NAME _____ RH ZOOM SESSION

1. Three cousins have ages that are consecutive integers. The product of the two older cousin's ages is twelve less than six times the sum of the younger two cousin's ages. Write an equation that could be solved to find the three cousin's ages and find their ages algebraically.

x = 1st consecutive integer = 1, 8
$x+1$ = 2nd consecutive integer = 2, 9
$x+2$ = 3rd consecutive integer = 3, 10

$(x+1)(x+2) = 6(x+x+1)-12$
$x^2+3x+2 = 12x+6-12$
$x^2+3x+2 = 12x-6$
$x^2-9x+8=0$
$(x-8)(x-1)=0$

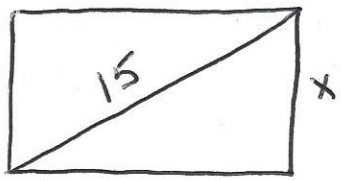
$x-8=0$	$x-1=0$
$x=8$	$x=1$

check

$9 \times 10 = 6(8+9)-12$
$90 = 6(17)-12$
$90=90$ ✓

$2 \times 3 = 6(1+2)-12$
$6 = 18-12$
$6=6$ ✓

2. Nancy walks 15 meters diagonally across a rectangular field. She then returns to her starting position along the outside of the field. The total distance she walks is 36 meters. What are the dimensions of the field?



$36-15-x$
$21-x$

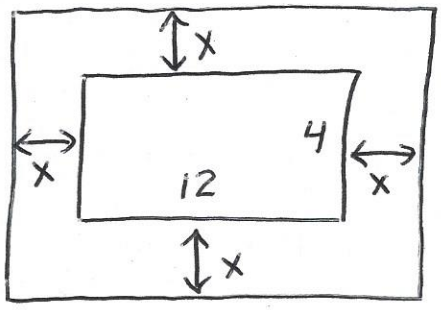
x = width of rectangle
$21-x$ = length of rectangle

$a^2+b^2=c^2$
$(21-x)^2+x^2=15^2$
$441-42x+x^2+x^2=225$
$2x^2-42x+216=0$
$x^2-21x+108=0$
$(x-9)(x-12)=0$

$x-9=0$	$x-12=0$
$x=9$	$x=12$

dimensions are
9 meters by 12 meters

3. A rectangular poster is 12 inches by 4 inches and is surrounded by a frame of uniform width. If the area of the photo and the frame is 180 square inches, find the width of the frame.



$2x+12$

frame: length $= 2x+12$

width $= 2x+4 = 2(3)+4 = 10$ inches

$(2x+12)(2x+4) = 180$

$4x^2+8x+24x+48 = 180$

$4x^2+32x-132 = 0$

$x^2+8x-33 = 0$

$(x+11)(x-3) = 0$

$x+11=0$	$x-3=0$
$x=-11$	$x=3$

reject

uniform width is 3 inches

4. A model rocket launcher is launched from the roof of a building. Its flight path is modeled by $h = -5t^2 + 30t + 10$ where h is the height of the rocket above the ground in meters and t is the time after the launch in seconds.

t = time (seconds)
h = height (meters)

a. From what height was the rocket launched from?

y intercept 10 meters

b. When does the rocket hit its maximum height?

x value of vertex 3 seconds

$x = \frac{-b}{2a} = \frac{-30}{2(-5)} = 3$

c. What is the rocket's maximum height?

y value of vertex 55 meters

substitute x value of vertex in equation of function

$y = -5(3)^2+30(3)+10$

$= 55$

d. How high is the rocket after 1 second?

y value

$x = 1$

$y = -5(1)^2+30(1)+10$

$= 35$ meters

e. How long before the rocket hits the ground? (nearest tenth) 6.3 seconds

roots (x intercept)

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

$a = 1$

$b = -6$

$c = -2$

$0 = -5t^2+30t+10$

$0 = -5(t^2-6t-2)$

$x = \frac{6 \pm \sqrt{(-6)^2-4(1)(-2)}}{2(1)}$

$x = \frac{6 \pm \sqrt{36+8}}{2}$

$x = \frac{6 \pm \sqrt{44}}{2} = \frac{6 \pm 2\sqrt{11}}{2}$

$\frac{6+2\sqrt{11}}{2} \approx 6.32$

$\frac{6-2\sqrt{11}}{2} \approx -0.32$ reject