

Simplifying Radicals: Finding hidden perfect squares and taking their root.

Simplify each expression by factoring to find perfect squares and then taking their root.

1) $\sqrt{75}$

2) $\sqrt{16}$

3) $\sqrt{36}$

4) $\sqrt{64}$

5) $\sqrt{80}$

6) $\sqrt{30}$

7) $\sqrt{8}$

8) $\sqrt{18}$

9) $\sqrt{32}$

10) $\sqrt{12}$

11) $\sqrt{8}$

12) $\sqrt{108}$

13) $\sqrt{125}$

14) $\sqrt{50}$

15) $\sqrt{175}$

16) $\sqrt{28}$

17) $\sqrt{45}$

18) $\sqrt{72}$

19) $\sqrt{20}$

20) $\sqrt{150}$

Simplifying Radical Expressions: Adding and Subtracting

Add or subtract radicals by simplifying each term and then combining like terms.

a. $2\sqrt{2} + \sqrt{5} - 6\sqrt{2} = -4\sqrt{2} + \sqrt{5}$ **Subtract like radicals.**

b. $4\sqrt{3} - \sqrt{27} = 4\sqrt{3} - \sqrt{9 \cdot 3}$ **Perfect square factor**

$= 4\sqrt{3} - \sqrt{9} \cdot \sqrt{3}$ **Use product property.**

$= 4\sqrt{3} - 3\sqrt{3}$ **Simplify.**

$= \sqrt{3}$ **Subtract like radicals.**

1) $3\sqrt{6} - 4\sqrt{6}$

2) $-3\sqrt{7} + 4\sqrt{7}$

3) $-11\sqrt{21} - 11\sqrt{21}$

4) $-9\sqrt{15} + 10\sqrt{15}$

5) $-10\sqrt{7} + 12\sqrt{7}$

6) $-3\sqrt{17} - 4\sqrt{17}$

7) $-10\sqrt{11} - 11\sqrt{11}$

8) $-2\sqrt{3} + 3\sqrt{27}$

9) $2\sqrt{6} - 2\sqrt{24}$

10) $2\sqrt{6} + 3\sqrt{54}$

11) $-\sqrt{12} + 3\sqrt{3}$

12) $3\sqrt{3} - \sqrt{27}$

13) $3\sqrt{8} + 3\sqrt{2}$

14) $-3\sqrt{6} + 3\sqrt{6}$

Simplifying Radical Expressions: Multiplying

- (a) Multiply numbers that are BOTH OUTSIDE the radical.
Multiply numbers that are BOTH INSIDE the radical.
Simplify the expression

$2 \cdot 5 = \underline{\hspace{2cm}}$

$2 \cdot \sqrt{5} = \underline{\hspace{2cm}}$

$\sqrt{2} \cdot 5 = \underline{\hspace{2cm}}$

$2\sqrt{3} \cdot 5 = \underline{\hspace{2cm}}$

$2\sqrt{3} \cdot \sqrt{5} = \underline{\hspace{2cm}}$

$2\sqrt{3} \cdot 4\sqrt{5} = \underline{\hspace{2cm}}$

1) $\sqrt{6} \cdot 4\sqrt{6}$

2) $-\sqrt{5} \cdot \sqrt{20}$

3) $-\sqrt{2} \cdot \sqrt{3}$

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

5) $\sqrt{12} \cdot \sqrt{15}$

6) $\sqrt{5} \cdot -2\sqrt{5}$

7) $-3\sqrt{5} \cdot \sqrt{20}$

8) $\sqrt{15} \cdot 3\sqrt{5}$

9) $\sqrt{9} \cdot \sqrt{3}$

10) $-4\sqrt{8} \cdot \sqrt{10}$

Simplifying Radical Expressions: Dividing and rationalizing the Denominator

$$\frac{6}{3} = \underline{\hspace{2cm}}$$

$$\frac{\sqrt{6}}{\sqrt{2}} = \underline{\hspace{2cm}}$$

$$\frac{\sqrt{6}}{2} = \underline{\hspace{2cm}}$$

$$\frac{12\sqrt{6}}{2} = \underline{\hspace{2cm}}$$

$$\frac{12\sqrt{6}}{\sqrt{2}} = \underline{\hspace{2cm}}$$

Simplest form for fractions with $\sqrt{\hspace{1cm}}$

1. No perfect square factor under $\sqrt{\hspace{1cm}}$ ex. $\sqrt{75} = \sqrt{25}\sqrt{3} = 5\sqrt{3}$

2. No fractions under a $\sqrt{\hspace{1cm}}$ ex. $\sqrt{\frac{3}{4}} = \frac{\sqrt{3}}{\sqrt{4}} = \frac{\sqrt{3}}{2}$

3. No $\sqrt{\hspace{1cm}}$ in a denominator ex. $\frac{2}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{2\sqrt{3}}{\sqrt{9}} = \frac{2\sqrt{3}}{3}$

