10.2 a
Simplifying Radicals

Who uses this?

Forest, conservation and logging workers

Economists

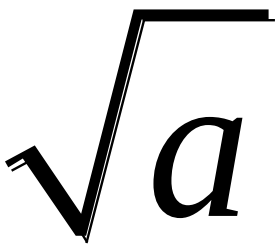
Actuary

Statistician

Engineer

Insurance underwriters

Vocabulary



radical symbol

radicand

the number underneath the radical

radical expression

An expression that has radicals in it

Ways to Simplify A Radical Expression

Option 1

- Find the prime factorization of the radicand

- Every 2 equal factors under the radical sign is equivalent to one of those factors outside of the radical

Examples

$$\sqrt{75} = \sqrt{3 \cdot 5 \cdot 5} = 5\sqrt{3}$$

$$\sqrt{300} = \sqrt{2 \cdot 2 \cdot 3 \cdot 5 \cdot 5} = 2 \cdot 5\sqrt{3} = 10\sqrt{3}$$

$$\sqrt{60} = \sqrt{2 \cdot 2 \cdot 3 \cdot 5} = 2\sqrt{15}$$

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

Ways to Simplify
A Radical Expression

Option 2

- Express the radicand using perfect square factors

- Use the Product Property of Square Roots to simplify

Examples

$$\sqrt{75} = \sqrt{25 \cdot 3} = \sqrt{25}\sqrt{3} = 5\sqrt{3}$$

$$\sqrt{300} = \sqrt{100 \cdot 3} = \sqrt{100}\sqrt{3} = 10\sqrt{3}$$

$$\sqrt{60} = \sqrt{4 \cdot 15} = \sqrt{4}\sqrt{15} = 2\sqrt{15}$$

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

Examples

$$\sqrt{2}\cdot\sqrt{10} = \sqrt{20} = \sqrt{4}\sqrt{5} = 2\sqrt{5}$$

$$\sqrt{15}\cdot\sqrt{3} = \sqrt{45} = \sqrt{9\cdot 5} = 3\sqrt{5}$$

$$\sqrt{12}\cdot 3\sqrt{6} = 3\sqrt{72} = 3\sqrt{36\cdot 2} = 18\sqrt{2}$$

$$7\sqrt{15}\cdot\left(-2\sqrt{21}\right) = -14\sqrt{315} = -14\sqrt{9\cdot 35} = -42\sqrt{35}$$

Examples

$\sqrt{x^3}$

$\sqrt{x \cdot x \cdot x}$

$x^1 \sqrt{x}$

$\sqrt{x^2 y^4}$

$\sqrt{x \cdot x \cdot y \cdot y \cdot y \cdot y}$

xy^2

$\sqrt{x^5 y^9}$

$\sqrt{x \cdot x \cdot x \cdot x \cdot x \cdot y \cdot y \cdot y \cdot y \cdot y \cdot y \cdot y \cdot y \cdot y}$

$x^2 \ y^4 \sqrt{xy}$

$\sqrt{16x^4 y^6}$

$4x^2 y^3 \sqrt{\ }$

Examples

$$\sqrt{48x^9}$$

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

$$4x^4\sqrt{3\ x}$$

$$3\sqrt{5x}\cdot\sqrt{15x^3}$$

$$3\sqrt{75x^4}$$

$$3\sqrt{5\cdot 5\cdot 3\cdot x\cdot x\cdot x\cdot x}$$

$$15\ x^2\sqrt{\ 3}$$

Examples

$$3\sqrt{12x^2}\cdot 2\sqrt{20x^5}$$

$$6\sqrt{240x^7}$$

$$6\sqrt{2\cdot 2\cdot 2\cdot 2\cdot 5\cdot 3\cdot x\cdot x\cdot x\cdot x\cdot x\cdot x}$$

$$24\,x^3\sqrt{15x}$$