

# HOMWORK SOLUTIONS...

Worksheet - Simplifying Radicals (Square Roots).pdf

*Largest Perfect Square*

$$\sqrt{a \times b} = \sqrt{a} \times \sqrt{b}$$

1)  $\sqrt{96}$

$$\begin{aligned} &\sqrt{16 \times 6} \\ &\sqrt{16} \times \sqrt{6} \\ &4\sqrt{6} \end{aligned}$$

2)  $\sqrt{216}$

$$\begin{aligned} &\sqrt{36 \times 6} \\ &\sqrt{36} \times \sqrt{6} \\ &6\sqrt{6} \end{aligned}$$

3)  $\sqrt{98}$

$$\begin{aligned} &\sqrt{49 \times 2} \\ &\sqrt{49} \times \sqrt{2} \\ &7\sqrt{2} \end{aligned}$$

4)  $\sqrt{18}$

$$\begin{aligned} &\sqrt{9 \times 2} \\ &\sqrt{9} \times \sqrt{2} \\ &3\sqrt{2} \end{aligned}$$

5)  $\sqrt{72}$

$$\begin{aligned} &\sqrt{36 \times 2} \\ &6\sqrt{2} \end{aligned}$$

6)  $\sqrt{144}$

$$12$$

7)  $\sqrt{45}$

$$\begin{aligned} &\sqrt{9 \times 5} \\ &3\sqrt{5} \end{aligned}$$

8)  $\sqrt{175}$

$$\begin{aligned} &\sqrt{25 \times 7} \\ &5\sqrt{7} \end{aligned}$$

9)  $\sqrt{343}$

$$\begin{aligned} &\sqrt{49 \times 7} \\ &\sqrt{49} \times \sqrt{7} \\ &7\sqrt{7} \end{aligned}$$

10)  $\sqrt{12}$

$$\begin{aligned} &\sqrt{4 \times 3} \\ &2\sqrt{3} \end{aligned}$$

11)  $10\sqrt{96}$

$$\begin{aligned} &10\sqrt{16 \times 6} \\ &10 \times \sqrt{16} \times \sqrt{6} \\ &10 \times 4\sqrt{6} \\ &40\sqrt{6} \end{aligned}$$

12)  $9\sqrt{245}$

$$\begin{aligned} &9\sqrt{49 \times 5} \\ &9\sqrt{49} \times \sqrt{5} \\ &9 \times 7\sqrt{5} \\ &63\sqrt{5} \end{aligned}$$

13)  $7\sqrt{600}$

$$7\sqrt{100 \times 6}$$

$$7\sqrt{100} \times \sqrt{6}$$

$$7 \times 10 \sqrt{6}$$

$$(70\sqrt{6})$$

15)  $5\sqrt{180}$

$$5\sqrt{36 \times 5}$$

$$5 \times 6\sqrt{5}$$

$$(30\sqrt{5})$$

17)  $2\sqrt{36}$

$$2 \times 6$$

$$(12)$$

19)  $8\sqrt{27}$

$$8\sqrt{9 \times 3}$$

$$8 \times \sqrt{9} \times \sqrt{3}$$

$$8 \times 3 \times \sqrt{3}$$

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

21)  $3\sqrt{900}$

$$3 \times 30$$

$$(90)$$

23)  $11\sqrt{1215}$

$$11\sqrt{81 \times 15}$$

$$11 \times \sqrt{81} \times \sqrt{15}$$

$$11 \times 9 \times \sqrt{15}$$

$$(99\sqrt{15})$$

14)  $5\sqrt{45}$

$$5\sqrt{9 \times 5}$$

$$5 \times 3\sqrt{5}$$

$$(15\sqrt{5})$$

16)  $3\sqrt{405}$

$$3\sqrt{81 \times 5}$$

$$3 \times 9\sqrt{5}$$

$$(27\sqrt{5})$$

18)  $9\sqrt{125}$

$$9\sqrt{25 \times 5}$$

$$9 \times 5\sqrt{5}$$

$$(45\sqrt{5})$$

20)  $12\sqrt{1764}$

$$12 \times 42$$

$$(504)$$

22)  $7\sqrt{2535}$

$$7\sqrt{169 \times 15}$$

$$7 \times 13\sqrt{15}$$

$$(91\sqrt{15})$$

24)  $2\sqrt{200}$

$$2\sqrt{100 \times 2}$$

$$2 \times 10\sqrt{2}$$

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

**Simplifying square roots...let's practice!!**

<p><b>RULE:</b> <math>\sqrt{ab} = \sqrt{a} \times \sqrt{b}</math></p> <p style="text-align: center;">↑ LARGEST Perfect Square</p>
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$$\begin{aligned} &\sqrt{12} \\ &\sqrt{4} \times \sqrt{3} \\ &2\sqrt{3} \end{aligned}$$

$$\begin{aligned} &\sqrt{45} \\ &\sqrt{9} \times \sqrt{5} \\ &3\sqrt{5} \end{aligned}$$

$$\begin{aligned} &9\sqrt{8} \\ &9(\sqrt{4} \times \sqrt{2}) \\ &9(2\sqrt{2}) \\ &= 18\sqrt{2} \end{aligned}$$

