Chapter 8 Radicals

In class work: Solve each problem.

Section 8.2
Multiplying, Dividing, and Simplifying Radical

1) Simplify the following:

$\sqrt{90}$

$\sqrt{125}$

$\sqrt{128}$

$\dfrac{\sqrt{200}}{\sqrt{2}}$

$\sqrt{\dfrac{5}{2}}\cdot\sqrt{\dfrac{125}{8}}$

$\dfrac{30\sqrt{10}}{5\sqrt{2}}$

$\sqrt[3]{40}$

$\sqrt[4]{243}$

$\sqrt[3]{-\dfrac{216}{125}}$

2) Simplify each radical. Assume all variables represent nonnegative real numbers.

$\sqrt{m^2}$

$\sqrt{36z^2}$

$\sqrt{18x^8}$

$\sqrt{z^5}$

$\sqrt{81m^4n^2}$

$\sqrt[3]{p^3}$

$\sqrt[3]{15t^5}$

$\sqrt[3]{216m^3n^6}$

Section 8.3
Adding and Subtracting Radicals

3) Simplify. Assume all variables represent nonnegative real numbers.

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

$2\sqrt{50}-5\sqrt{72}$

$9\sqrt{24}-2\sqrt{54}+3\sqrt{20}$

$\dfrac{1}{4}\sqrt{288}+\dfrac{1}{6}\sqrt{72}$

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

$2\sqrt[4]{48}-\sqrt[4]{243}$

$\sqrt{32x}-\sqrt{18x}$

$\sqrt{75x^2}+x\sqrt{300}$

$5\sqrt[3]{27x^2}+8\sqrt[3]{8x^2}$

$10\sqrt[3]{4m^4}-3m\sqrt[3]{32m}$

Section 8.4
Rationalizing the Denominator

The process of changing the denominator from a radical (irrational number) to a rational number is called rationalizing the denominator.

Simplified form of a radical

1. The radicand contains no factor(except1) that is a perfect square (when dealing with square roots), a perfect cube(when dealing with cube roots), and so on.
2. The radicand has no fractions.
3. No denominator contains a radical.

4) Rationalize each denominator.

$\frac{6}{\sqrt{5}}$

$\frac{12\sqrt{10}}{8\sqrt{3}}$

$\frac{6}{\sqrt{200}}$

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

$\sqrt[3]{\frac{1}{2}}$

$\frac{\sqrt[3]{7m}}{\sqrt[3]{36n}}$

$\sqrt[3]{\frac{3}{25x^2}}$

5) Simplify.

$\sqrt{\frac{7}{13}} \cdot \sqrt{\frac{13}{3}}$

$\sqrt{\frac{9}{8}} \cdot \sqrt{\frac{7}{16}}$

$\sqrt{\frac{16}{m}}$

$\frac{\sqrt{7x^3}}{\sqrt{y}}$

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

Section 8.5
More Simplifying and Operations with Radicals

6) Simplify.

$\sqrt{5}\left(\sqrt{3}-\sqrt{7}\right)$

$\sqrt[3]{4}\left(\sqrt[3]{2}-3\right)$

$3\sqrt{14}\cdot\sqrt{2}-\sqrt{28}$

$\left(5\sqrt{7}-2\sqrt{3}\right)^2$

$\left(2\sqrt{6}+3\right)\left(3\sqrt{6}+7\right)$

$\left(\sqrt{5}+\sqrt{30}\right)\left(\sqrt{6}+\sqrt{3}\right)$

$\left(\sqrt{6}+1\right)^2$

$\left(\sqrt[3]{4}+\sqrt[3]{2}\right)\left(\sqrt[3]{16}-\sqrt[3]{8}+\sqrt[3]{4}\right)$

$\left(5a-\sqrt{2}\right)\left(5a+\sqrt{2}\right)$

7) Rationalize.

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

$\frac{\sqrt{12}}{\sqrt{3}+1}$

$\frac{\sqrt{6}+\sqrt{5}}{\sqrt{3}+\sqrt{5}}$

$\frac{\sqrt{108}}{3+3\sqrt{3}}$

8) Reduce to lowest terms.

