

# Solutions

2. Simplify.

a)  $\sqrt{5} \times \sqrt{7}$

$$= \sqrt{5 \times 7}$$

$$= \sqrt{35}$$

c)  $2\sqrt{3} \times 5\sqrt{2}$

$$= (2)(5) \times \sqrt{3 \times 2}$$

$$= 10\sqrt{6}$$

b)  $\sqrt{11} \times \sqrt{6}$

$$= \sqrt{11 \times 6}$$

$$= \sqrt{66}$$

d)  $-4\sqrt{3} \times 8\sqrt{13}$

$$= (-4)(8) \times \sqrt{3 \times 13}$$

$$= -32\sqrt{39}$$

3. Simplify.

$$\begin{aligned} \text{a) } & 4\sqrt{5} + 3\sqrt{5} \\ & = 7\sqrt{5} \end{aligned}$$

$$\begin{aligned} \text{c) } & 3\sqrt{3} + 8\sqrt{2} - 4\sqrt{3} + 11\sqrt{2} \\ & = -\sqrt{3} + 19\sqrt{2} \end{aligned}$$

$$\begin{aligned} \text{b) } & 9\sqrt{7} - 4\sqrt{7} \\ & = 5\sqrt{7} \end{aligned}$$

$$\begin{aligned} \text{d) } & \sqrt{8} - \sqrt{18} \\ & = \sqrt{4 \times 2} - \sqrt{9 \times 2} \\ & = \sqrt{4}\sqrt{2} - \sqrt{9}\sqrt{2} \\ & = 2\sqrt{2} - 3\sqrt{2} \\ & = -\sqrt{2} \end{aligned}$$

5. Simplify.

$$\begin{aligned} \text{a) } & \sqrt{3}(2 - \sqrt{5}) \\ & = 2\sqrt{3} - \sqrt{3}\sqrt{5} \\ & = 2\sqrt{3} - \sqrt{15} \end{aligned}$$

$$\begin{aligned} \text{d) } & (-2\sqrt{3})^3 \\ & = (-2)^3(\sqrt{3})^3 \\ & = -8(\sqrt{3}\sqrt{3}\sqrt{3}) \\ & = -8(3)(\sqrt{3}) = -24\sqrt{3} \end{aligned}$$

$$\begin{aligned} \text{b) } & 2\sqrt{2}(\sqrt{7} + 3\sqrt{3}) \\ & = 2\sqrt{2}\sqrt{7} + 6\sqrt{2}\sqrt{3} \\ & = 2\sqrt{14} + 6\sqrt{6} \end{aligned}$$

$$\begin{aligned} \text{e) } & 4\sqrt{3} \times 3\sqrt{6} \\ & = 12\sqrt{3}\sqrt{6} \\ & = 12\sqrt{18} \\ & = 12\sqrt{9}\sqrt{2} = 36\sqrt{2} \end{aligned}$$

$$\begin{aligned} \text{c) } & (4\sqrt{2})^2 \\ & = (4\sqrt{2})(4\sqrt{2}) \\ & = 16\sqrt{2}\sqrt{2} \\ & = 16\sqrt{4} \\ & = 32 \end{aligned}$$

$$\begin{aligned} \text{f) } & -7\sqrt{2} \times 5\sqrt{8} \\ & = -35\sqrt{2}\sqrt{8} \\ & = -35\sqrt{2}\sqrt{4 \times 2} \\ & = -35\sqrt{2}\sqrt{4}\sqrt{2} \\ & = -35(2)(2) = -140 \end{aligned}$$

6. Simplify.

a)  $\sqrt{8} - \sqrt{32}$

b)  $\sqrt{12} + \sqrt{18} - \sqrt{27} + \sqrt{50}$

c)  $3\sqrt{98} - 5\sqrt{72}$

$$\begin{aligned} \text{a)} &= 2\sqrt{2} - 4\sqrt{2} \\ &= -2\sqrt{2} \end{aligned}$$

$$\begin{aligned} \text{b)} &= 2\sqrt{3} + 3\sqrt{2} - 3\sqrt{3} + 5\sqrt{2} \\ &= 2\sqrt{3} - 3\sqrt{3} + 3\sqrt{2} + 5\sqrt{2} \\ &= -\sqrt{3} + 8\sqrt{2} \end{aligned}$$

$$\begin{aligned} \text{c)} &= 21\sqrt{2} - 30\sqrt{2} \\ &= -9\sqrt{2} \end{aligned}$$

d)  $-4\sqrt{200} + 5\sqrt{242}$

e)  $-5\sqrt{45} + \sqrt{52} + 3\sqrt{125}$

f)  $7\sqrt{12} - 3\sqrt{28} + \frac{1}{2}\sqrt{48} + \frac{2}{3}\sqrt{63}$

$$\begin{aligned} \text{d)} &= -40\sqrt{2} + 55\sqrt{2} \\ &= 15\sqrt{2} \end{aligned}$$

$$\begin{aligned} \text{e)} &= -15\sqrt{5} + 2\sqrt{13} + 15\sqrt{5} \\ &= 2\sqrt{13} \end{aligned}$$

$$\begin{aligned} \text{f)} &= 14\sqrt{3} - 6\sqrt{7} + 2\sqrt{3} + 2\sqrt{7} \\ &= 16\sqrt{3} - 4\sqrt{7} \end{aligned}$$

