

**APPLY the Math****EXAMPLE 2** Solving a quadratic equation using a difference of squares

Determine the roots of the following equation:

$$75p^2 - 192 = 0$$

Verify your solution.

**Alberto's Solution**

$$75p^2 - 192 = 0$$

$$\frac{75p^2}{3} - \frac{192}{3} = \frac{0}{3}$$

$$25p^2 - 64 = 0$$

$$(5p - 8)(5p + 8) = 0$$

$$5p - 8 = 0 \quad \text{or} \quad 5p + 8 = 0$$

$$5p = 8 \qquad 5p = -8$$

$$p = \frac{8}{5} \qquad p = -\frac{8}{5}$$

The roots are  $\frac{8}{5}$  and  $-\frac{8}{5}$ .

$$75p^2 - 192 = 0$$

$$75p^2 = 192$$

$$p^2 = \frac{192}{75}$$

$$p^2 = \frac{64}{25}$$

$$p = \pm\sqrt{\frac{64}{25}}$$

$$p = \pm\frac{8}{5}$$

I noticed that 3 is a factor of both 75 and 192.

I noticed that  $25p^2$  and 64 are both perfect squares, so  $25p^2 - 64$  is a difference of squares.

I determined the roots.

I decided to verify my solutions by solving the equation using a different method.

I isolated  $p^2$  and then took the square root of each side. I knew that  $p^2$  has two possible square roots, one positive and the other negative.

My solution matched the solution I obtained by factoring.

**EXAMPLE 3** Solving a quadratic equation with only one root

Solve and verify the following equation:

$$4x^2 + 28x + 49 = 0$$

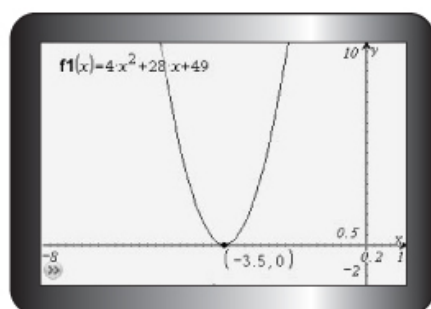
**Arya's Solution**

$$4x^2 + 28x + 49 = 0$$

$$(2x + 7)(2x + 7) = 0$$

$$2x + 7 = 0$$

$$x = -3.5$$



I factored the trinomial. I noticed that both factors are the same, so there is only one root.

I decided to verify my solution by graphing the corresponding quadratic function.

I noticed that the vertex of the function is on the x-axis at  $-3.5$ , so my solution makes sense.

**EXAMPLE 5** Describing errors in a solution

Matthew solved a quadratic equation as shown. Identify and correct the error in Matthew's solution.

$$4x^2 = 9x$$

$$\frac{4x^2}{x} = \frac{9x}{x}$$

$$4x = 9$$

$$x = 2.25$$

**Raj's Solution**

Matthew made an error in the second line of his solution. When he divided both sides by  $x$ , he eliminated a possible factor,  $x = 0$ .

$\frac{4x^2}{x}$  and  $\frac{9x}{x}$  are not defined when  $x = 0$ , so Matthew cannot divide by  $x$ .

Correctly solving the equation:

$$4x^2 - 9x = 0$$

$$x(4x - 9) = 0$$

To solve the equation, I rewrote it in standard form and then factored the left side.

$$x = 0 \quad \text{or} \quad 4x - 9 = 0$$

$$x = 0 \quad \text{or} \quad 4x = 9$$

$$x = 2.25$$

For my equation to be true, either  $x$  or  $4x - 9$  must equal 0.

Verify:

$$4x^2 - 9x = 0$$

$$x = 0 \qquad x = 2.25$$

I verified each solution by substituting it into the original equation. For both solutions, the left side is equal to the right side. Therefore, both solutions are correct.

LS	RS	LS	RS
$4x^2 - 9x$	0	$4x^2 - 9x$	0
$4(0)^2 - 9(0)$		$4(2.25)^2 - 9(2.25)$	
$0 - 0$		$20.25 - 20.25$	
0		0	
LS = RS		LS = RS	

## Attachments

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7s5e2 finalt.mp4

7s5e3 finalt.mp4

7s5e4 finalt.mp4

7s5e5 finalt.mp4

FM11-7s5.gsp