$\frac{5\sqrt{7}-10}{5}$ $\frac{6\sqrt{5}-9}{3}$ $\frac{16+8\sqrt{2}}{24}$

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$\sqrt{90}$

$\sqrt{125}$

$\sqrt{128}$

$\dfrac{\sqrt{200}}{\sqrt{2}}$

$\sqrt{\dfrac{5}{2}}\cdot\sqrt{\dfrac{125}{8}}$

$\dfrac{30\sqrt{10}}{5\sqrt{2}}$

$\sqrt[3]{40}$

$\sqrt[4]{243}$

$\sqrt[3]{-\dfrac{216}{125}}$

2) Simplify each radical. Assume all variables represent nonnegative real numbers.

$\sqrt{m^2}$

$\sqrt{36z^2}$

$\sqrt{18x^8}$

$\sqrt{z^5}$

$\sqrt{81m^4n^2}$

$\sqrt[3]{p^3}$

$\sqrt[3]{15t^5}$

$\sqrt[3]{216m^3n^6}$

Section 8.3
Adding and Subtracting Radicals

3) Simplify. Assume all variables represent nonnegative real numbers.

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

$2\sqrt{50}-5\sqrt{72}$

$9\sqrt{24}-2\sqrt{54}+3\sqrt{20}$

$\dfrac{1}{4}\sqrt{288}+\dfrac{1}{6}\sqrt{72}$

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

$2\sqrt[4]{48}-\sqrt[4]{243}$

$\sqrt{32x}-\sqrt{18x}$

$\sqrt{75x^2}+x\sqrt{300}$

$5\sqrt[3]{27x^2}+8\sqrt[3]{8x^2}$

$10\sqrt[3]{4m^4}-3m\sqrt[3]{32m}$

Section 8.4
Rationalizing the Denominator

The process of changing the denominator from a radical (irrational number) to a rational number is called rationalizing the denominator.

Simplified form of a radical

1. The radicand contains no factor(except1) that is a perfect square (when dealing with square roots), a perfect cube(when dealing with cube roots), and so on.
2. The radicand has no fractions.
3. No denominator contains a radical.

4) Rationalize each denominator.

$\frac{6}{\sqrt{5}}$

$\frac{12\sqrt{10}}{8\sqrt{3}}$

$\frac{6}{\sqrt{200}}$

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

$\sqrt[3]{\frac{1}{2}}$

$\frac{\sqrt[3]{7m}}{\sqrt[3]{36n}}$

$\sqrt[3]{\frac{3}{25x^2}}$

5) Simplify.

$\sqrt{\frac{7}{13}} \cdot \sqrt{\frac{13}{3}}$

$\sqrt{\frac{9}{8}} \cdot \sqrt{\frac{7}{16}}$

$\sqrt{\frac{16}{m}}$

$\frac{\sqrt{7x^3}}{\sqrt{y}}$

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

Section 8.5
More Simplifying and Operations with Radicals

6) Simplify.

$\sqrt{5}\left(\sqrt{3}-\sqrt{7}\right)$

$\sqrt[3]{4}\left(\sqrt[3]{2}-3\right)$

$3\sqrt{14}\cdot\sqrt{2}-\sqrt{28}$

$\left(5\sqrt{7}-2\sqrt{3}\right)^2$

$\left(2\sqrt{6}+3\right)\left(3\sqrt{6}+7\right)$

$\left(\sqrt{5}+\sqrt{30}\right)\left(\sqrt{6}+\sqrt{3}\right)$

$\left(\sqrt{6}+1\right)^2$

$\left(\sqrt[3]{4}+\sqrt[3]{2}\right)\left(\sqrt[3]{16}-\sqrt[3]{8}+\sqrt[3]{4}\right)$

$\left(5a-\sqrt{2}\right)\left(5a+\sqrt{2}\right)$

7) Rationalize.

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

$\frac{\sqrt{12}}{\sqrt{3}+1}$

$\frac{\sqrt{6}+\sqrt{5}}{\sqrt{3}+\sqrt{5}}$

$\frac{\sqrt{108}}{3+3\sqrt{3}}$

8) Reduce to lowest terms.

$\frac{5\sqrt{7}-10}{5}$

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In class work: Solve each problem.

