

3.4 Operations with Radicals $\sqrt{\quad}$

Mar 13

$$\sqrt{8} = \sqrt{4 \times 2} = \sqrt{4} \sqrt{2} = 2\sqrt{2}$$

$$\sqrt{27} = \sqrt{9 \times 3} = 3\sqrt{3}$$

$$\sqrt{72} = \sqrt{36 \times 2} = 6\sqrt{2}$$

$$\sqrt{50} = \sqrt{25 \times 2} = 5\sqrt{2}$$

Simplify

$$\begin{aligned} & \underline{-4\sqrt{6}} \times \underline{2\sqrt{6}} \\ &= -8\sqrt{36} \\ &= -8(6) \\ &= -48 \end{aligned}$$

$$\begin{aligned} & 3\sqrt{14} \times 5\sqrt{7} \\ &= 15\sqrt{98} \\ &= 15\sqrt{49 \times 2} \\ &= 15(7)\sqrt{2} \\ &= 105\sqrt{2} \end{aligned}$$

Simplify

$$\begin{aligned}
 & 3\sqrt{2} - 2\sqrt{5} + \sqrt{8} - \sqrt{20} \\
 &= 3\sqrt{2} - 2\sqrt{5} + \sqrt{4 \times 2} - \sqrt{4 \times 5} \\
 &= \underline{3\sqrt{2}} - \underline{2\sqrt{5}} + \underline{2\sqrt{2}} - \underline{2\sqrt{5}} \\
 &= 5\sqrt{2} - 4\sqrt{5}
 \end{aligned}$$

$$\begin{aligned}
 & (3\sqrt{2} - 4\sqrt{3})^2 \\
 &= (3\sqrt{2})^2 - 2(3\sqrt{2})(4\sqrt{3}) + (4\sqrt{3})^2 \\
 &= 9(2) - 24\sqrt{6} + 16(3) \\
 &= 18 - 24\sqrt{6} + 48 \\
 &= 66 - 24\sqrt{6}
 \end{aligned}$$

Determine the zeros of the following quadratic in exact simplified form.

$$f(x) = 3x^2 - 2x - 4$$

$$f(x) = 0$$

$$X = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$X = \frac{2 \pm \sqrt{2^2 - 4(3)(-4)}}{2(3)}$$

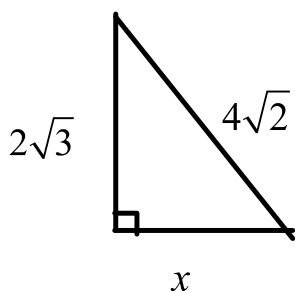
$$X = \frac{2 \pm \sqrt{52}}{6}$$

$$\begin{aligned}
 \sqrt{52} &= \sqrt{4 \times 13} \\
 \sqrt{52} &= 2\sqrt{13}
 \end{aligned}$$

$$X = \frac{2 \pm 2\sqrt{13}}{6}$$

$$X = \frac{\cancel{2}(1 \pm \sqrt{13})}{\cancel{6}_3} = \frac{1 \pm \sqrt{13}}{3}$$

Determine the length of the missing side in exact simplified form.



$$\begin{aligned}
 & \begin{array}{c} a \quad c \\ \downarrow \quad \uparrow \\ b \end{array} \quad \begin{aligned} c^2 &= a^2 + b^2 \\ b^2 &= c^2 - a^2 \end{aligned}
 \end{aligned}$$

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

$$x^2 = 16(2) - 4(3)$$

$$x^2 = 20$$

$$x = \pm \sqrt{20}, \text{ but } x > 0$$

$$x = \sqrt{20} = \sqrt{4 \times 5} = \underline{2\sqrt{5}}$$

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