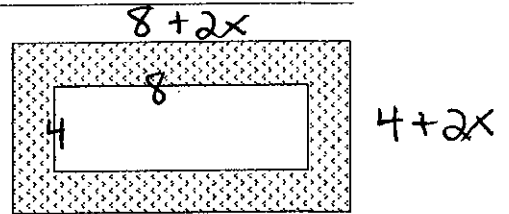# QUADRATIC WORD PROBLEMS
Solving Quadratic Equations

<u>Example 1</u>

A rectangular lawn measuring 8 m by 4 m is surrounded by a flower bed of uniform width. The combined area of the lawn and the flower bed is 165 m². What is the width of the flower bed?

$$(8+2x)(4+2x) = 165$$

$$4x^2 + 24x + 32 = 165$$

$$4x^2 + 24x - 133 = 0 \quad (\text{Graph, Find the Zero})$$

$$\boxed{X = 3.5}$$

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CUBIC APPLICATION –
Lumber and Construction

Jonny Forrester has the job of figuring out how much lumber can be obtained from various sizes of oak trees. From sawmill records he finds the following numbers of board-feet of lumber can be cut from trees of the given diameters:

Diameter (feet)	Lumber (board-feet)
1	10
2	99
3	324
4	745

He figures that since board-feet is a cubic measure, <u>a cubic function</u> would be a reasonable mathematical model.

A) Using your graphing calculator, find the equation expressing Board-feet in terms of diameter.

$$B = 10d^3 + 8d^2 - 5d - 3$$

B) How much lumber can be obtained from a tree with a trunk five feet in diameter?

$d = 5 ft$ $B = 1422$ board-feet

C) Jonny finds that the function in part A has one integer zero.
Use your calculator to find this integer zero: ___−1___

Without a calculator, find all other zeroes:

$X = -.457$ $X = .657$

D) According to this model, what is the smallest diameter tree that will produce usable lumber?

$D > .657$ feet

E) Jonny's boss tells him not to cut down any tree that would give less than 200 board-feet of lumber. Approximately what diameter trees can Woody cut down?

2.54 feet