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$\sqrt{\dfrac{5}{2}} \cdot \sqrt{\dfrac{125}{8}}$

$\dfrac{30\sqrt{10}}{5\sqrt{2}}$

$\sqrt[3]{40}$

$\sqrt[4]{243}$

$\sqrt[3]{-\dfrac{216}{125}}$

2) Simplify each radical. Assume all variables represent nonnegative real numbers.

$\sqrt{m^2}$

$\sqrt{36z^2}$

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$\sqrt{81m^4n^2}$

$\sqrt[3]{p^3}$

$\sqrt[3]{15t^5}$

$\sqrt[3]{216m^3n^6}$

Section 8.3
Adding and Subtracting Radicals

3) Simplify. Assume all variables represent nonnegative real numbers.

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

$2\sqrt{50}-5\sqrt{72}$

$9\sqrt{24}-2\sqrt{54}+3\sqrt{20}$

$\dfrac{1}{4}\sqrt{288}+\dfrac{1}{6}\sqrt{72}$

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

$2\sqrt[4]{48}-\sqrt[4]{243}$

$\sqrt{32x}-\sqrt{18x}$

$\sqrt{75x^2}+x\sqrt{300}$

$5\sqrt[3]{27x^2}+8\sqrt[3]{8x^2}$

$10\sqrt[3]{4m^4}-3m\sqrt[3]{32m}$

Section 8.4
Rationalizing the Denominator

The process of changing the denominator from a radical (irrational number) to a rational number is called rationalizing the denominator.

Simplified form of a radical

1. The radicand contains no factor(except1) that is a perfect square (when dealing with square roots), a perfect cube(when dealing with cube roots), and so on.
2. The radicand has no fractions.
3. No denominator contains a radical.

4) Rationalize each denominator.

$\frac{6}{\sqrt{5}}$

$\frac{12\sqrt{10}}{8\sqrt{3}}$

$\frac{6}{\sqrt{200}}$

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

$\sqrt[3]{\frac{1}{2}}$

$\frac{\sqrt[3]{7m}}{\sqrt[3]{36n}}$

$\sqrt[3]{\frac{3}{25x^2}}$

5) Simplify.

$\sqrt{\frac{7}{13}}\cdot\sqrt{\frac{13}{3}}$

$\sqrt{\frac{9}{8}}\cdot\sqrt{\frac{7}{16}}$

$\sqrt{\frac{16}{m}}$

$\frac{\sqrt{7x^3}}{\sqrt{y}}$

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

Section 8.5
More Simplifying and Operations with Radicals

6) Simplify.

$\sqrt{5}\left(\sqrt{3}-\sqrt{7}\right)$

$\sqrt[3]{4}\left(\sqrt[3]{2}-3\right)$

$3\sqrt{14}\cdot\sqrt{2}-\sqrt{28}$

$\left(5\sqrt{7}-2\sqrt{3}\right)^2$

$\left(2\sqrt{6}+3\right)\left(3\sqrt{6}+7\right)$

$\left(\sqrt{5}+\sqrt{30}\right)\left(\sqrt{6}+\sqrt{3}\right)$

$\left(\sqrt{6}+1\right)^2$

$\left(\sqrt[3]{4}+\sqrt[3]{2}\right)\left(\sqrt[3]{16}-\sqrt[3]{8}+\sqrt[3]{4}\right)$

$\left(5a-\sqrt{2}\right)\left(5a+\sqrt{2}\right)$

7) Rationalize.

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

$\frac{\sqrt{12}}{\sqrt{3}+1}$

$\frac{\sqrt{6}+\sqrt{5}}{\sqrt{3}+\sqrt{5}}$

$\frac{\sqrt{108}}{3+3\sqrt{3}}$

8) Reduce to lowest terms.

$\frac{5\sqrt{7}-10}{5}$ $\frac{6\sqrt{5}-9}{3}$ $\frac{16+8\sqrt{2}}{24}$

Chapter 8 Radicals

In class work: Solve each problem.

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Multiplying, Dividing, and Simplifying Radical

1) Simplify the following:

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$\sqrt{125}$

$\sqrt{128}$

$\dfrac{\sqrt{200}}{\sqrt{2}}$

$\sqrt{\dfrac{5}{2}}\cdot\sqrt{\dfrac{125}{8}}$

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$\frac{30\sqrt{10}}{5\sqrt{2}}$

$\sqrt[3]{40}$

$\sqrt[4]{243}$

$\sqrt[3]{-\frac{216}{125}}$

2) Simplify each radical. Assume all variables represent nonnegative real numbers.

