Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

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What makes this problem different from the last? ▸ Example 8

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

What makes this problem different from the last? ▸ Example 8

If we Add 3 to both sides

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

What makes this problem different from the last? ▸ Example 8

If we Add 3 to both sides

$$\sqrt{x+7}+3 = \sqrt{4x+13} - 3+3$$

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

What makes this problem different from the last? ▸ Example 8

If we Add 3 to both sides

$$\sqrt{x+7}+3 = \sqrt{4x+13} - 3+3 = \sqrt{4x+13}$$

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

What makes this problem different from the last? ▸ Example 8

If we Add 3 to both sides

$$\sqrt{x+7}+3 = \sqrt{4x+13} - 3+3 = \sqrt{4x+13}$$

To keep the equation true, we need to square both sides.

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

What makes this problem different from the last? ▸ Example 8

If we Add 3 to both sides

$$\sqrt{x+7}+3 = \sqrt{4x+13} - 3+3 = \sqrt{4x+13}$$

To keep the equation true, we need to square both sides.

To square the right side, we square $\sqrt{4x+13}$ by itself

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

What makes this problem different from the last? ▸ Example 8

If we Add 3 to both sides

$$\sqrt{x+7}+3 = \sqrt{4x+13} - 3+3 = \sqrt{4x+13}$$

To keep the equation true, we need to square both sides.

To square the right side, we square $\sqrt{4x+13}$ by itself

To square the left side, we need to distribute $\sqrt{x+7}+3$

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

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If we Add 3 to both sides

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To square the right side, we square $\sqrt{4x+13}$ by itself

To square the left side, we need to distribute $\sqrt{x+7}+3$

This did not help the problem of needing to distribute.

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

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If we Add 3 to both sides

$$\sqrt{x+7}+3 = \sqrt{4x+13} - 3+3 = \sqrt{4x+13}$$

To keep the equation true, we need to square both sides.

To square the right side, we square $\sqrt{4x+13}$ by itself

To square the left side, we need to distribute $\sqrt{x+7}+3$

This did not help the problem of needing to distribute.

This moved the problem from the right side to the left side.

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

What makes this problem different from the last? ▸ Example 8

If we Add 3 to both sides

$$\sqrt{x+7}+3 = \sqrt{4x+13} - 3+3 = \sqrt{4x+13}$$

To keep the equation true, we need to square both sides.

To square the right side, we square $\sqrt{4x+13}$ by itself

To square the left side, we need to distribute $\sqrt{x+7}+3$

This did not help the problem of needing to distribute.

This moved the problem from the right side to the left side.

Although we don't have to, let's go back to the original

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

Squaring both sides, we get:

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

Squaring both sides, we get:

$$\sqrt{x+7}^2 = (\sqrt{4x+13} - 3)^2$$

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

Squaring both sides, we get:

$$x + 7 = \sqrt{x+7}^2 = (\sqrt{4x+13} - 3)^2$$

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

Squaring both sides, we get:

$$x + 7 = \sqrt{x+7}^2 = (\sqrt{4x+13} - 3)^2$$ ▸ Watch this squared

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

Squaring both sides, we get:

$$x + 7 = \sqrt{x+7}^2 = (\sqrt{4x+13} - 3)^2$$

▸ Watch this squared

$$= 4x + 22 - 6\sqrt{4x+13}$$

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

Squaring both sides, we get:

$$x + 7 = \sqrt{x+7}^2 = (\sqrt{4x+13} - 3)^2$$ ▸ Watch this squared

$$x + 7 = 4x + 22 - 6\sqrt{4x+13}$$

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

Squaring both sides, we get:

$$x + 7 = \sqrt{x+7}^2 = (\sqrt{4x+13} - 3)^2$$ ▸ Watch this squared

$$x + 7 = 4x + 22 - 6\sqrt{4x+13}$$

We want to square $\sqrt{4x+13}$; so let's clean up the right side.

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

Squaring both sides, we get:

$$x + 7 = \sqrt{x+7}^2 = (\sqrt{4x+13} - 3)^2$$ ▸ Watch this squared

$$x + 7 = 4x + 22 - 6\sqrt{4x+13}$$

We want to square $\sqrt{4x+13}$; so let's clean up the right side.

