

Lesson 1.7B: Quadratic Applications

Ex. 1 For what value(s) of k does $f(x) = x^2 + kx + 9$ have 2 distinct real solutions?

$$D = b^2 - 4ac$$

$$= k^2 - 4(1)(9)$$

$$= k^2 - 36$$

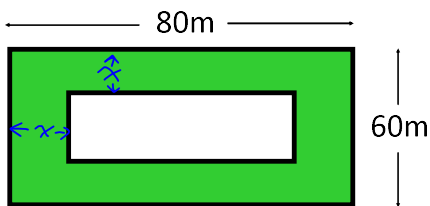
$D > 0$ means 2 solⁿ

$$k^2 - 36 > 0$$

$$k^2 > 36 \quad \pm 6$$

$$k > 6 \text{ or } k < -6$$

Ex. 2 A factory is built on a lot that measures 80 m by 60 m. A lawn of uniform width, equal to the area of the factory, surrounds it. How wide is the strip of lawn, and what are the dimensions of the factory?



Total Area = 80×60
 $= 4800$

\therefore Area of each is 2400

Let x rep. the width of the lawn

A_{FACTORY}

$$2400 = (80 - 2x)(60 - 2x)$$

$$2400 = 4800 - 160x - 120x + 4x^2$$

$$0 = 4x^2 - 280x + 2400$$

$$= 4(x^2 - 70x + 600)$$

$$= 4(x - 60)(x - 10)$$

Factor
or
Quad

M 600

A -70

N -60, -10

$x = 60$

$x = 10$

Inadmissible

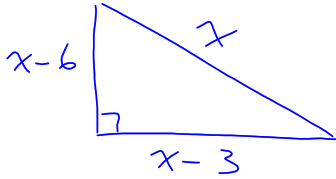
because side length would be -60

\therefore Sides are $80 - 2x$
 $= 80 - 2(10)$
 $= 60$

$60 - 2x$
 $= 60 - 2(10)$
 $= 40$

\therefore Width of lawn is 10m

- Ex. 3 The difference between the length of the hypotenuse and the length of the next longest side of a right triangle is 3 cm. The difference between the lengths of the two perpendicular sides is 3 cm. Find the three side lengths.



Let x rep. the length of hyp.

$$1x^2 = (x-3)^2 + (x-6)^2$$

$$x^2 = x^2 - 6x + 9 + x^2 - 12x + 36$$

$$0 = x^2 - 18x + 45$$

$$= (x-3)(x-15)$$

$$\downarrow$$

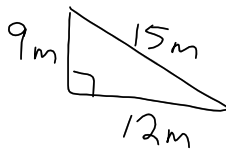
$$x=3$$

$$\downarrow$$

$$x=15$$

INADMISSABLE
would result in
negative side lengths

\therefore Side lengths are: 15, 12, 9m



Homework

pg. 13 #8

pg. 50 #8, 15, 16, 17

Handout 1.3B #1c, 11c

Extra Practice?

pg. 58 #7

Handout 1.3B 3, 9, 12