$$\begin{aligned} &5\sqrt{90} \\ &5(\sqrt{9} \times \sqrt{10}) \\ &15\sqrt{10} \end{aligned}$$

$$\begin{aligned} &\sqrt{72} \\ &\sqrt{9} \times \sqrt{8} \\ &3\sqrt{8} \\ &3(\sqrt{4} \times \sqrt{2}) \\ &6\sqrt{2} \end{aligned} \left. \begin{array}{l} \\ \\ \\ \\ \end{array} \right\} \begin{aligned} &\sqrt{36} \times \sqrt{2} \\ &6\sqrt{2} \end{aligned}$$

$$\begin{aligned} &7\sqrt{48} \\ &7 \times \sqrt{16} \times \sqrt{3} \\ &7 \times 4\sqrt{3} \\ &28\sqrt{3} \end{aligned}$$

### What about simplifying roots OTHER than square roots?

- finding Perfect cubes...

- finding other higher powers...

$$\begin{aligned} & \sqrt[3]{24} \\ & \sqrt[3]{8} \times \sqrt[3]{3} \\ & 2\sqrt[3]{3} \end{aligned}$$

- 8
- 27
- 64
- 125

$$\begin{aligned} & \sqrt[4]{243} \\ & \sqrt[4]{81} \times \sqrt[4]{3} \\ & 3\sqrt[4]{3} \end{aligned}$$

$$\begin{aligned} & \sqrt[3]{54} \quad \begin{matrix} 8 \\ 27 \\ 64 \end{matrix} \\ & \sqrt[3]{27} \times \sqrt[3]{2} \\ & 3\sqrt[3]{2} \end{aligned}$$

$$\begin{aligned} & 2\sqrt[5]{64} \quad \begin{matrix} 2^5=32 \\ 3^5=243 \end{matrix} \\ & 2 \times (\sqrt[5]{32} \times \sqrt[5]{2}) \\ & 2 \times 2\sqrt[5]{2} \\ & 4\sqrt[5]{2} \end{aligned}$$

#### Powers of 4

$$\begin{aligned} 1^4 &= 1 \\ 2^4 &= 16 \\ 3^4 &= 81 \\ 4^4 &= 256 \\ 5^4 &= 625 \end{aligned}$$

# MORE EXAMPLES...

Simplify each radical.

a)  $\sqrt{80}$   
 $\sqrt{16} \times \sqrt{5}$   
 $4\sqrt{5}$

b)  $\sqrt[3]{144}$   
 $\sqrt[3]{8} \times \sqrt[3]{18}$   
 $2\sqrt[3]{18}$

$2^3=8$   
 $2^7=128$   
 $6^3=216$

c)  $\sqrt[4]{162}$   
 $\sqrt[4]{81} \times \sqrt[4]{2}$   
 $3\sqrt[4]{2}$

$3^4=81$   
 $2^4=16$

Write each radical in simplest form, if possible.

Entire  
 a)  $\sqrt[3]{40}$   
 $\sqrt[3]{8} \times \sqrt[3]{5}$   
 $2\sqrt[3]{5}$   
Mixed Radical

b)  $\sqrt{26}$   
 ✓

c)  $\sqrt[4]{32}$   
 $\sqrt[4]{16} \times \sqrt[4]{2}$   
 $2\sqrt[4]{2}$

What if we wanted to reverse this process?

- Changing a MIXED radical to an ENTIRE radical

$$3\sqrt{5} = \frac{\sqrt{3^2 \times 5}}{\sqrt{45}}$$

$$4\sqrt{2} = \frac{\sqrt{4^2 \times 2}}{\sqrt{32}}$$

$$\begin{array}{l} \sqrt{20} \\ \nearrow \sqrt{4} \times \sqrt{5} \\ \text{"Square"} \end{array} \quad 2\sqrt{5}$$

$$2^3\sqrt{3} = \frac{\sqrt[3]{2^3 \cdot 3}}{\sqrt[3]{24}}$$

$$3^5\sqrt{4} = \frac{\sqrt[5]{3^5 \cdot 4}}{\sqrt[5]{972}}$$

$$\begin{array}{l} \sqrt[3]{54} \\ \sqrt[3]{27} \times \sqrt[3]{2} \\ \sqrt[3]{2} \end{array}$$

Express as entire Radicals:

$$3\sqrt[3]{7}$$

$$\sqrt{3^2 \times 7}$$

$$\sqrt{63}$$

$$\overset{\text{Index}}{\downarrow} \\ \textcircled{4} \\ 3\sqrt[4]{5}$$

$$\sqrt[4]{3^4 \cdot 5}$$

$$\sqrt[4]{405}$$

$$2\sqrt[3]{10}$$

$$\sqrt[3]{2^3 \cdot 10}$$

$$\sqrt[3]{80}$$

## Practice Problems...

Page 218 - 219

#4,

#10 (1st & 3rd columns)

#11 (1st column)

#17

#21

#22 (a & c)

## Attachments

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4.1 Page 206 Questions.pdf

Introductory worksheet.doc

Worksheet - Simplifying Radicals (Square Roots).pdf

arithmetic and geometric sequences.doc

applications of sequences.doc