We start by Subtracting $4x + 22$ on each side.

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

Squaring both sides, we get:

$$x + 7 = \sqrt{x+7}^2 = (\sqrt{4x+13} - 3)^2$$ ▸ Watch this squared

$$x + 7 = 4x + 22 - 6\sqrt{4x+13}$$

We want to square $\sqrt{4x+13}$; so let's clean up the right side.

We start by Subtracting $4x + 22$ on each side.

$$x + 7 - (4x + 22) = 4x + 22 - 6\sqrt{4x+13} - (4x + 22)$$

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

Squaring both sides, we get:

$$x + 7 = \sqrt{x+7}^2 = (\sqrt{4x+13} - 3)^2$$ ▸ Watch this squared

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We start by Subtracting $4x + 22$ on each side.

$$x + 7 - (4x + 22) = 4x + 22 - 6\sqrt{4x+13} - (4x + 22)$$

$$-3x - 15 = -6\sqrt{4x+13}$$

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Find the solutions to the equation:

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$$-3x - 15 = -6\sqrt{4x+13}$$

We can divide both sides by (-6) to get the square root by itself

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

Squaring both sides, we get:

$$x + 7 = \sqrt{x+7}^2 = (\sqrt{4x+13} - 3)^2$$ ▸ Watch this squared

$$x + 7 = 4x + 22 - 6\sqrt{4x+13}$$

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But we do not need to, because: ▸ Distribution of Exponents over Mult

Radical Equations Example 9

Find the solutions to the equation:

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Squaring both sides, we get:

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We can divide both sides by (-6) to get the square root by itself

But we do not need to, because: ▸ Distribution of Exponents over Mult

$$(a \cdot b)^n = a^n \cdot b^n$$

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

Squaring both sides, we get:

$$x + 7 = \sqrt{x+7}^2 = (\sqrt{4x+13} - 3)^2$$ ▸ Watch this squared

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We can divide both sides by (-6) to get the square root by itself

But we do not need to, because: ▸ Distribution of Exponents over Mult

$$(a \cdot b)^n = a^n \cdot b^n$$

Using this on the right we have:

$$(-6\sqrt{4x+13})^2 = (-6)^2\sqrt{4x+13}^2$$

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

Squaring both sides, we get:

$$x + 7 = \sqrt{x+7}^2 = (\sqrt{4x+13} - 3)^2$$ ▸ Watch this squared

$$x + 7 = 4x + 22 - 6\sqrt{4x+13}$$

We want to square $\sqrt{4x+13}$; so let's clean up the right side.

We start by Subtracting $4x + 22$ on each side.

$$x + 7 - (4x + 22) = 4x + 22 - 6\sqrt{4x+13} - (4x + 22)$$

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We can divide both sides by (-6) to get the square root by itself

But we do not need to, because: ▸ Distribution of Exponents over Mult

$$(a \cdot b)^n = a^n \cdot b^n$$

Using this on the right we have:

$$(-6\sqrt{4x+13})^2 = (-6)^2\sqrt{4x+13}^2 = 36(4x+13)$$

Radical Equations Example 9

Find the solutions to the equation:

$$-3x - 15 = -6\sqrt{4x + 13}$$

Radical Equations Example 9

Find the solutions to the equation:

$$-3x - 15 = -6\sqrt{4x + 13}$$

Squaring both sides

Radical Equations Example 9

Find the solutions to the equation:

$$-3x - 15 = -6\sqrt{4x + 13}$$

Squaring both sides

$$(-3x - 15)^2 = (-6\sqrt{4x + 13})^2$$

Radical Equations Example 9

Find the solutions to the equation:

$$-3x - 15 = -6\sqrt{4x + 13}$$

Squaring both sides ▸ See polynomial squared out

$$9x^2 + 90x + 225 = (-3x - 15)^2 = (-6\sqrt{4x + 13})^2$$

Radical Equations Example 9

Find the solutions to the equation:

$$-3x - 15 = -6\sqrt{4x + 13}$$

Squaring both sides ▸ See polynomial squared out

$$9x^2 + 90x + 225 = (-3x - 15)^2 = (-6\sqrt{4x + 13})^2$$
$$= 36 \cdot (4x + 13)$$

