

11-27-18

Aim: SWBAT continue to simplify radical expressions.

HW: Finish Classwork (Packet Pages 10 and 12)

(compare to answer key online)

Quiz tomorrow (Pages 1 - 13)

Do Now: Packet Page 11

Homework - Simplifying Radical Expressions

List the first 15 perfect squares starting with 1.

1 4 9 16 25 36 49 64 81 100
121 144 169 196 225

Simplify each radical expression. Justify your answer.

1) $\sqrt{63}$

$$\begin{aligned} &\sqrt{9 \cdot 7} \\ &\sqrt{9} \cdot \sqrt{7} \\ &3\sqrt{7} \end{aligned}$$

2) $\sqrt{99}$

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

3) $3\sqrt{99}$

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

4) $\sqrt{108}$

$$\begin{aligned} &\sqrt{36 \cdot 3} \\ &\sqrt{36} \cdot \sqrt{3} \\ &6\sqrt{3} \end{aligned}$$

5) $\sqrt{242}$

$$\begin{aligned} &\sqrt{121 \cdot 2} \\ &\sqrt{121} \cdot \sqrt{2} \\ &11\sqrt{2} \end{aligned}$$

6) $\sqrt{128}$

$$\begin{aligned} &\sqrt{64 \cdot 2} \\ &\sqrt{64} \cdot \sqrt{2} \\ &8\sqrt{2} \end{aligned}$$

7) $5\sqrt{18}$

$$\begin{aligned} &5 \cdot \sqrt{9 \cdot 2} \\ &5 \cdot \sqrt{9} \cdot \sqrt{2} \\ &5 \cdot 3 \cdot \sqrt{2} \\ &15\sqrt{2} \end{aligned}$$

8) $3\sqrt{8}$

$$\begin{aligned} &3 \cdot \sqrt{4 \cdot 2} \\ &3 \cdot \sqrt{4} \cdot \sqrt{2} \\ &3 \cdot 2 \cdot \sqrt{2} \\ &6\sqrt{2} \end{aligned}$$

9) $4\sqrt{200}$

$$\begin{aligned} &4 \cdot \sqrt{100 \cdot 2} \\ &4 \cdot \sqrt{100} \cdot \sqrt{2} \\ &4 \cdot 10 \cdot \sqrt{2} \\ &40\sqrt{2} \end{aligned}$$

10) $\frac{2}{3}\sqrt{12}$

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

$$\frac{4}{3}\sqrt{3} \text{ or } \frac{4\sqrt{3}}{3}$$

11) $\frac{1}{3}\sqrt{18}$

$$\begin{aligned} &\frac{1}{3} \cdot \sqrt{9 \cdot 2} \\ &\frac{1}{3} \cdot \sqrt{9} \cdot \sqrt{2} \\ &\frac{1}{3} \cdot 3 \cdot \sqrt{2} \end{aligned}$$

$$\sqrt{2}$$

12) $\frac{1}{2}\sqrt{20}$

$$\begin{aligned} &\frac{1}{2} \cdot \sqrt{4 \cdot 5} \\ &\frac{1}{2} \cdot 2 \cdot \sqrt{5} \\ &\sqrt{5} \end{aligned}$$

Aim: SWBAT Simplify Square Roots

Do Now:

Write each expression in simplest radical form.

1) $5\sqrt{90}$ 2) $\sqrt{180}$ 3) $\frac{3}{4}\sqrt{96}$ 4) $\sqrt{800}$ $\frac{\sqrt{400} \cdot 2}{20\sqrt{2}}$
 $15\sqrt{10}$ $6\sqrt{5}$ $3\sqrt{6}$ $20\sqrt{2}$

Identify each number as RATIONAL or IRRATIONAL.

- 5) π Irrational 6) $\sqrt{18}$ Irrational
 7) 0.47 Rational 8) $0.\overline{42}$ Rational
 9) 0.181181118... Irrational 10) $\frac{3}{7}$ Rational

State ALL of the sets of numbers that each of the following belongs to.

- 11) 0 whole, integer, rational, real
 12) $-\frac{6}{11}$ rational, real
 13) 0.5678... irrational, real
 14) $\frac{24}{6}$ natural (counting), whole, integer, rational, real

Answer each question with...

ALWAYS SOMETIMES NEVER

- 15) Counting Numbers are Whole Numbers. (A) S N
 16) Rational Numbers are Irrational A S (N)
 17) Integers are Whole Numbers A (S) N
 18) Rational Numbers are Real Numbers (A) S N

AIM: SWBAT simplify radical expressions.

