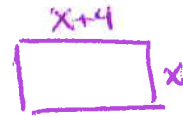
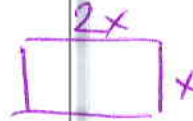


1. Write the expression with a single variable. Draw the picture.

a. The length of a rectangle is four centimeters more than its width.



b. The length of a rectangle is twice the width.

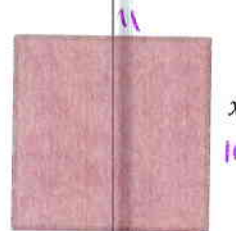


c. The height of a triangle is one more than four times its base.



2. Find the dimensions of each shape.

a. The area is 121.



$$x^2 = 121$$

$$x = 11$$

$$x^2 - 121 = 0$$

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

$$x = 11, -11$$

↑  
disregard  
Not a  
length

b. The area is 84.

$$(x-2)(x+3) = 84$$

$$x^2 + x - 6 = 84$$

$$x^2 + x - 90 = 0$$

$$(x+10)(x-9) = 0$$

$$x = -10 \text{ (disregard)}$$

$$x = 9$$



$$x - 2 = 7$$

$$x + 3 = 12$$

c. The perimeter is 120.

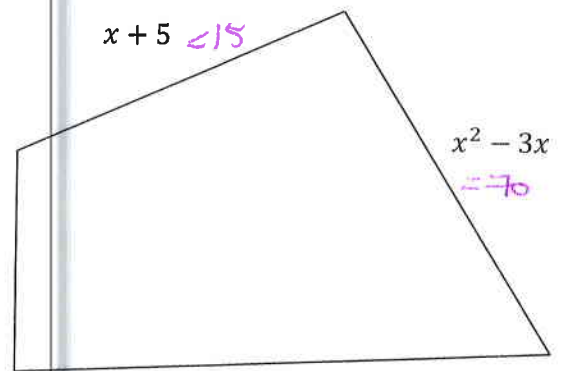
$$x+5 + x+3 + x^2 - 3x + 3x - 8 = 120$$

$$x^2 + 2x - 120 = 0$$

$$(x+12)(x-10) = 0$$

$$x = -12 \text{ (disregard)}$$

$$x = 10$$



$$x + 5 = 15$$

$$x + 3 = 13$$

$$x^2 - 3x = 70$$

$$3x - 8 = 22$$

3. An object is thrown upwards from the top of an 80-foot building with an initial velocity of 64 feet per second. The height of the object after  $t$  seconds is  $h = -16t^2 + 64t + 80$ . When will the object hit the ground?

$$-16(t^2 - 4t - 5) = 0$$

$$-16(t+1)(t-5) = 0$$

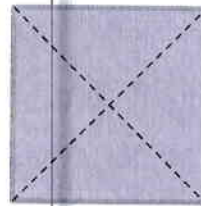
$$t = -1 \text{ (disregard)}$$

$$t = 5$$

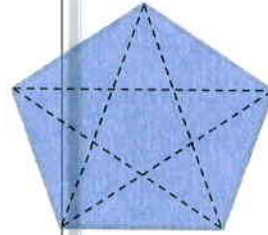
after 5 seconds

4. The equation  $D = \frac{1}{2}n(n - 3)$  gives the number of diagonals for a polygon on  $n$  sides. Find the number of diagonals for a polygon of 12 sides.

$$\frac{1}{2}(12)(12-3) = 6(9) = 54$$



2 diagonals



5 diagonals

5. The sum of a number and its square is 132. Find the number.

$$x^2 + x = 132$$

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

$$(x+12)(x-11) = 0$$

$$x = -12 \text{ or } x = 11$$

6. The product of two consecutive room numbers is 210. Find the numbers.

$$x(x+1) = 210 \quad x^2 + x - 210 = 0$$

$$(x+15)(x-14) = 0 \quad x = -15, \text{ (} x = 14 \text{)}$$

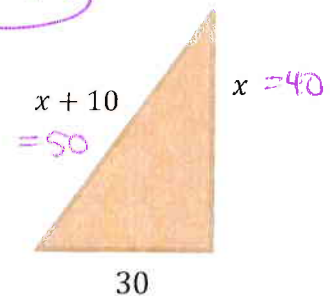
(4 and 15)

7. Find the length of the hypotenuse.

$$30^2 + x^2 = (x+10)^2$$

$$\cancel{x^2} + 900 = \cancel{x^2} + 20x + 100$$

$$\frac{800}{20} = \frac{20x}{20} \Rightarrow x = 40$$



8. At the end of two years,  $P$  dollars invested at an interest rate  $r$  compounded annually increases to an amount  $A$  given by the equation  $A = P(1 + r)^2$ . Find the interest rate  $r$  if \$100 is increased to \$144 in two years. Write your answer as a percent.

$$\frac{144}{100} = \frac{100}{100} (1+r)^2$$

$$r = .20$$

$$\text{or } 20\%$$

$$1.44 = (1+r)^2$$

$$1.2 = 1+r$$

$$-1 \quad -1$$