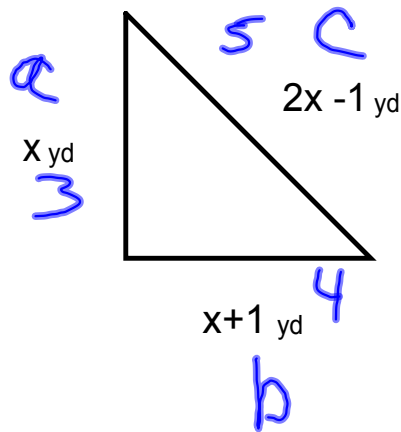**Unique Building Company is constructing a triangular roof truss for a building. The workers assemble the truss with the dimensions shown on the diagram below. Using the Pythagorean Theorem, find the length of the sides of the truss.**

a

5 c

2x -1 ₍yd₎

X ₍yd₎

3

x+1 ₍yd₎ 4

b

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

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

$$x^2 + x^2 + 2x + 1 = 4x^2 - 4x + 1$$
$$-2x^2 \quad -2x - 1 \quad -2x^2 - 2x - 1$$

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

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

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

$x = 0 \qquad x = 3$

1

31. LANDSCAPING A landscaping company has been commissioned to design a triangular flower bed for a mall entrance. The final dimensions of the flower bed have not been determined, but the company knows that the height will be two feet less than the base. The area of the flower bed can be represented by the equation $A = \frac{1}{2}b^2 - b$.

a. Write this equation in factored form.

b. Suppose the base of the flower bed is 16 feet. What will be its area?
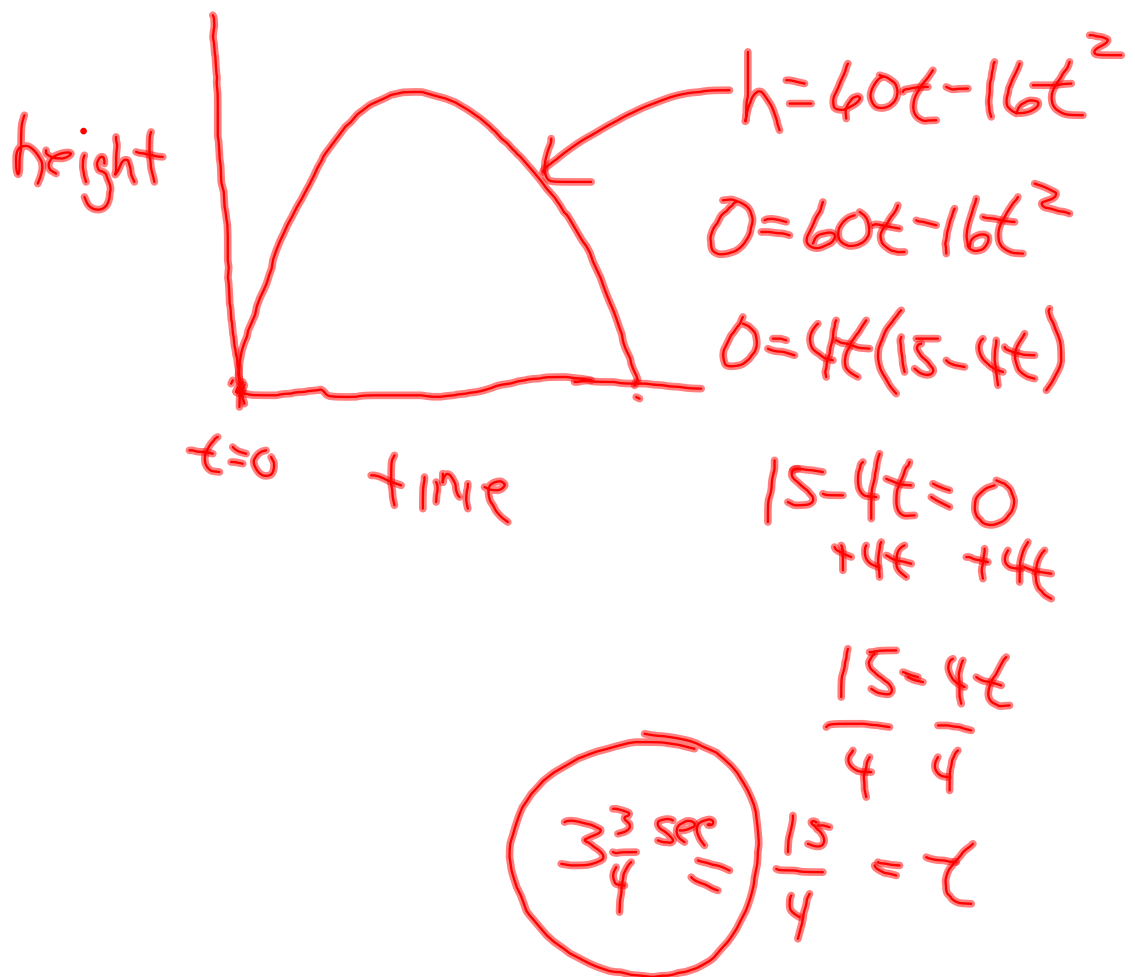
$$A = \frac{1}{2}b^2 - b$$