DO NOW:

List the first 15 Perfect Square.

1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225

When is a square root in simplest form?

When its radicand DOES NOT contain any perfect square factors other than 1.

the # inside the $\sqrt{\quad}$

There are two ways to simplify a radical expression:

Method 1: Find the largest perfect square that is a factor of that number.

Example: $\sqrt{20}$ $\sqrt{20} = \sqrt{4 \cdot 5} = \sqrt{4} \cdot \sqrt{5} = 2\sqrt{5}$ $\sqrt{4} \cdot \sqrt{5}$
 $\sqrt{20} = 2\sqrt{5}$ $2 \cdot \sqrt{5}$
 $2\sqrt{5}$

1) $\sqrt{75}$

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

2) $\sqrt{24}$

$\sqrt{4 \cdot 6}$
 $\sqrt{4} \cdot \sqrt{6}$
 $2 \cdot \sqrt{6}$
 $2\sqrt{6}$

3) $\sqrt{200}$

$\sqrt{100 \cdot 2}$
 $\sqrt{100} \cdot \sqrt{2}$
 $10\sqrt{2}$

4) $4\sqrt{27}$

$4 \cdot \sqrt{27}$
 $4 \cdot \sqrt{9 \cdot 3}$
 $4 \cdot \sqrt{9} \cdot \sqrt{3}$
 $4 \cdot 3 \cdot \sqrt{3}$
 $12\sqrt{3}$

5) $\sqrt{50}$

$\sqrt{25 \cdot 2}$
 $\sqrt{25} \cdot \sqrt{2}$
 $5\sqrt{2}$

6) $3\sqrt{63}$

$3 \cdot \sqrt{9 \cdot 7}$
 $3 \cdot \sqrt{9} \cdot \sqrt{7}$
 $3 \cdot 3 \cdot \sqrt{7}$
 $9\sqrt{7}$

7) $\sqrt{50y^2}$

$\sqrt{50} \cdot \sqrt{y^2}$
 $\sqrt{25 \cdot 2} \cdot y$
 $\sqrt{25} \cdot \sqrt{2} \cdot y$
 $5 \cdot \sqrt{2} \cdot y$
 $5\sqrt{2}y$

8) $4\sqrt{45}$

$4 \cdot \sqrt{9 \cdot 5}$
 $4 \cdot \sqrt{9} \cdot \sqrt{5}$
 $4 \cdot 3 \cdot \sqrt{5}$
 $12\sqrt{5}$

Method 2: Use its prime factorization to find all the perfect squares.

Example: $\sqrt{20} = \sqrt{2 \cdot 2 \cdot 5} = \sqrt{2^2 \cdot 5} = 2\sqrt{5}$

9) $\sqrt{75}$

$\sqrt{3 \cdot 5 \cdot 5}$
 $\sqrt{3 \cdot 5^2}$
 $\sqrt{3} \cdot \sqrt{5^2}$
 $\sqrt{3} \cdot 5$
 $5\sqrt{3}$

10) $\sqrt{24}$

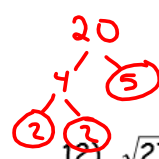
$\sqrt{2 \cdot 2 \cdot 2 \cdot 3}$
 $2\sqrt{6}$

11) $\sqrt{200}$

$\sqrt{2 \cdot 2 \cdot 2 \cdot 5 \cdot 5}$
 $2 \cdot 5 \cdot \sqrt{2}$
 $10\sqrt{2}$

12) $\sqrt{27}$

$\sqrt{3 \cdot 3 \cdot 3}$
 $3\sqrt{3}$



Homework - Simplifying Radical Expressions

List the first 15 perfect squares.

Simplify. You may use either method.

1) $\sqrt{8}$

2) $\sqrt{12}$

3) $\sqrt{18}$

4) $\sqrt{32}$

5) $\sqrt{40}$

6) $\sqrt{48}$

7) $\sqrt{45}$

8) $\frac{1}{2}\sqrt{20}$

9) $\sqrt{28}$

10) $\sqrt{72}$

11) $\sqrt{54}$

12) $\sqrt{80}$

13) $\sqrt{63}$

14) $\sqrt{90}$

15) $\sqrt{99}$

16) $\sqrt{108}$

17) $\sqrt{242}$

18) $\sqrt{128}$

19) $5\sqrt{18}$

20) $3\sqrt{8}$

21) $4\sqrt{200}$

22) $\frac{2}{3}\sqrt{12}$

23) $\sqrt{18x^2}$

24) $\sqrt{20y^4}$

Homework - Simplifying Radical Expressions

List the first 15 perfect squares.

