Operations on Radicals Lesson #1: Adding and Subtracting Radicals

Investigation 1

In the last unit we verified that addition of radicals cannot be done by adding the radicands.

In order to develop a rule for adding and subtracting radicals, complete the work below.

a) Use a calculator to investigate which of the following radical statements are true. Circle the statements which are true and place a single line through the expressions which are false.

$$i) \sqrt{2} + 5\sqrt{2} = 6\sqrt{2}$$

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ii) $4\sqrt[3]{5} - 7\sqrt[3]{5} = -3\sqrt[3]{5}$
iv) $7\sqrt{5} + 7\sqrt[3]{5} = 14\sqrt[5]{5}$
v) $\sqrt[3]{3} + \sqrt[3]{2} = \sqrt[3]{5}$

ii)
$$4\sqrt[3]{5} - 7\sqrt[3]{5} = -3\sqrt[3]{5}$$

$$\mathbf{v}) \quad \sqrt[3]{3} + \sqrt[3]{2} = \sqrt[3]{5}$$

iii)
$$5\sqrt{8} - 2\sqrt{8} + 7\sqrt{8} = 10\sqrt{8}$$

b) Use the results in a) to suggest a rule for adding and subtracting radicals.



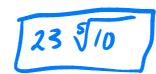
c) Simplify the following. Express the answer as a mixed radical.

i)
$$8\sqrt{7} - 3\sqrt{7} + 15\sqrt{7}$$

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 ii) $18\sqrt[5]{10} + 12\sqrt[5]{10} - 7\sqrt[5]{10}$ iii) $5\sqrt{x} - 4\sqrt{x}$

iii)
$$5\sqrt{x} - 4\sqrt{x}$$







Investigation 2

a) Use a calculator to verify that the following statements are true.

i)
$$\sqrt{2} + \sqrt{8} = 3\sqrt{2}$$

ii)
$$5\sqrt{12} + 6\sqrt{48} = 34\sqrt{3}$$

b) Does this appear to contradict the rule you wrote in Investigation #1 b)?

c) Complete the following by writing each radical in simplest mixed form to show that the rule can be modified.

i)
$$\sqrt{2} + \sqrt{8}$$

ii)
$$5\sqrt{12} + 6\sqrt{48}$$

$$=\sqrt{2}$$
 +

Adding and Subtracting Radicals

In order to add and subtract radicals, they must be able to be expressed as like radicals, i.e. radicals with the SAME radicand and the SAME index.



Class Ex. #2

Write each expression in terms of a single radical.

a) $\sqrt{80} = \sqrt{20}$ b) $\sqrt[3]{80} + \sqrt[3]{20}$

6 × 80 + √ 2/0

c) $7\sqrt{27} - 3\sqrt{75} + 2\sqrt{147}$

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Simplify by combining like radicals.

a)
$$-5\sqrt{108} + \frac{3}{4}\sqrt{8} - \frac{5}{4}\sqrt{48} + \frac{1}{2}\sqrt{50}$$

$$-30\sqrt{3} + \frac{3}{2}\sqrt{2} - 5\sqrt{3} + \frac{5}{2}\sqrt{2}$$

 $= \frac{1}{455} + 452$

b)
$$\frac{\sqrt[3]{64}}{8} + 2\sqrt[3]{375} - \frac{2\sqrt[3]{54}}{3} - \frac{5\sqrt[3]{24}}{2}$$

$$\frac{1}{8}\sqrt[3]{64} + 2\sqrt[3]{25}\sqrt[3]{5} = \frac{2\sqrt[3]{54}}{3} - \frac{5\sqrt[3]{24}}{2}$$

$$\frac{1}{8}\sqrt[3]{64} + 2\sqrt[3]{375} - \frac{2\sqrt[3]{54}}{3} - \frac{5\sqrt[3]{24}}{2}$$

= = = +533 -232

Complete Assignment Questions #1 - #5

#1-6(0,1,0...) +7,9,10