$$a) \quad A = b\left(\frac{1}{2}b - 1\right)$$

$$b) \quad A = 16\left(\frac{1}{2}\cdot 16 - 1\right)$$

$$(16) \ 7$$

$$A = 112$$

32. **PHYSICAL SCIENCE** Mr. Alim's science class launched a toy rocket from ground level with an initial upward velocity of 60 feet per second. The height h of the rocket in feet above the ground after t seconds is modeled by the equation $h = 60t - 16t^2$. How long was the rocket in the air before it returned to the ground?

$$h = 60t - 16t^2$$

$$0 = 60t - 16t^2$$

$$0 = 4t(15 - 4t)$$

$$15 - 4t = 0$$

$$\frac{15 - 4t}{4} \quad \frac{4t}{4}$$

$$\frac{15}{4} = t$$

$$3\frac{3}{4} \text{ sec}$$

height

$t = 0$

time

Chapter 8-3 Factoring $x^2 + bx + c$

Multiply: $(x+2)(x+3)$ What do you observe?

$$X^2 + 3x + 2x + 6$$

$$X^2 + 5x + 6$$

To factor trinomials in the form of $x^2 + bx + c$, find two integers, m and p, with a sum of b and a product of c. Then write $x^2 + bx + c$ as $(x+m)(x+p)$ when m+p = b and mp = c.

$$x^2 + 9x + 20$$

Factors of 20	Sum of Factors
4, 5	9
2, 10	12
1, 20	21

$$(x+4)(x+5)$$

$$x^2 + \underbrace{5x + 4x}_{9x} + 20$$

$$x^2 - 8x + 12$$ (notice negative sign before 8)

Factors of 12	Sum of Factors
3,4	7
-2,-6	-8
1,12	13

$(x-2)(x-6)$

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

$x^2 - 8x + 12$

$$x^2 + 2x - 15$$

Factors of -15	Sum of Factors

$$x^2 - 7x - 18$$

Factors of -18	Sum of Factors

$x^2 - 7x - 18$ What does this sign configuration mean?

Factors	Sum of Factors
4 18	
2,9	-7

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

$$x^2 + 17x + 42$$

$$-24 - 10x + x^2$$

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

$$n^2 - 120 = 7n$$

25. $x^2 - 18x = -32$

11. **FRAMING** Tina bought a frame for a photo, but the photo is too big for the frame. Tina needs to reduce the width and length of the photo by the same amount. The area of the photo should be reduced to half the original area. If the original photo is 12 inches by 16 inches, what will be the dimensions of the smaller photo?