

What you will learn about:
Adding and Subtracting Square Roots

Adding and Subtracting Like Square Roots

$$2\sqrt{2} - 7\sqrt{2}$$

$$-5\sqrt{2}$$

$$3\sqrt{y} + 4\sqrt{y}$$

$$7\sqrt{y}$$

$$5\sqrt{13} + 4\sqrt{13} + 2\sqrt{13}$$

$$11\sqrt{13}$$

$$1\sqrt{7x} - 7\sqrt{7x} + 4\sqrt{7x}$$

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

$$3\sqrt{7mn} + \sqrt{7mn} - 5\sqrt{7mn}$$

$$-\sqrt{7mn}$$

Add and Subtract Square Roots that Need Simplification

Simplify

$$\sqrt{20} = \frac{\sqrt{4} \cdot \sqrt{5}}{2\sqrt{5}}$$

$$\sqrt{20} + 3\sqrt{5}$$

$$2\sqrt{5} + 3\sqrt{5}$$

$$5\sqrt{5}$$

$$\sqrt{18} + 6\sqrt{2}$$

$$3\sqrt{2} + 6\sqrt{2}$$

$$9\sqrt{2}$$

$$\sqrt{48} - \sqrt{75}$$

$$4\sqrt{3} - 5\sqrt{3}$$

$$\sqrt{32} - \sqrt{18}$$

$$4\sqrt{2} - 3\sqrt{2}$$

$$\sqrt{20} - \sqrt{45}$$

$$2\sqrt{5} - 3\sqrt{5}$$

$$-\sqrt{3}$$

$$\sqrt{2}$$

$$-\sqrt{5}$$

$$2\sqrt{2}$$

$\frac{5\sqrt{18}}{\sqrt{18} = 3\sqrt{2}}$ $\frac{5(3\sqrt{2})}{15\sqrt{2}}$ $\frac{3}{4} \cdot \frac{8}{1} = \frac{24}{4} = 6$ $\frac{24}{15}\sqrt{2} - \frac{10}{15}\sqrt{2}$ $\frac{14}{15}\sqrt{2}$ $\frac{\sqrt{9} \cdot \sqrt{2}}{3\sqrt{2}}$	$\frac{5\sqrt{18} - 2\sqrt{8}}{15\sqrt{2} - 4\sqrt{2}}$ $\frac{11\sqrt{2}}{11\sqrt{2}}$ $\frac{\frac{3}{4}\sqrt{192} - \frac{5}{6}\sqrt{108}}{\frac{3}{4}(8\sqrt{3}) - \frac{5}{6}(6\sqrt{3})}$ $\frac{6\sqrt{3} - 5\sqrt{3}}{\sqrt{3}}$ $\frac{\frac{2}{5}\sqrt{32} - \frac{1}{3}\sqrt{8}}{\frac{2}{5}(4\sqrt{2}) - \frac{1}{3}(2\sqrt{2})}$ $\frac{\frac{8}{5}\sqrt{2} - \frac{2}{3}\sqrt{2}}{\frac{8}{5}\sqrt{2} - \frac{2}{3}\sqrt{2}}$ $\frac{\sqrt{32m^7} - \sqrt{50m^7}}{4m^3\sqrt{2m} - 5m^3\sqrt{2m}}$ $\frac{-m^3\sqrt{2m}}{-m^3\sqrt{2m}}$ $\frac{3\sqrt{18x^2} - 6x\sqrt{32} + 2\sqrt{50x^2}}{3(3x\sqrt{2}) - 6x(4\sqrt{2}) + 2(5x\sqrt{2})}$ $\frac{9x\sqrt{2} - 24x\sqrt{2} + 10x\sqrt{2}}{-5x\sqrt{2}}$ $\frac{4\sqrt{24x^2} - \sqrt{54x^2} + \frac{1}{2}x\sqrt{36}}{4(2x\sqrt{6}) - 3x\sqrt{6} + 3x}$ $\frac{8x\sqrt{6} - 3x\sqrt{6} + 3x}{5x\sqrt{6} + 3x}$	$\frac{4\sqrt{27} - 3\sqrt{12}}{4(3\sqrt{3}) - 3(2\sqrt{3})}$ $\frac{12\sqrt{3} - 6\sqrt{3}}{6\sqrt{3}}$ $\frac{\frac{2}{3}\sqrt{108} - \frac{5}{7}\sqrt{147}}{\frac{2}{3}(6\sqrt{3}) - \frac{5}{7}(7\sqrt{3})}$ $\frac{4\sqrt{3} - 5\sqrt{3}}{-\sqrt{3}}$ $\frac{\frac{1}{3}\sqrt{80} - \frac{1}{4}\sqrt{125}}{\frac{1}{3}(4\sqrt{5}) - \frac{1}{4}(5\sqrt{5})}$ $\frac{\frac{4}{3}\sqrt{5} - \frac{5}{4}\sqrt{5}}{\frac{4}{3}\sqrt{5} - \frac{5}{4}\sqrt{5}}$ $\frac{9\sqrt{50m^2} - 6\sqrt{48m^2}}{45m\sqrt{2} - 24m\sqrt{3}}$ $4 \cdot 12$ $2\sqrt{12}$
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$$x + x^2$$

$$x \cdot x^2 = x^3$$

What you will learn about:
Multiplying Square Roots

$$\sqrt{a} \cdot \sqrt{b} = \sqrt{ab}$$

Simplify:

$$\sqrt{2} \cdot \sqrt{6}$$

$$\sqrt{12}$$

$$2\sqrt{3}$$

$$(4\sqrt{3})(2\sqrt{12})$$

$$8\sqrt{36}$$

$$8 \cdot 6$$

$$48$$

$$(6\sqrt{3})(5\sqrt{6})$$

$$30\sqrt{18}$$

$$30(3\sqrt{2})$$

$$90\sqrt{2}$$

$$(6\sqrt{2})(3\sqrt{10})$$

$$18\sqrt{20}$$

$$18(2\sqrt{5})$$

$$36\sqrt{5}$$

$$(\sqrt{6x^3})(\sqrt{3x})$$

$$\sqrt{18x^4}$$

$$3x^2\sqrt{2}$$

$$(\sqrt{2y^2})(\sqrt{50y^3})$$

$$\sqrt{100y^5}$$

$$10y^2\sqrt{y}$$

$$\frac{48}{108}$$

$$(10\sqrt{6p^3})(3\sqrt{18p^2})$$

$$30\sqrt{108p^5}$$

$$30(6p^2\sqrt{3p})$$

$$180p^2\sqrt{3p}$$

$$(2\sqrt{6y^3})(12\sqrt{30y^3})$$

$$24\sqrt{180y^6}$$

$$24(6y^3\sqrt{5})$$

$$144y^3\sqrt{5}$$

$$\frac{24}{144}$$

Squaring a Square Root
If a is a nonnegative real number, then

$$(\sqrt{a})^2 = a$$

$$(\sqrt{2})^2 = \sqrt{4}$$

$$= 2$$

$$(-\sqrt{11})^2$$

$$11$$

$$(-\sqrt{20})^2$$

$$20$$

$$(6\sqrt{11})(5\sqrt{11})$$

$$30(11)$$

$$330$$

$$(5\sqrt{8})^2$$

$$25 \cdot 8$$

$$200$$

$$(-4\sqrt{6})^2$$

$$(16)(6)$$

$$96$$

Using Polynomial Multiplication
to Multiply Square Roots

$$3(5 - \sqrt{2})$$

$$15 - 3\sqrt{2}$$

$$\sqrt{2}(4 - \sqrt{10})$$

$$4\sqrt{2} - \sqrt{20}$$

$$4\sqrt{2} - 2\sqrt{5}$$

$$\sqrt{7}(1 + \sqrt{14})$$

$$\sqrt{7} + \sqrt{98}$$

$$\sqrt{7} + 7\sqrt{2}$$

$$\sqrt{5}(7 + 2\sqrt{5})$$

$$7\sqrt{5} + 2\sqrt{25}$$

$$7\sqrt{5} + 10$$

$$\sqrt{6}(\sqrt{2} + \sqrt{18})$$

$$\sqrt{12} + \sqrt{108}$$

$$2\sqrt{3} + 6\sqrt{3}$$

$$8\sqrt{3}$$

$$\sqrt{12}(\sqrt{3} + \sqrt{24})$$

$$\sqrt{36} + \sqrt{288}$$

$$6 + 12\sqrt{2}$$

$$\frac{24}{12}$$

$$\frac{240}{240}$$

$$(2 + \sqrt{3})(4 - \sqrt{3})$$

$$8 - 2\sqrt{3} + 4\sqrt{3} - 3$$

$$5 + 2\sqrt{3}$$

$$(4 - \sqrt{10})(2 + \sqrt{10})$$

$$8 + 4\sqrt{10} - 2\sqrt{10} - 10$$

$$-2 + 2\sqrt{10}$$

$$(3\sqrt{2} - \sqrt{5})(\sqrt{2} + 4\sqrt{5})$$

$$6 + 12\sqrt{10} - \sqrt{10} - 20$$

$$-14 + 11\sqrt{10}$$

$$(\sqrt{6} - 3\sqrt{8})(2\sqrt{6} - \sqrt{8})$$

$$12 - \sqrt{48} - 6\sqrt{48} + 24$$

$$36 - 7\sqrt{48}$$

$$36 - 28\sqrt{3}$$

$$\sqrt{48} = \sqrt{16 \cdot 3}$$

$$4\sqrt{3}$$

$$(10 + \sqrt{2})^2$$

$$(10 + \sqrt{2})(10 + \sqrt{2})$$

$$100 + 20\sqrt{2} + 2$$

$$102 + 20\sqrt{2}$$

$$(4 - 2\sqrt{5})^2$$

$$16 - 16\sqrt{5} + 20$$

$$36 - 16\sqrt{5}$$

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

$$9 - 24\sqrt{n} + 16n$$

Conjugates

$$(4 + \sqrt{2})(4 - \sqrt{2})$$

$$16 - 4\sqrt{2} + 4\sqrt{2} - 2$$

$$14$$

$$(5 - 2\sqrt{3})(5 + 2\sqrt{3})$$

$$25 + 10\sqrt{3} - 10\sqrt{3} - 12$$

$$13$$

$$(4 + 5\sqrt{7})(4 - 5\sqrt{7})$$

$$(3 - 2\sqrt{5})(3 + 2\sqrt{5})$$

$$16 - 175$$

$$-159$$

$$9 - 20$$

$$-11$$