1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225

Simplify. You may use either method.

$$1) \sqrt{8}$$

$$\frac{\sqrt{4 \cdot 2}}{\sqrt{4} \cdot \sqrt{2}}$$

$$2\sqrt{2}$$

$$2) \sqrt{12}$$

$$\frac{\sqrt{4 \cdot 3}}{\sqrt{4} \cdot \sqrt{3}}$$

$$2\sqrt{3}$$

$$3) \sqrt{18}$$

$$\frac{\sqrt{9 \cdot 2}}{\sqrt{9} \cdot \sqrt{2}}$$

$$3\sqrt{2}$$

$$4) \sqrt{32}$$

$$\frac{\sqrt{16 \cdot 2}}{\sqrt{16} \cdot \sqrt{2}}$$

$$4\sqrt{2}$$

$$5) \sqrt{40}$$

$$\frac{\sqrt{4 \cdot 10}}{\sqrt{4} \cdot \sqrt{10}}$$

$$2\sqrt{10}$$

$$6) \sqrt{48}$$

$$\frac{\sqrt{16 \cdot 3}}{\sqrt{16} \cdot \sqrt{3}}$$

$$4\sqrt{3}$$

$$7) \sqrt{45}$$

$$\frac{\sqrt{9 \cdot 5}}{\sqrt{9} \cdot \sqrt{5}}$$

$$3\sqrt{5}$$

$$8) \frac{1}{2} \sqrt{20}$$

$$\frac{1}{2} \cdot \frac{\sqrt{4 \cdot 5}}{\sqrt{4} \cdot \sqrt{5}}$$

$$\frac{1}{2} \cdot 2 \cdot \sqrt{5}$$

$$9) \sqrt{28}$$

$$\frac{\sqrt{4 \cdot 7}}{\sqrt{4} \cdot \sqrt{7}}$$

$$2\sqrt{7}$$

$$10) \sqrt{72}$$

$$\frac{\sqrt{36 \cdot 2}}{\sqrt{36} \cdot \sqrt{2}}$$

$$6\sqrt{2}$$

$$11) \sqrt{54}$$

$$\frac{\sqrt{9 \cdot 6}}{\sqrt{9} \cdot \sqrt{6}}$$

$$3\sqrt{6}$$

$$12) \sqrt{80}$$

$$\frac{\sqrt{16 \cdot 5}}{\sqrt{16} \cdot \sqrt{5}}$$

$$4\sqrt{5}$$

$$13) \sqrt{63}$$

$$\frac{\sqrt{9 \cdot 7}}{\sqrt{9} \cdot \sqrt{7}}$$

$$3\sqrt{7}$$

$$14) \sqrt{90}$$

$$\frac{\sqrt{9 \cdot 10}}{\sqrt{9} \cdot \sqrt{10}}$$

$$3\sqrt{10}$$

$$15) \sqrt{99}$$

$$\frac{\sqrt{9 \cdot 11}}{\sqrt{9} \cdot \sqrt{11}}$$

$$3\sqrt{11}$$

$$16) \sqrt{108}$$

$$\frac{\sqrt{36 \cdot 3}}{\sqrt{36} \cdot \sqrt{3}}$$

$$6\sqrt{3}$$

$$17) \sqrt{242}$$

$$\frac{\sqrt{121 \cdot 2}}{\sqrt{121} \cdot \sqrt{2}}$$

$$11\sqrt{2}$$

$$18) \sqrt{128}$$

$$\frac{\sqrt{64 \cdot 2}}{\sqrt{64} \cdot \sqrt{2}}$$

$$8\sqrt{2}$$

$$19) 5\sqrt{18}$$

$$5 \cdot \frac{\sqrt{9 \cdot 2}}{\sqrt{9} \cdot \sqrt{2}}$$

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

$$15\sqrt{2}$$

$$20) 3\sqrt{8}$$

$$3 \cdot \frac{\sqrt{4 \cdot 2}}{\sqrt{4} \cdot \sqrt{2}}$$

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

$$6\sqrt{2}$$

$$21) 4\sqrt{200}$$

$$4 \cdot \frac{\sqrt{100 \cdot 2}}{\sqrt{100} \cdot \sqrt{2}}$$

$$4 \cdot 10 \cdot \sqrt{2}$$

$$40\sqrt{2}$$

$$22) \frac{2}{3} \sqrt{12}$$

$$\frac{2}{3} \cdot \frac{\sqrt{4 \cdot 3}}{\sqrt{4} \cdot \sqrt{3}}$$

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

$$\frac{4}{3} \sqrt{3}$$

$$23) \sqrt{18x^2}$$

$$\sqrt{9 \cdot 2 \cdot x^2}$$

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

$$3x\sqrt{2}$$

