

## Word Problems Quadratic Equations

**Example:**

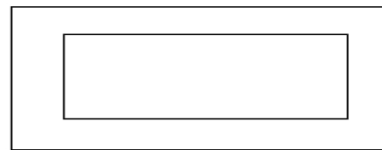
A radiation control point is set up near a solid waste disposal facility. The pad on which the facility is set up measures 20 metres by 30 metres. If the health physicist sets up a controlled walkway around the pad that reduces the area by 264 square metres, how wide is the walkway?

**Step 1.** Let  $x$  = Width of the Walkway

**Step 2.** Then,

$$30 - 2x = \text{Length of Reduced Pad}$$

$$20 - 2x = \text{Width of Reduced Pad}$$



**Step 3.**

$$\text{Area of Reduced Pad} = (\text{Length of Reduced Pad})(\text{Width of Reduced Pad})$$

**Step 4.** Solve this quadratic equation.

$$(30 - 2x)(20 - 2x) = 336$$

$$4x^2 - 100x + 264 = 0$$

Using the Quadratic Formula, substitute the coefficients for a, b, and c and solve for x.

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$$x = \frac{-(-100) \pm \sqrt{(-100)^2 - 4(4)(264)}}{2(4)}$$

The two roots are  $x = 22$  feet and  $x = 3$  feet. Since  $x = 22$  feet is not meaningful, the answer is  $x = 3$  feet.

$$x = \frac{100 \pm \sqrt{5776}}{8} \text{ physically}$$

$$x = \frac{100 \pm 76}{8}$$

**Step 5.** Check the answer.

$$(30 - 2(3))(20 - 2(3)) = 336$$

$$x = 3, 22$$

The area of the reduced area pad is 264 square feet less than the area of the original pad.