

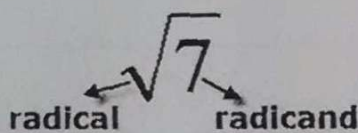
SIMPLIFYING RADICALS AND SOLVING QUADRATICS BY SQUARE ROOT

Life would be easier for you if memorize the perfect squares for this unit!!

4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225, 400, 625, 900

Use the calculator to find the decimal approximation for each expression in the table. Round to the nearest thousandth.

Expression	Decimal Approximation	Expression	Decimal Approximation	Simplified Radical Expression
$\sqrt{3} \cdot \sqrt{6}$	4.243	$\sqrt{18}$	4.243	
$\sqrt{2} \cdot \sqrt{27}$	7.348	$\sqrt{54}$	7.348	
$\frac{\sqrt{30}}{\sqrt{8}}$	1.936	$\sqrt{\frac{30}{8}}$	1.936	



Simplifying Radical Expressions

The radicand has no perfect square factors other than 1

$\sqrt{32}$
 $\sqrt{16} \sqrt{2}$
 $4\sqrt{2}$
 Look for largest perfect square

Prime Factorization
 32
 $8 \cdot 4$
 $(2 \cdot 4) (2 \cdot 2)$
 $(2 \cdot 2) (2 \cdot 2)$
 $\sqrt{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2} = 2 \cdot 2 \sqrt{2} = 4\sqrt{2}$

$-\sqrt{84}$
 $-\sqrt{4} \sqrt{21}$
 $-2\sqrt{21}$

$\sqrt{120}$
 $\sqrt{4} \sqrt{30}$
 $2\sqrt{30}$

$2\sqrt{27}$
 $2 \cdot \sqrt{9} \sqrt{3}$
 $2 \cdot 3\sqrt{3}$
 $6\sqrt{3}$

$\sqrt{48}$ $4\sqrt{3}$	$-\sqrt{24}$ $-2\sqrt{6}$	$2\sqrt{196}$ 28	$\sqrt{250}$ $5\sqrt{10}$
$\sqrt{260}$ $2\sqrt{65}$	$-3\sqrt{108}$ $-18\sqrt{3}$	$\sqrt{800}$ $20\sqrt{2}$	$5\sqrt{56}$ $10\sqrt{14}$

Adding and Subtracting Radicals:

Simplify each radical and add or subtract **like radicals**.

$$7\sqrt{2} + 5\sqrt{8} - 3\sqrt{2}$$

$$7\sqrt{2} + 10\sqrt{2} - 3\sqrt{2} = 14\sqrt{2}$$

$2\sqrt{18} + \sqrt{32}$ $2\sqrt{9}\sqrt{2} \quad \sqrt{16}\sqrt{2}$ $2 \cdot 3\sqrt{2}$ $6\sqrt{2} + 4\sqrt{2}$ $10\sqrt{2}$	$9\sqrt{7} + 2\sqrt{14} - 5\sqrt{28}$ $5\sqrt{4}\sqrt{7}$ $5 \cdot 2\sqrt{7}$ $9\sqrt{7} + 2\sqrt{14} - 10\sqrt{7}$ $2\sqrt{14} - \sqrt{7}$	$-3\sqrt{12} + 3\sqrt{3} - \sqrt{20}$ $-3\sqrt{4}\sqrt{3} \quad \sqrt{4}\sqrt{5}$ $-3 \cdot 2\sqrt{3} \quad 2\sqrt{5}$ $-6\sqrt{3} + 3\sqrt{3} - 2\sqrt{5}$ $-3\sqrt{3} - 2\sqrt{5}$
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Product Property of Square roots:

$$\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}, \text{ where } a \geq 0 \text{ and } b \geq 0$$

Simplify the following radicals. Leave answer in simplest radical form.

$\sqrt{50}\sqrt{24}$ $\sqrt{50} \quad \sqrt{24}$ $\sqrt{25}\sqrt{2} \quad \sqrt{4}\sqrt{6}$ $5\sqrt{2} \quad 2\sqrt{6}$ $(5\sqrt{2})(2\sqrt{6})$ $10\sqrt{12}$ $\sqrt{4}\sqrt{3}$ $10 \cdot 2\sqrt{3}$ $20\sqrt{3}$	$\sqrt{6}\sqrt{10}$ $\sqrt{60}$ $\sqrt{4}\sqrt{15}$ $2\sqrt{15}$	$\sqrt{15} \cdot 3$ $\sqrt{45}$ $\sqrt{9}\sqrt{5}$ $3\sqrt{5}$	$(3\sqrt{12})(5\sqrt{4})$ $15\sqrt{48}$ $15\sqrt{16}\sqrt{3}$ $15 \cdot 4\sqrt{3}$ $60\sqrt{3}$
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Quotient Property of Square Roots

$$\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}; \text{ where } a \geq 0 \text{ and } b > 0$$

$\frac{\sqrt{3}}{\sqrt{49}}$ $\frac{\sqrt{3}}{\sqrt{49}} = \frac{\sqrt{3}}{49}$	$\frac{\sqrt{5}}{\sqrt{16}} \quad \frac{\sqrt{5}}{\sqrt{16}}$ $\frac{\sqrt{5}}{4}$	$\frac{\sqrt{9}}{\sqrt{25}}$ $\frac{\sqrt{9}}{\sqrt{25}} = \frac{3}{5}$	$\frac{\sqrt{200}}{\sqrt{49}}$ $\frac{\sqrt{200}}{\sqrt{49}} \quad \frac{\sqrt{100}\sqrt{2}}{7}$ $\frac{10\sqrt{2}}{7}$
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Rationalizing the Denominator (cannot have a radical in the denominator)

Multiply numerator and denominator by radical in denominator then simplify

$\frac{3}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}}$ $\frac{3\sqrt{5}}{5}$	$\frac{\sqrt{10}}{\sqrt{12}}$ $\frac{\sqrt{5}}{6} \cdot \frac{\sqrt{5}}{\sqrt{6}} \cdot \frac{\sqrt{6}}{\sqrt{6}} = \frac{\sqrt{30}}{6}$ <hr/> $\frac{\sqrt{10}}{\sqrt{12}} \cdot \frac{\sqrt{12}}{\sqrt{12}} = \frac{\sqrt{120}}{12}$ $\frac{2\sqrt{30}}{12} = \frac{\sqrt{30}}{6}$	$\sqrt{\frac{6}{15}}$ $\sqrt{\frac{2}{5}} = \frac{\sqrt{2}}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{\sqrt{10}}{5}$ <hr/> $\frac{\sqrt{6}}{\sqrt{15}} \cdot \frac{\sqrt{15}}{\sqrt{15}} = \frac{\sqrt{90}}{15}$ $\frac{3\sqrt{10}}{15} = \frac{\sqrt{10}}{5}$
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Simplify.

$\sqrt{6} + \sqrt{24}$ $3\sqrt{6}$	$2\sqrt{32}$ $8\sqrt{2}$	$\frac{4\sqrt{10}}{\sqrt{45}}$ $\frac{4\sqrt{2}}{3}$
$3\sqrt{40} \cdot 2\sqrt{5}$ $60\sqrt{2}$	$2\sqrt{54} - 3\sqrt{6}$ $3\sqrt{6}$	$3\sqrt{5} + 2\sqrt{45}$ $9\sqrt{5}$
$3\sqrt{3} - \sqrt{27}$ 0	$\frac{\sqrt{15}}{\sqrt{2}}$ $\frac{\sqrt{30}}{2}$	$\frac{4\sqrt{10}}{\sqrt{45}}$