

Simplify

Add &

subtract

Multiply

Divide

How do you **SIMPLIFY** square roots?

Example 1:

$$\sqrt{300}$$

Example 2:

$$\sqrt{99}$$

Example 3:

$$\sqrt{162}$$

How do you **ADD & SUBTRACT** square roots?

Example 4:

$$3\sqrt{6} + 8\sqrt{6}$$

Example 5:

$$2\sqrt{7} + 9\sqrt{3} - 8\sqrt{7}$$

Example 6:

$$5\sqrt{3} - \sqrt{27}$$

How do you **MULTIPLY** square roots?

Example 7:

$$\sqrt{5} \cdot \sqrt{20}$$

Example 8:

$$\sqrt{8} \cdot 7\sqrt{8}$$

Example 9:

$$7\sqrt{2} \cdot 3\sqrt{18}$$

How do you **DIVIDE** square roots?

Example 10:

$$\sqrt{\frac{25}{49}}$$

Example 11:

$$\sqrt{\frac{72}{4}}$$

Example 12:

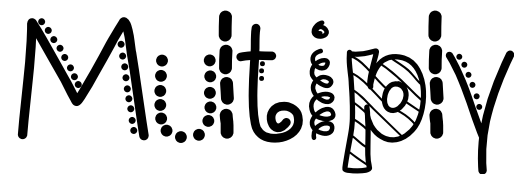
$$\sqrt{\frac{80}{81}}$$



The word "Simplify" is written in a playful, hand-drawn font. The letter 'S' is a gear-like shape. The letter 'i' has a dotted pattern. The letter 'p' has a diagonal hatching pattern. The letter 'f' has a dotted pattern.

The words "Add &" are written in a playful, hand-drawn font. The letter 'A' is a gear-like shape. The letter 'd' has a dotted pattern. The ampersand has a dotted pattern.

The word "subtract" is written in a playful, hand-drawn font. The letter 's' is a gear-like shape. The letter 'u' has a dotted pattern. The letter 'b' has a dotted pattern. The letter 't' has a dotted pattern. The letter 'r' has a dotted pattern. The letter 'a' has a dotted pattern. The letter 'c' has a dotted pattern. The letter 't' has a dotted pattern.

The word "Multiply" is written in a playful, hand-drawn font. The letter 'M' has a dotted pattern. The letter 'u' has a dotted pattern. The letter 'l' has a dotted pattern. The letter 't' has a dotted pattern. The letter 'i' has a dotted pattern. The letter 'p' has a diagonal hatching pattern. The letter 'l' has a dotted pattern. The letter 'y' has a dotted pattern.

The word "Divide" is written in a playful, hand-drawn font. The letter 'D' has a dotted pattern. The letter 'i' has a dotted pattern. The letter 'v' has a dotted pattern. The letter 'i' has a dotted pattern. The letter 'c' has a dotted pattern. The letter 'e' has a dotted pattern. The letter 'd' has a dotted pattern. The letter 'e' has a dotted pattern.

How do you **SIMPLIFY** square roots?

Rewrite as the product of the largest perfect square that the radicand is divisible by and some other factor. Evaluate the perfect square and keep the other factor inside the square root.

Example 1:

$$\begin{aligned}\sqrt{300} \\ &= \sqrt{100} \cdot \sqrt{3} \\ &= \boxed{10\sqrt{3}}\end{aligned}$$

Example 2:

$$\begin{aligned}\sqrt{99} \\ &= \sqrt{9} \cdot \sqrt{11} \\ &= \boxed{3\sqrt{11}}\end{aligned}$$

Example 3:

$$\begin{aligned}\sqrt{162} \\ &= \sqrt{81} \cdot \sqrt{2} \\ &= \boxed{9\sqrt{2}}\end{aligned}$$

How do you **ADD & SUBTRACT** square roots?

If the radicands (# under the radical) are the same, combine like terms by adding or subtracting the coefficients and keep the radicand.

Example 4:

$$\begin{aligned}3\sqrt{6} + 8\sqrt{6} \\ &= (3 + 8)\sqrt{6} \\ &= \boxed{11\sqrt{6}}\end{aligned}$$

Example 5:

$$\begin{aligned}2\sqrt{7} + 9\sqrt{3} - 8\sqrt{7} \\ &= (2 - 8)\sqrt{7} + 9\sqrt{3} \\ &= \boxed{-6\sqrt{7} + 9\sqrt{3}}\end{aligned}$$

Example 6:

$$\begin{aligned}5\sqrt{3} - \sqrt{27} \\ &= 5\sqrt{3} - \sqrt{9 \cdot 3} \\ &= 5\sqrt{3} - 3\sqrt{3} \\ &= \boxed{2\sqrt{3}}\end{aligned}$$

How do you **MULTIPLY** square roots?

Multiply the radicands together under one radical. Simplify, if possible. If there are any numbers outside the square root, keep them outside.

Example 7:

$$\begin{aligned}\sqrt{5} \cdot \sqrt{20} \\ &= \sqrt{5 \cdot 20} \\ &= \sqrt{100} \\ &= \boxed{10}\end{aligned}$$

Example 8:

$$\begin{aligned}\sqrt{8} \cdot 7\sqrt{8} \\ &= 7\sqrt{8 \cdot 8} \\ &= 7\sqrt{64} \\ &= 7 \cdot 8 \\ &= \boxed{56}\end{aligned}$$

Example 9:

$$\begin{aligned}7\sqrt{2} \cdot 3\sqrt{18} \\ &= 7 \cdot 3\sqrt{2 \cdot 18} \\ &= 21\sqrt{36} \\ &= 21 \cdot 6 \\ &= \boxed{126}\end{aligned}$$

How do you **DIVIDE** square roots?

Separate the numerator and denominator under their own radical. Simplify each square root, separately.

Example 10:

$$\begin{aligned}\frac{\sqrt{25}}{\sqrt{49}} &= \frac{\sqrt{25}}{\sqrt{49}} \\ &= \boxed{\frac{5}{7}}\end{aligned}$$

Example 11:

$$\begin{aligned}\frac{\sqrt{72}}{\sqrt{4}} &= \frac{\sqrt{72}}{\sqrt{4}} \\ &= \frac{\sqrt{36 \cdot 2}}{2} \\ &= \frac{6\sqrt{2}}{2} = \boxed{3\sqrt{2}}\end{aligned}$$

Example 12:

$$\begin{aligned}\frac{\sqrt{80}}{\sqrt{81}} &= \frac{\sqrt{80}}{\sqrt{81}} \\ &= \frac{\sqrt{16 \cdot 5}}{9} \\ &= \boxed{\frac{4\sqrt{5}}{9}}\end{aligned}$$

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