$\sqrt{m^2}$

$\sqrt{36z^2}$

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$\sqrt{z^5}$

$\sqrt{81m^4n^2}$

$\sqrt[3]{p^3}$

$\sqrt[3]{15t^5}$

$\sqrt[3]{216m^3n^6}$

Section 8.3
Adding and Subtracting Radicals

3) Simplify. Assume all variables represent nonnegative real numbers.

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

$2\sqrt{50}-5\sqrt{72}$

$9\sqrt{24}-2\sqrt{54}+3\sqrt{20}$

$\frac{1}{4}\sqrt{288}+\frac{1}{6}\sqrt{72}$

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

$2\sqrt[4]{48}-\sqrt[4]{243}$

$\sqrt{32x}-\sqrt{18x}$

$\sqrt{75x^2}+x\sqrt{300}$

$5\sqrt[3]{27x^2}+8\sqrt[3]{8x^2}$

$10\sqrt[3]{4m^4}-3m\sqrt[3]{32m}$

Section 8.4
Rationalizing the Denominator

The process of changing the denominator from a radical (irrational number) to a rational number is called rationalizing the denominator.

Simplified form of a radical

1. The radicand contains no factor(except1) that is a perfect square (when dealing with square roots), a perfect cube(when dealing with cube roots), and so on.
2. The radicand has no fractions.
3. No denominator contains a radical.

4) Rationalize each denominator.

$\frac{6}{\sqrt{5}}$

$\frac{12\sqrt{10}}{8\sqrt{3}}$

$\frac{6}{\sqrt{200}}$

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

$\sqrt[3]{\frac{1}{2}}$

$\frac{\sqrt[3]{7m}}{\sqrt[3]{36n}}$

$\sqrt[3]{\frac{3}{25x^2}}$

5) Simplify.

$\sqrt{\frac{7}{13}} \cdot \sqrt{\frac{13}{3}}$

$\sqrt{\frac{9}{8}} \cdot \sqrt{\frac{7}{16}}$

$\sqrt{\frac{16}{m}}$

$\frac{\sqrt{7x^3}}{\sqrt{y}}$

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

Section 8.5
More Simplifying and Operations with Radicals

6) Simplify.

$\sqrt{5}\left(\sqrt{3}-\sqrt{7}\right)$

$\sqrt[3]{4}\left(\sqrt[3]{2}-3\right)$

$3\sqrt{14}\cdot\sqrt{2}-\sqrt{28}$

$\left(5\sqrt{7}-2\sqrt{3}\right)^2$

$\left(2\sqrt{6}+3\right)\left(3\sqrt{6}+7\right)$

$\left(\sqrt{5}+\sqrt{30}\right)\left(\sqrt{6}+\sqrt{3}\right)$

$\left(\sqrt{6}+1\right)^2$

$\left(\sqrt[3]{4}+\sqrt[3]{2}\right)\left(\sqrt[3]{16}-\sqrt[3]{8}+\sqrt[3]{4}\right)$

$\left(5a-\sqrt{2}\right)\left(5a+\sqrt{2}\right)$

7) Rationalize.

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

$\frac{\sqrt{12}}{\sqrt{3}+1}$

$\frac{\sqrt{6}+\sqrt{5}}{\sqrt{3}+\sqrt{5}}$

$\frac{\sqrt{108}}{3+3\sqrt{3}}$

8) Reduce to lowest terms.

$\frac{5\sqrt{7}-10}{5}$ $\frac{6\sqrt{5}-9}{3}$ $\frac{16+8\sqrt{2}}{24}$

Chapter 8 Radicals

In class work: Solve each problem.

Section 8.2
Multiplying, Dividing, and Simplifying Radical

1) Simplify the following:

$\sqrt{90}$

$\sqrt{125}$

$\sqrt{128}$

$\dfrac{\sqrt{200}}{\sqrt{2}}$

$\sqrt{\dfrac{5}{2}}\cdot\sqrt{\dfrac{125}{8}}$

$\dfrac{30\sqrt{10}}{5\sqrt{2}}$

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