

Enrichment Solving a Radical Equation involving Two Radicals


Billy was given the radical equation $\sqrt{3a+4} - \sqrt{a+1} = 3$ to solve. Billy solved the equation incorrectly. His work is shown.

a) Explain where Billy made his error.

$$\checkmark \sqrt{3a+4} - \sqrt{a+1} = 3$$

$$\checkmark \sqrt{3a+4} = 3 + \sqrt{a+1}$$

$$\checkmark (\sqrt{3a+4})^2 = (3 + \sqrt{a+1})^2$$

$$\times 3a+4 = 9 + a+1$$

$$2a = 6$$

$$a = 3$$

b) Show the correct work.

$$\sqrt{3a+4} - \sqrt{a+1} = 3$$

$$(\sqrt{3a+4})^2 = (3 + \sqrt{a+1})^2$$

$$3a+4 = 9 + 6\sqrt{a+1} + (a+1)$$

$$3a+4 = a+10 + 6\sqrt{a+1}$$

$$(2a-6)^2 = (6\sqrt{a+1})^2$$

$$4a^2 - 24a + 36 = 36(a+1)$$

$$4a^2 - 24a + 36 = 36a + 36$$

$$4a^2 - 60a = 0$$

$$4a(a-15) = 0$$

$$a = \cancel{0}, 15 = a$$

Check $a=0$

$$LS = \sqrt{3(0)+4} - \sqrt{0+1}$$

$$= \sqrt{4} - \sqrt{1}$$

$$= 2 - 1$$

$$= 1 \quad \times$$

$$RS = 3$$

Check $a=15$

$$LS = \sqrt{3(15)+4} - \sqrt{15+1}$$

$$= \sqrt{49} - \sqrt{16}$$

$$= 7 - 4$$

$$= 3 \quad \checkmark$$

$$RS = 3$$

Complete Assignment Question #12 - #14

Ex. 5 Solve $\sqrt{4x-7} - \sqrt{2x-7} = 2$

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

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

$$4x-7 = 2x-3 + 4\sqrt{2x-7}$$

$$2x-4 = 4\sqrt{2x-7}$$

$$(x-2)^2 = (2\sqrt{2x-7})^2$$
) Divide both sides by 2.

$$x^2 - 4x + 4 = 4(2x-7)$$

$$x^2 - 4x + 4 = 8x - 28$$

$$x^2 - 12x + 32 = 0$$

$$(x-4)(x-8) = 0$$

$$x = 4, 8$$

Check $x=4$

$$\begin{aligned} \text{LS} &= \sqrt{4(4)-7} - \sqrt{2(4)-7} \\ &= \sqrt{9} - \sqrt{1} \end{aligned}$$

$$= 2$$

$$\text{RS} = 2 \quad \checkmark$$

Check $x=8$

$$\begin{aligned} \text{LS} &= \sqrt{4(8)-7} - \sqrt{2(8)-7} \\ &= \sqrt{25} - \sqrt{9} \end{aligned}$$

$$= 2$$

$$\text{RS} = 2 \quad \checkmark$$

Do # 9-14