Radical Equations Example 9

Find the solutions to the equation:

$$-3x - 15 = -6\sqrt{4x + 13}$$

Squaring both sides ▸ See polynomial squared out

$$\begin{aligned} 9x^2 + 90x + 225 = (-3x - 15)^2 &= (-6\sqrt{4x + 13})^2 \\ &= 36 \cdot (4x + 13) \\ &= 144x + 468 \end{aligned}$$

Radical Equations Example 9

Find the solutions to the equation:

$$-3x - 15 = -6\sqrt{4x + 13}$$

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$$9x^2 + 90x + 225 = 144x + 468$$

Radical Equations Example 9

Find the solutions to the equation:

$$-3x - 15 = -6\sqrt{4x + 13}$$

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$$\begin{aligned} 9x^2 + 90x + 225 = (-3x - 15)^2 &= (-6\sqrt{4x + 13})^2 \\ &= 36 \cdot (4x + 13) \\ &= 144x + 468 \\ 9x^2 + 90x + 225 &= 144x + 468 \end{aligned}$$

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Find the solutions to the equation:

$$-3x - 15 = -6\sqrt{4x + 13}$$

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$$\begin{aligned} 9x^2 + 90x + 225 = (-3x - 15)^2 &= (-6\sqrt{4x + 13})^2 \\ &= 36 \cdot (4x + 13) \\ &= 144x + 468 \end{aligned}$$

$$9x^2 + 90x + 225 = 144x + 468$$

Subtracting $(144x + 468)$ from both sides

Radical Equations Example 9

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$$-3x - 15 = -6\sqrt{4x + 13}$$

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$$\begin{aligned} 9x^2 + 90x + 225 = (-3x - 15)^2 &= (-6\sqrt{4x + 13})^2 \\ &= 36 \cdot (4x + 13) \\ &= 144x + 468 \end{aligned}$$

$$9x^2 + 90x + 225 = 144x + 468$$

Subtracting $(144x + 468)$ from both sides

$$9x^2 + 90x + 225 - (144x + 468) = 0$$

Radical Equations Example 9

Find the solutions to the equation:

$$-3x - 15 = -6\sqrt{4x + 13}$$

Squaring both sides ▸ See polynomial squared out

$$\begin{aligned} 9x^2 + 90x + 225 = (-3x - 15)^2 &= (-6\sqrt{4x + 13})^2 \\ &= 36 \cdot (4x + 13) \\ &= 144x + 468 \end{aligned}$$

$$9x^2 + 90x + 225 = 144x + 468$$

Subtracting $(144x + 468)$ from both sides

$$9x^2 + 90x + 225 - (144x + 468) = 0$$

$$9x^2 - 54x - 243 = 0$$

Radical Equations Example 9

Find the solutions to the equation:

$$-3x - 15 = -6\sqrt{4x + 13}$$

Squaring both sides ▸ See polynomial squared out

$$\begin{aligned} 9x^2 + 90x + 225 = (-3x - 15)^2 &= (-6\sqrt{4x + 13})^2 \\ &= 36 \cdot (4x + 13) \\ &= 144x + 468 \end{aligned}$$

$$9x^2 + 90x + 225 = 144x + 468$$

Subtracting $(144x + 468)$ from both sides

$$9x^2 + 90x + 225 - (144x + 468) = 0$$

$$9x^2 - 54x - 243 = 0$$

We can make thing easier if we divide both sides by 9

Radical Equations Example 9

Find the solutions to the equation:

$$-3x - 15 = -6\sqrt{4x + 13}$$

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Subtracting $(144x + 468)$ from both sides

$$9x^2 + 90x + 225 - (144x + 468) = 0$$

$$9x^2 - 54x - 243 = 0$$

We can make thing easier if we divide both sides by 9

$$x^2 - 6x - 27 = 0$$

Radical Equations Example 9

Find the solutions to the equation:

$$-3x - 15 = -6\sqrt{4x + 13}$$

Squaring both sides ▸ See polynomial squared out

$$\begin{aligned} 9x^2 + 90x + 225 = (-3x - 15)^2 &= (-6\sqrt{4x + 13})^2 \\ &= 36 \cdot (4x + 13) \\ &= 144x + 468 \end{aligned}$$

$$9x^2 + 90x + 225 = 144x + 468$$

Subtracting $(144x + 468)$ from both sides

$$9x^2 + 90x + 225 - (144x + 468) = 0$$

$$9x^2 - 54x - 243 = 0$$

We can make thing easier if we divide both sides by 9

$$x^2 - 6x - 27 = 0$$

We can solve $x^2 - 6x - 27 = 0$ because it's a quadratic.

