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?

$a=1 \quad b=k \quad c=9$

$D = b^2 - 4ac$

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

$= k^2 - 36$

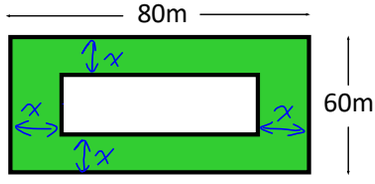
$D > 0$ means 2 sol^n

$\therefore k^2 - 36 > 0$

$k^2 > 36$

$k > 6$ 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?



Let x represent the width of the lawn

Total Area $= 80(60)$

$= 4800$

$A_{FACTORY} = \frac{4800}{2}$

$= 2400$

$A_{FACTORY} = (80-2x)(60-2x)$

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

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

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

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

M 600
A -70
-60, -10

$x = 60$ $\quad$ $x = 10$

Inadmissable because length would be -60

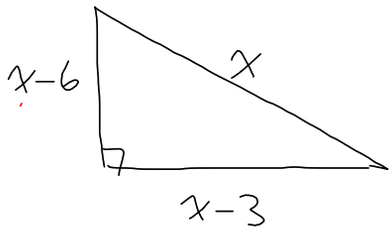
For $x = 10$

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

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

Width of the 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.

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

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

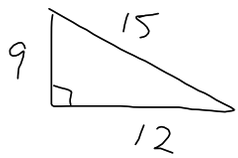
$0 = x^2 - 18x + 45$

$0 = (x-15)(x-3)$

$x = 15$ $\quad$ $x = 3$

Inadmissable because it would result in negative side lengths

$\therefore x = 15$



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Homework

p. 177 # ~~1~~, ~~2~~, 7, 9, 12, 14, 16