4. Must be reduced ex. $\frac{8\sqrt{5}}{2} = 4\sqrt{5}$

11) $\frac{\sqrt{8}}{\sqrt{7}}$

12) $\frac{7}{8\sqrt{7}}$

13) $\frac{\sqrt{2}}{\sqrt{6}}$

14) $\frac{\sqrt{21}}{\sqrt{15}}$

15) $\frac{\sqrt{3}}{6\sqrt{7}}$

16) $\frac{\sqrt{5}}{\sqrt{3}}$

17) $\frac{\sqrt{15}}{3\sqrt{6}}$

18) $\frac{\sqrt{8}}{2\sqrt{7}}$

Simplify each radical expression. ODD PROBLEMS REQUIRED

1. $\sqrt{5} \sqrt{15}$

2. $\sqrt{14} \sqrt{35}$

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

4. $\sqrt{3}(\sqrt{27} - \sqrt{3})$

5. $\sqrt{2}(\sqrt{6} + \sqrt{10})$

6. $\sqrt{7}(3 - \sqrt{7})$

7. $\sqrt{5}(3\sqrt{5} - 4\sqrt{3})$

8. $\sqrt{y}(\sqrt{y} - \sqrt{5})$

Simplify each radical expression. ODD PROBLEMS REQUIRED

21. $\sqrt{\frac{27}{16}}$

22. $\sqrt{\frac{14}{y^2}}$

23. $\sqrt{\frac{24}{25}}$

24. $\sqrt{\frac{7}{5}}$

25. $\sqrt{\frac{10}{7}}$

26. $\frac{2}{\sqrt{3}}$

27. $\frac{5}{\sqrt{10}}$

28. $\frac{6}{\sqrt{3}}$

29. $\frac{2}{\sqrt{6}}$

15) $-3\sqrt{20} - \sqrt{5}$

16) $2\sqrt{45} - 2\sqrt{5}$

17) $3\sqrt{18} - 2\sqrt{2}$

18) $-3\sqrt{18} + 3\sqrt{8} - \sqrt{24}$

19) $3\sqrt{18} + 3\sqrt{12} + 2\sqrt{27}$

20) $-3\sqrt{5} - \sqrt{6} - \sqrt{5}$

Simplify each expression completely.

2. $\sqrt{14} \sqrt{35}$

4. $\sqrt{3}(\sqrt{27} - \sqrt{3})$

24. $\sqrt{\frac{7}{5}}$

26. $\frac{2}{\sqrt{3}}$

16) $2\sqrt{45} - 2\sqrt{5}$

18) $-3\sqrt{18} + 3\sqrt{8} - \sqrt{24}$

A perfect square is a number whose square root is an integer. Half of the first 300 perfect squares are listed for you. Fill in the other 15 perfect squares.

$$\sqrt{1} = 1 \quad \text{because} \quad 1^2 = 1$$

$$\sqrt{256} = 16 \quad \text{because} \quad 16^2 = 256$$

$$\sqrt{\quad} = \quad \text{because} \quad \quad^2 = \quad$$

$$\sqrt{\quad} = \quad \text{because} \quad \quad^2 = \quad$$

$$\sqrt{\quad} = \quad \text{because} \quad \quad^2 = \quad$$

$$\sqrt{\quad} = \quad \text{because} \quad \quad^2 = \quad$$

$$\sqrt{\quad} = \quad \text{because} \quad \quad^2 = \quad$$

$$\sqrt{361} = 19 \quad \text{because} \quad 19^2 = 361$$

$$\sqrt{25} = 5 \quad \text{because} \quad 5^2 = 25$$

$$\sqrt{\quad} = \quad \text{because} \quad \quad^2 = \quad$$

$$\sqrt{\quad} = \quad \text{because} \quad \quad^2 = \quad$$

$$\sqrt{441} = 21 \quad \text{because} \quad 21^2 = 441$$

$$\sqrt{49} = 7 \quad \text{because} \quad 7^2 = 49$$

$$\sqrt{\quad} = \quad \text{because} \quad \quad^2 = \quad$$

$$\sqrt{\quad} = \quad \text{because} \quad \quad^2 = \quad$$

$$\sqrt{\quad} = \quad \text{because} \quad \quad^2 = \quad$$

$$\sqrt{\quad} = \quad \text{because} \quad \quad^2 = \quad$$

$$\sqrt{576} = 24 \quad \text{because} \quad 24^2 = 576$$

$$\sqrt{100} = 10 \quad \text{because} \quad 10^2 = 100$$

$$\sqrt{625} = 25 \quad \text{because} \quad 25^2 = 625$$

$$\sqrt{\quad} = \quad \text{because} \quad \quad^2 = \quad$$

$$\sqrt{\quad} = \quad \text{because} \quad \quad^2 = \quad$$

$$\sqrt{144} = 12 \quad \text{because} \quad 12^2 = 144$$

$$\sqrt{729} = 27 \quad \text{because} \quad 27^2 = 729$$

$$\sqrt{\quad} = \quad \text{because} \quad \quad^2 = \quad$$

$$\sqrt{784} = 28 \quad \text{because} \quad 28^2 = 784$$

$$\sqrt{196} = 14 \quad \text{because} \quad 14^2 = 196$$

$$\sqrt{\quad} = \quad \text{because} \quad \quad^2 = \quad$$

$$\sqrt{15} = 225 \quad \text{because} \quad 15^2 = 225$$

$$\sqrt{900} = 30 \quad \text{because} \quad 30^2 = 900$$