5.1 Working with Radicals

Think: A square has an area of 13 cm^2. What is the length of each side?

If we give the side length in exact values (no decimals), it's called a radical.

Mixed radical: Numbers with an integer and a radical number.

ie

$$5\sqrt{3}, -2\sqrt{6}, x\sqrt{3y}$$

Entire Radical: The number is just the radical.

Radicals always need to be in simplified form.

Example 1: Simplify: (Write as a mixed radical)

a.) $\sqrt{24}$

b.) $\sqrt{75}$

c.) $\sqrt{80}$

d.) $\sqrt{162}$

e.) $\sqrt{3x^2}$ State the restriction(s) for the variable(s).

f.) $\sqrt{25x^3}$

g.) $\sqrt{12x^4y^5}$

h.) $\sqrt[3]{24}$

i.) $\sqrt[3]{-108}$

Example 2: Write as an entire radical

a.) $2\sqrt{5}$

b.) $6\sqrt{2}$

c.) $2x\sqrt{7}$

d.) $8x^2y\sqrt{10}$

e.) $4x\sqrt[3]{16}$

Like terms are mixed radicals that have the same radicand.

$3\sqrt{5}$ and $-7\sqrt{5}$

To add these mixed radicals, if the radicand is the same, add or subtract the coefficient (the number in front of the radical sign)

Example 3: Simplify

a.) $3\sqrt{5} - 7\sqrt{5}$

b.) $6\sqrt{2} - 4\sqrt{2} + \sqrt{2}$

c.) $\sqrt{18} - \sqrt{2}$

d.) $4\sqrt{6} + 2\sqrt{10}$

e.) $\sqrt{98} + \sqrt{10} - 5\sqrt{8} - 3\sqrt{40}$

f.) $\sqrt[3]{16} + 5\sqrt[3]{54}$

g.) $\frac{2}{3}\sqrt{11} - \frac{5}{3}\sqrt{11}$