Radical Equations Example 6

Find the solutions to the equation:
$$x - 1 = \sqrt{4x - 4}$$

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Squaring both sides

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Squaring both sides

$$(x - 1)^2 = (\sqrt{4x - 4})^2$$

Radical Equations Example 6

Find the solutions to the equation:
$$x - 1 = \sqrt{4x - 4}$$

Squaring both sides ▸ See polynomial squared out

$$x^2 + (-2)x + 1 = (x - 1)^2 = (\sqrt{4x - 4})^2$$

Radical Equations Example 6

Find the solutions to the equation:
$$x - 1 = \sqrt{4x - 4}$$

Squaring both sides ► See polynomial squared out

$$x^2 + (-2)x + 1 = (x - 1)^2 = (\sqrt{4x - 4})^2 = 4x - 4$$

Radical Equations Example 6

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Subtracting $(4x - 4)$ from both sides

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$$x^2 + (-2)x + 1 - (4x - 4) = (4x - 4) - (4x - 4)$$

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$$x^2 + (-2)x + 1 {-}(4x - 4) = (4x - 4){-}(4x - 4)$$
$$x^2 + (-6)x + 5 = 0$$

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

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Check $x = 1$
$$\text{LHS} = 1 - 1$$

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Check $x = 1$

$$\text{LHS} = 1 - 1$$
$$= 0$$
$$\text{RHS} = \sqrt{4 \cdot 1 - 4}$$

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$\quad$ LHS $= 1 - 1$ $\qquad\qquad\qquad$ LHS $= 5 - 1$

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Check $x = 5$

$$\text{LHS} = 5 - 1$$
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$$\text{RHS} = \sqrt{4 \cdot 5 - 4}$$

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Check $x = 1$ | Check $x = 5$

$$\text{LHS} = 1 - 1$$
$$= 0$$
$$\text{RHS} = \sqrt{4 \cdot 1 - 4}$$
$$= 0$$

$$\text{LHS} = 5 - 1$$
$$= 4$$
$$\text{RHS} = \sqrt{4 \cdot 5 - 4}$$
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$\qquad = 0$ $\qquad\qquad\qquad\qquad\qquad = 4$

$\quad$ RHS $= \sqrt{4 \cdot 1 - 4}$ $\qquad\qquad\qquad$ RHS $= \sqrt{4 \cdot 5 - 4}$

$\qquad = 0$ $\qquad\qquad\qquad\qquad\qquad = 4$

$x = 1$ is a solution $\qquad\qquad\qquad$ $x = 5$ is a solution