

Quadratic Word Problems

- 1) Read the problem carefully. Decide what unknown numbers are asked for and what facts are known. Making a sketch may help.*
- 2) Choose a variable and use it with the given facts to represent the unknowns described in the problem.*
- 3) Reread the problem and write an equation that represents relationships among the numbers in the problem.*
- 4) Solve the equation and find the unknowns.*
- 5) Check your results with the word of the problem. State the answer.*

Set up an equation then solve.

1) The square of a number decreased by three times the number is 28.
Find all possible values for the number.

$$x^2 - 3x = 28$$

$$x^2 - \underline{3x} - \underline{28} = 0$$

$$(x - 7)(x + 4) = 0$$

$$\boxed{x = 7, -4}$$

Set up an equation then solve.

- 2) If a positive number is subtracted from its square, the result is 72.
Find all possible values for the number.

$$x^2 - x = 72$$

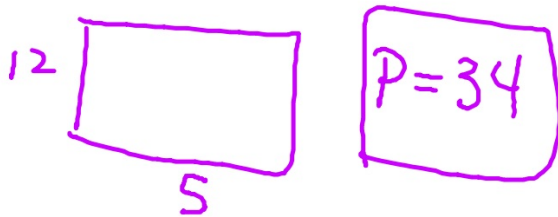
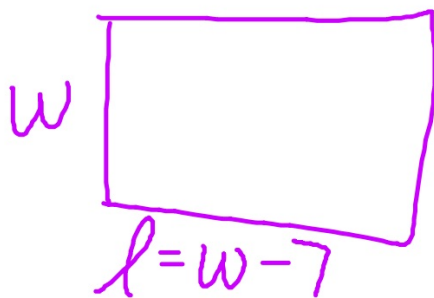
$$x^2 - \underline{x} - \underline{72} = 0$$

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

$$\boxed{x = 9, \cancel{x = -8}}$$

Set up an equation then solve.

3) The length of a rectangle is 7 less than its width. Find the perimeter if the area is 60 square units.



$$lw = A$$
$$(w-7)w = 60$$

$$w^2 - 7w = 60$$

$$w^2 - 7w - 60 = 0$$

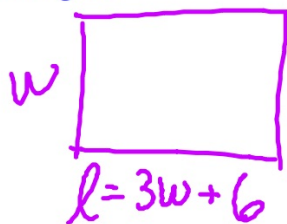
$$(w-12)(w+5) = 0$$

$$w = 12, \cancel{-5}$$

5.12

Set up an equation then solve.

4) The length of a rectangle is 6 cm more than three times its width. The area of the rectangle is 144 cm^2 . Find the dimensions of the rectangle.



$$wl = A$$

$L + W$

$$w(3w + 6) = 144$$

$$3w^2 + 6w - 144 = 0$$

$$3(w^2 + 2w - 48) = 0$$

$$3(w + 8)(w - 6) = 0$$

$$w = -8 \text{ cm}, 6 \text{ cm}$$

6cm,
24cm

Cons. integers	Cons. odd int.	Cons. even int.
X $X+1$ $X+2$	X $X+1$ $X+2$ $X+3$ $X+4$	X $X+1$ $X+2$ $X+3$ $X+4$

Set up an equation then solve.

5) Find two consecutive negative integers whose product is 90.

↙ multiply

$$x(x+1) = 90$$

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

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

$$x = -10, \cancel{9}$$

-10
-9

Set up an equation then solve.

6) Two consecutive positive odd integers have a product of 99. Find the numbers.

$$\begin{aligned}x(x+2) &= 99 \\x^2 + 2x - 99 &= 0 \\(x+11)(x-9) &= 0 \\x &= \cancel{-11}, 9\end{aligned}$$

9
11

Set up an equation then solve.

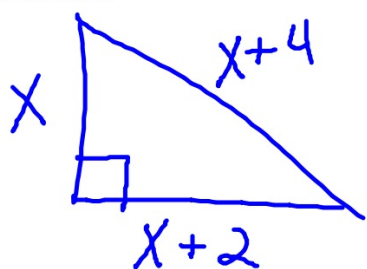
7) *The product of two consecutive even integers is 48. What are the integers?*

$$\begin{aligned}x(x+2) &= 48 \\x^2 + 2x - 48 &= 0 \\(x+8)(x-6) &= 0 \\x &= -8, 6\end{aligned}$$

6, 8
-8, -6

Set up an equation then solve.

8) A right triangle has sides that are consecutive even integers. Find the numbers.



$6, 8, 10$

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

$$\begin{aligned}x^2 + (x+2)^2 &= (x+4)^2 \\x^2 + x^2 + 4x + 4 &= x^2 + 8x + 16 \\2x^2 + 4x + 4 &= x^2 + 8x + 16 \\x^2 - 4x - 12 &= 0 \\(x-6)(x+2) &= 0 \\x &= 6, \cancel{2}\end{aligned}$$

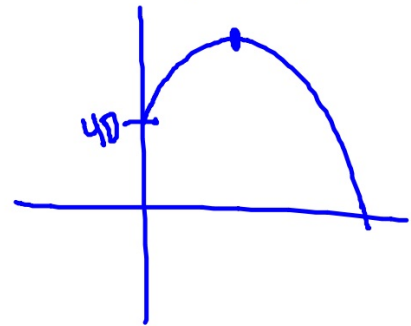
Set up an equation then solve.

initial ht: $t = 0$

9) The formula for throwing a baseball in the air is represented by $h(t) = -16t^2 + 12t + 40$, where $h(t)$ is the height of the ball (in feet) and t is measured in seconds.

a) What is the height at $t = 1$ second?

$$\begin{aligned} h(1) &= -16(1)^2 + 12(1) + 40 \\ &= -16 + 12 + 40 \\ &= 36 \text{ ft} \end{aligned}$$



Set up an equation then solve.

9) The formula for throwing a baseball in the air is represented by $h(t) = -16t^2 + 12t + 40$, where $h(t)$ is the height of the ball (in feet) and t is measured in seconds.

b) After how many seconds will the ball hit the ground? 0 ft

$$0 = -16t^2 + 12t + 40$$

$$0 = -4(4t^2 - 3t - 10)$$

$$0 = (-4)(4t + 5)(t - 2)$$

$$4t + 5 = 0 \quad t - 2 = 0$$

~~$t = -\frac{5}{4}$~~

$$t = 2 \text{ sec}$$

Set up an equation then solve.

10) An object is launched up into the air and is modeled by $h(t) = -16t^2 + 64t + 6$ where $h(t)$ is measured in feet and t is measured in seconds.

$$a = -16 \quad b = 64$$

a) At what time is the object at its maximum height?

$$\frac{-b}{2a}$$

$$t = \frac{-64}{2(-16)} = 2 \text{ sec}$$

Set up an equation then solve.

10) An object is launched up into the air and is modeled by $h(t) = -16t^2 + 64t + 6$ where $h(t)$ is measured in feet and t is measured in seconds.

b) What is the maximum height?

$$\begin{aligned} h(2) &= -16(2)^2 + 64(2) + 6 \\ &= -64 + 128 + 6 \\ &= 64 + 6 = 70 \text{ ft} \end{aligned}$$

Set up an equation then solve.

10) An object is launched up into the air and is modeled by $\underline{h(t)} = -16t^2 + 64t + 6$ where $h(t)$ is measured in feet and t is measured in seconds.

c) Find the time(s) when the object is at a height of 6 feet.

$$6 = -16t^2 + 64t + 6$$

$$0 = -16t^2 + 64t$$