

Quadratic Word Problems using factoring to solve

Annotating Math Word Problems - CUBES

Just like in Language Arts, we sometimes need to annotate problems to better understand them.

- C – Circle important numbers
- U – Underline important words
- B – Box what the problem is asking you to solve
- E – Equation
- S – Solve

There are several standard types: problems where the formula is given, falling object problems, problems involving geometric shapes. Just to name a few. There are many other types of application problems that use quadratic equations, however, we will concentrate on these types to simplify the matter.

We must be very careful when solving these problems since sometimes we want the maximum or minimum of the quadratic, and sometimes we simply want to solve or evaluate the quadratic.

ZERO PRODUCT PROPERTY

If the product of two expressions is zero, then one or other of the expressions equals zero.

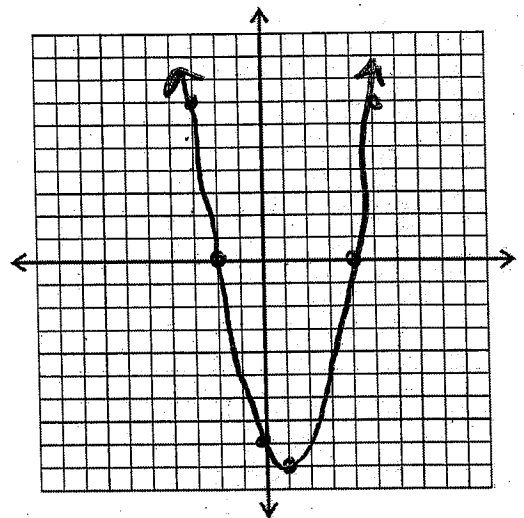
Algebra If A and B are expressions and $AB = 0$, then $A = 0$ or $B = 0$.

Example If $(x + 5)(x + 2) = 0$, then $x + 5 = 0$ or $x + 2 = 0$. That is,
 $x = -5$ or $x = -2$.

Example:

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

x	y
-3	7
-2	0
0	-8
1	-9
4	0
5	7



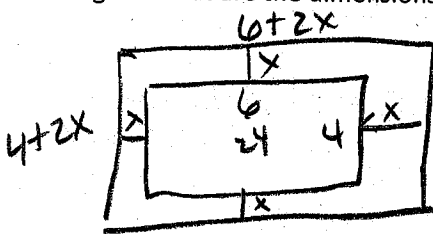
Word Problem Examples

- Eight more than the square of a number is the same as 6 times the number. Find the number.

$$\begin{aligned}
 x^2 + 8 &= 6x \\
 x^2 - 6x + 8 &= 0 \\
 (x - 4)(x - 2) &= 0 \\
 x - 4 = 0 &\quad x - 2 = 0 \\
 x = 4 &\text{ or } x = 2
 \end{aligned}$$

Common Core Math 2 Unit 2 Modeling with Quadratics

2. A 4 m by 6 m rug covers half of the floor area of a room and leaves a uniform strip of bare floor around the edges. What are the dimensions of the room?



Area room = $48 = (6+2x)(4+2x)$
 $x \neq \text{negative}$
 $\therefore x = 1$

$48 = 24 + 8x + 12x + 4x^2$
 $48 = 4x^2 + 20x + 24$
 $0 = 4x^2 + 20x - 24$
 $0 = 4(x^2 + 5x - 6)$

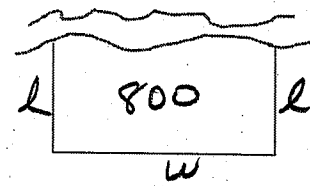
$0 = 4(x+6)(x-1)$
 $x+6=0$ or $x-1=0$
 $x=-6$ or $x=1$

3. One hundred feet of fencing is available to enclose a rectangular yard along side of the St. John's River, which is one side of the rectangle as shown. What dimensions will produce an area of 800 ft^2 ?

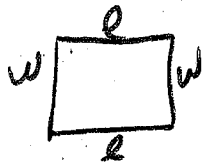
$2l + w = 100$
 $w = 100 - 2l$

Dimensions 10×80
 or 40×20

$l(100-2l) = 800$
 $100l - 2l^2 = 800$
 $0 = 2l^2 - 100l + 800$
 $0 = 2(l^2 - 50l + 400)$
 $0 = 2(l-40)(l-10)$
 $l-40=0$ or $l-10=0$
 $l=40$ or $l=10$



4. The perimeter of a rectangle is 50 ft. The area is 100 ft^2 . What are the dimensions of the rectangle?



$2(l+w) = 50$
 $w+l = 25$
 $l = 25-w$

20×5

$w(25-w) = 100$

$25w - w^2 = 100$

$0 = w^2 - 25w + 100$

$0 = (w-20)(w-5)$

$w-20=0$ or $w-5=0$
 $w=20$ or $w=5$

5. A company sells team photos for \$10 each, and the coaches find that they sell on average 30 photographs per team. The coaches do a survey and find out for each reduction in price of \$0.50, an additional two photographs will be sold. At what price will the revenue from the photographs be \$150.

6. The current price of an amateur theater ticket is \$10, and the venue typically sells 50 tickets. A survey found that for each \$1 increase in ticket price, 2 fewer tickets are sold? When will the revenue equal \$300.