2$

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

L) $10x^2+49x+49=0$

$5 \rightarrow -7=-35$

$2 \rightarrow -7=-14 \Rightarrow -49$

$(2x-7)(5x-7)=0$

$2x-7=0 \quad 5x-7=0$

$2x=7 \quad 5x=7$

$x=\frac{7}{2} \quad x=\frac{7}{5}$

m) $(x+2)^2+8(x+2)-20=0$

make : $x+2=k$

$k^2+8k-20=0$

$(k-2)(k+10)=0$

$k=2,-10$

$x+2=2,\quad x+2=-10$

$x=0 \qquad x=-12$

n) $(x-3)^2+10(x-3)+9=0$

make : $x-3=k$

$k^2+10k+9=0$

$(k+1)(k+9)=0$

$k=-1,\quad -9$

$x-3=-1,\quad x-3=-9$

$x=2 \qquad x=-6$

o) $2(x+1)^2-(x+1)-6=0$

same method as the previous question. Make a substitution and then solve for "x"

p) $4(x+2)^2=6-5(x+2)$

Move all the terms to the left and then use the same method as the previous question. Make a substitution and then solve for "x"

o) $x^4-256=0$

Difference of Squares

$x^4-256=0$

$(x^2+16)(x^2-16)=0$

$(x^2+16)(x+4)(x-4)=0$

$x=4 \quad x=-4$

q) $x^4=10-9x^2$

$x^4+9x^2-10=0$

$(x^2-1)(x^2+10)=0$

$(x+1)(x-1)(x^2+10)=0$

$x=1 \quad x=-1$

r) $r^4-17r^2+16=0$

$r^4-17r^2+16=0$

$(r^2-1)(r^2-16)=0$

$(r+1)(r-1)(r+4)(r-4)=0$

$r=\pm1 \quad x=\pm4$

s) $x^4-29x^2+100=0$

$x^4-29x^2+100=0$

$(x^2-25)(x^2-4)=0$

$(x+5)(x-5)(x+2)(x-2)=0$

$r=\pm5 \quad x=\pm2$

t)

$4(x^2-6x+9)^2-12(x^2-6x+9)=-9$

Make : $k=x^2-6x+9$

$4k^2-12k+9=0$

$(2k-3)(2k-3)0$

$k=\frac{3}{2}$

$x^2-6x+9=\frac{3}{2}$

$2x^2-12x+18=3$

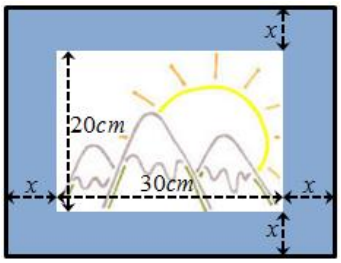
$2x^2-12x+15=0$

$2(x^2-6x+9)-18+15=0$

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

$x=3\pm\frac{\sqrt{3}}{2}$

3. A photograph that is 20cm by 30cm is framed with a uniform mat board as shown below. If the area of the photo with the mat is 999cm^2, then what is the width of the mat?



$A = (20+2x)(30+2x)$

$999 = 600+100x+4x^2$

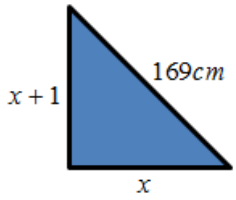
$0 = 4x^2+100x-399$

$0 = (2x-7)(2x+57)$

$x = \frac{7}{2}, -\frac{57}{2}$

Only take the positive value because the length can not be negative

4. Find the length of the base for the following triangle:



Use the Pythagorean theorem:

$(x+1)^2 + x^2 = 169^2$

$x^2 + 2x + 1 + x^2 = 28561$

$2x^2 + 2x - 28560 = 0$

$x^2 + x - 14280 = 0$

$(x-119)(x+120) = 0$

$x = 119, -120$

Take the positive value, so the length will be 119, and the height will be 120