7. Simplify.

- a)  $(6 - \sqrt{5})(3 + 2\sqrt{10})$   
 b)  $(2 + 3\sqrt{3})^2$   
 c)  $(\sqrt{2} + \sqrt{5})(\sqrt{2} - \sqrt{5})$

$$\begin{array}{r|rr}
 & 6 & -\sqrt{5} \\
 \hline
 3 & 18 & -3\sqrt{5} \\
 \hline
 2\sqrt{10} & 12\sqrt{10} & -2\sqrt{50}
 \end{array}$$

$$\begin{aligned}
 &= 18 - 3\sqrt{5} + 12\sqrt{10} - 2\sqrt{50} \\
 &= 18 - 3\sqrt{5} + 12\sqrt{10} - 10\sqrt{2}
 \end{aligned}$$

$$\begin{array}{r|rr}
 & 2 & 3\sqrt{3} \\
 \hline
 2 & 4 & 6\sqrt{3} \\
 \hline
 3\sqrt{3} & 6\sqrt{3} & 9\sqrt{3}\sqrt{3}
 \end{array}$$

$$\begin{aligned}
 &= 4 + 12\sqrt{3} + 27 \\
 &= 31 + 12\sqrt{3}
 \end{aligned}$$

$$\begin{array}{r|rr}
 & \sqrt{2} & \sqrt{5} \\
 \hline
 \sqrt{2} & \sqrt{4} & \sqrt{10} \\
 \hline
 -\sqrt{5} & -\sqrt{10} & -\sqrt{25}
 \end{array}$$

$$\begin{aligned}
 &= 2 - 5 \\
 &= -3
 \end{aligned}$$

- d)  $(3\sqrt{3} + 4\sqrt{2})(\sqrt{3} - 2\sqrt{2})$   
 e)  $(2\sqrt{5} - 3\sqrt{7})^2$   
 f)  $(1 - \sqrt{3})(2 + \sqrt{6})(5 + \sqrt{2})$

$$\begin{array}{r|rr}
 & 3\sqrt{3} & 4\sqrt{2} \\
 \hline
 \sqrt{3} & 3\sqrt{9} & 4\sqrt{6} \\
 \hline
 -2\sqrt{2} & -6\sqrt{6} & -8\sqrt{4}
 \end{array}$$

$$\begin{aligned}
 &= 9 - 2\sqrt{6} - 16 \\
 &= -7 - 2\sqrt{6}
 \end{aligned}$$

$$\begin{array}{r|rr}
 & 1 & -\sqrt{3} \\
 \hline
 2 & 2 & -2\sqrt{3} \\
 \hline
 \sqrt{6} & \sqrt{6} & -\sqrt{18}
 \end{array}$$

$$\begin{array}{r|rr}
 & 2 & -2\sqrt{3} & \sqrt{6} & -\sqrt{18} \\
 \hline
 5 & 10 & -10\sqrt{3} & 5\sqrt{6} & -5\sqrt{18} \\
 \hline
 \sqrt{2} & 2\sqrt{2} & -2\sqrt{6} & \sqrt{12} & -\sqrt{36}
 \end{array}$$

$$\begin{aligned}
 &= 10 - 10\sqrt{3} + 3\sqrt{6} - 15\sqrt{2} + 2\sqrt{2} \\
 &\quad + 2\sqrt{3} - 6 \\
 &= 4 - 8\sqrt{3} + 3\sqrt{6} - 13\sqrt{2}
 \end{aligned}$$

$$\begin{array}{r|rr}
 & 2\sqrt{5} & -3\sqrt{7} \\
 \hline
 2\sqrt{5} & 4\sqrt{25} & -6\sqrt{35} \\
 \hline
 -3\sqrt{7} & -6\sqrt{35} & 9\sqrt{49}
 \end{array}$$

$$\begin{aligned}
 &= 20 - 12\sqrt{35} + 63 \\
 &= 83 - 12\sqrt{35}
 \end{aligned}$$

## Attachments

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Simplifying Radicals Video 1.swf

Simplifying Radicals video.swf