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

We need to solve the quadratic $x^2 - 6x - 27 = 0$

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

We need to solve the quadratic $x^2 - 6x - 27 = 0$

▸ Factoring Or ▸ Using the Quadratic Formula, we find solutions

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

We need to solve the quadratic $x^2 - 6x - 27 = 0$

▸ Factoring Or ▸ Using the Quadratic Formula, we find solutions $x = -3, 9$

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

We need to solve the quadratic $x^2 - 6x - 27 = 0$

▸ Factoring Or ▸ Using the Quadratic Formula, we find solutions $x = -3, 9$

▸ Warning: Check if these are solutions to the original equation.

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Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

We need to solve the quadratic $x^2 - 6x - 27 = 0$

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Check $x = -3$

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

We need to solve the quadratic $x^2 - 6x - 27 = 0$

▸ Factoring Or ▸ Using the Quadratic Formula, we find solutions $x = -3, 9$

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Check $x = -3$

$$\text{LHS} = \sqrt{-3+7}$$

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

We need to solve the quadratic $x^2 - 6x - 27 = 0$

▸ Factoring Or ▸ Using the Quadratic Formula, we find solutions $x = -3,\ 9$

▸ Warning: Check if these are solutions to the original equation.

Check $x = -3$

$$\begin{aligned} \text{LHS} &= \sqrt{-3+7} \\ &= \sqrt{4} \end{aligned}$$

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

We need to solve the quadratic $x^2 - 6x - 27 = 0$

▸ Factoring Or ▸ Using the Quadratic Formula, we find solutions $x = -3, 9$

▸ Warning: Check if these are solutions to the original equation.

Check $x = -3$

$$\begin{aligned} \text{LHS} &= \sqrt{-3+7} \\ &= \sqrt{4} \\ &= 2 \end{aligned}$$

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

We need to solve the quadratic $x^2 - 6x - 27 = 0$

▸ Factoring Or ▸ Using the Quadratic Formula, we find solutions $x = -3, 9$

▸ Warning: Check if these are solutions to the original equation.

Check $x = -3$

$$\begin{aligned} \text{LHS} &= \sqrt{-3+7} \\ &= \sqrt{4} \\ &= 2 \\ \text{RHS} &= \sqrt{4 \cdot -3 + 13} - 3 \end{aligned}$$

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

We need to solve the quadratic $x^2 - 6x - 27 = 0$

▸ Factoring Or ▸ Using the Quadratic Formula, we find solutions $x = -3, 9$

▸ Warning: Check if these are solutions to the original equation.

Check $x = -3$

$$\begin{aligned} \text{LHS} &= \sqrt{-3+7} \\ &= \sqrt{4} \\ &= 2 \end{aligned}$$

$$\begin{aligned} \text{RHS} &= \sqrt{4 \cdot -3 + 13} - 3 \\ &= \sqrt{1} - 3 \end{aligned}$$

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

We need to solve the quadratic $x^2 - 6x - 27 = 0$

▸ Factoring Or ▸ Using the Quadratic Formula, we find solutions $x = -3, 9$

▸ Warning: Check if these are solutions to the original equation.