$$24) \sqrt{20y^4}$$

$$\sqrt{4 \cdot 5 \cdot y^2 \cdot y^2}$$

$$\sqrt{4} \cdot \sqrt{5} \cdot \sqrt{y^2} \cdot \sqrt{y^2}$$

$$2 \cdot \sqrt{5} \cdot y \cdot y$$

$$2y^2\sqrt{5}$$

OR

$$\frac{4\sqrt{3}}{3}$$

A square root is in simplest form when the radicand does not contain any perfect square factors other than one. To simplify a radical expression, find the largest perfect square that is a factor of that number.

1) $\sqrt{80}$

2) $\sqrt{200}$

3) $7\sqrt{20}$

4) $\frac{1}{6}\sqrt{27}$

Practice:

1) $\sqrt{28}$

2) $\frac{\sqrt{18}}{6}$

3) $\sqrt{x^4}$

4) $\sqrt{x^3}$

5) $\sqrt{75}$

6) $\sqrt{24}$

7) $\sqrt{242}$

8) $4\sqrt{27}$

A square root is in simplest form when the radicand does not contain any perfect square factors other than one. To simplify a radical expression, find the largest perfect square that is a factor of that number.

$$1) \sqrt{80}$$

$$\sqrt{16 \cdot 5}$$

$$\sqrt{16} \cdot \sqrt{5}$$

$$4\sqrt{5}$$

$$2) \sqrt{200}$$

$$\sqrt{100 \cdot 2}$$

$$\sqrt{100} \cdot \sqrt{2}$$

$$10\sqrt{2}$$

$$3) 7\sqrt{20}$$

$$7 \cdot \sqrt{4 \cdot 5}$$

$$7 \cdot \sqrt{4} \cdot \sqrt{5}$$

$$7 \cdot 2 \cdot \sqrt{5}$$

$$14\sqrt{5}$$

$$4) \frac{1}{6}\sqrt{27}$$

$$\frac{1}{6} \cdot \sqrt{9 \cdot 3}$$

$$\frac{1}{6} \cdot \sqrt{9} \cdot \sqrt{3}$$

$$\frac{1}{6} \cdot 3 \cdot \sqrt{3}$$

$$\frac{1}{2}\sqrt{3} \text{ OR } \frac{\sqrt{3}}{2}$$

Practice:

$$1) \sqrt{28}$$

$$\sqrt{4 \cdot 7}$$

$$\sqrt{4} \cdot \sqrt{7}$$

$$2\sqrt{7}$$

$$2) \frac{\sqrt{18}}{6}$$

$$\rightarrow \frac{\sqrt{9 \cdot 2}}{6}$$

$$\rightarrow \frac{\sqrt{9} \cdot \sqrt{2}}{6}$$

$$\rightarrow \frac{3 \cdot \sqrt{2}}{6}$$

$$\rightarrow \frac{\sqrt{2}}{2}$$

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

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

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

$$x \cdot x$$

$$x^2$$

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

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

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

$$x\sqrt{x}$$

$$5) \sqrt{75}$$

$$\sqrt{25 \cdot 3}$$

$$\sqrt{25} \cdot \sqrt{3}$$

$$5\sqrt{3}$$

$$6) \sqrt{24}$$

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

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

$$2\sqrt{6}$$

$$7) \sqrt{242}$$

$$\sqrt{121 \cdot 2}$$

$$\sqrt{121} \cdot \sqrt{2}$$

$$11\sqrt{2}$$

$$8) 4\sqrt{27}$$

$$4 \cdot \sqrt{9 \cdot 3}$$

$$4 \cdot \sqrt{9} \cdot \sqrt{3}$$

$$4 \cdot 3 \cdot \sqrt{3}$$

$$12\sqrt{3}$$