Check $x = -3$

$$\begin{aligned}
\text{LHS} &= \sqrt{-3+7} \\
&= \sqrt{4} \\
&= 2 \\
\text{RHS} &= \sqrt{4 \cdot -3 + 13} - 3 \\
&= \sqrt{1} - 3 \\
&= 1 - 3
\end{aligned}$$

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

We need to solve the quadratic $x^2 - 6x - 27 = 0$

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$$\begin{aligned}
\text{LHS} &= \sqrt{-3+7} \\
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\text{RHS} &= \sqrt{4 \cdot -3 + 13} - 3 \\
&= \sqrt{1} - 3 \\
&= 1 - 3 \\
&= -2
\end{aligned}$$

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

We need to solve the quadratic $x^2 - 6x - 27 = 0$

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$$\begin{aligned}
\text{LHS} &= \sqrt{-3+7} \\
&= \sqrt{4} \\
&= 2 \\
\text{RHS} &= \sqrt{4 \cdot -3 + 13} - 3 \\
&= \sqrt{1} - 3 \\
&= 1 - 3 \\
&= -2
\end{aligned}$$

$x = -3$ is not a solution

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

We need to solve the quadratic $x^2 - 6x - 27 = 0$

▸ Factoring Or ▸ Using the Quadratic Formula, we find solutions $x = -3, 9$

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$$\begin{aligned} \text{LHS} &= \sqrt{-3+7} \\ &= \sqrt{4} \\ &= 2 \end{aligned}$$

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$x = -3$ is not a solution

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Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

We need to solve the quadratic $x^2 - 6x - 27 = 0$

▸ Factoring Or ▸ Using the Quadratic Formula, we find solutions $x = -3,\ 9$

▸ Warning: Check if these are solutions to the original equation.

Check $x = -3$

$$\begin{aligned} \text{LHS} &= \sqrt{-3+7} \\ &= \sqrt{4} \\ &= 2 \end{aligned}$$

$$\begin{aligned} \text{RHS} &= \sqrt{4 \cdot -3 + 13} - 3 \\ &= \sqrt{1} - 3 \\ &= 1 - 3 \\ &= -2 \end{aligned}$$

$x = -3$ is not a solution

Check $x = 9$

$$\text{LHS} = \sqrt{9+7}$$

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

We need to solve the quadratic $x^2 - 6x - 27 = 0$

▸ Factoring Or ▸ Using the Quadratic Formula, we find solutions $x = -3, 9$

▸ Warning: Check if these are solutions to the original equation.

Check $x = -3$

$$\begin{aligned} \text{LHS} &= \sqrt{-3+7} \\ &= \sqrt{4} \\ &= 2 \end{aligned}$$

$$\begin{aligned} \text{RHS} &= \sqrt{4 \cdot -3 + 13} - 3 \\ &= \sqrt{1} - 3 \\ &= 1 - 3 \\ &= -2 \end{aligned}$$

$x = -3$ is not a solution

Check $x = 9$

$$\begin{aligned} \text{LHS} &= \sqrt{9+7} \\ &= \sqrt{16} \end{aligned}$$

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

We need to solve the quadratic $x^2 - 6x - 27 = 0$

▸ Factoring Or ▸ Using the Quadratic Formula, we find solutions $x = -3, 9$

▸ Warning: Check if these are solutions to the original equation.

Check $x = -3$

$$\begin{aligned} \text{LHS} &= \sqrt{-3+7} \\ &= \sqrt{4} \\ &= 2 \end{aligned}$$

$$\begin{aligned} \text{RHS} &= \sqrt{4 \cdot -3 + 13} - 3 \\ &= \sqrt{1} - 3 \\ &= 1 - 3 \\ &= -2 \end{aligned}$$

$x = -3$ is not a solution

Check $x = 9$

$$\begin{aligned} \text{LHS} &= \sqrt{9+7} \\ &= \sqrt{16} \\ &= 4 \end{aligned}$$

Radical Equations Example 9

Find the solutions to the equation:

$$\sqrt{x+7} = \sqrt{4x+13} - 3$$

We need to solve the quadratic $x^2 - 6x - 27 = 0$

▸ Factoring Or ▸ Using the Quadratic Formula, we find solutions $x = -3, 9$

▸ Warning: Check if these are solutions to the original equation.

Check $x = -3$

$$\begin{aligned} \text{LHS} &= \sqrt{-3+7} \\ &= \sqrt{4} \\ &= 2 \end{aligned}$$

$$\begin{aligned} \text{RHS} &= \sqrt{4 \cdot -3 + 13} - 3 \\ &= \sqrt{1} - 3 \\ &= 1 - 3 \\ &= -2 \end{aligned}$$

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