

# Adding & Subtracting Radicals

June-18-18  
8:34 AM

## PRE-CALCULUS 11 ABSOLUTE VALUE & RADICALS ADDING & SUBTRACTING RADICALS

### A. Definitions

1. **radical:** a mathematical symbol representing a root.
2. **like radicals:** terms with the same index and the same radicand.

$$\text{index} \rightarrow \sqrt[3]{6} \quad \& \quad -7\sqrt[3]{6}$$

$\uparrow$   
radicand.

### B. Adding & Subtracting Radicals

1. Simplify the following expressions.

a)  $5\sqrt{6} - 2\sqrt{6}$

$$= \boxed{3\sqrt{6}}$$

b)  $\sqrt{75} + \sqrt{27}$

$$\sqrt{25 \cdot 3} + \sqrt{9 \cdot 3}$$

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

$$= \boxed{8\sqrt{3}}$$

c)  $3\sqrt{8} - 2\sqrt{8} + 6\sqrt{8}$

$$= 7\sqrt{8}$$

$$7\sqrt{4 \cdot 2}$$

$$= \boxed{14\sqrt{2}}$$

- To Solve
- a) You must have like radicals to add or subtract.
  - b) The only parts that gets added or subtracted are the coefficients.
  - c) Simplify the answer if possible

\* Simplify the roots first.

$$d) \quad 3\sqrt{6} + 5\sqrt{3} - 2\sqrt{3} - 5\sqrt{6}$$

$$= \boxed{-2\sqrt{6} + 3\sqrt{3}}$$

Order the roots based on the size of the radicand.

$$e) \quad 2\sqrt{25} + \sqrt{98} + \sqrt{81} - 3\sqrt{72}$$

$$2\sqrt{25} + \sqrt{49} \cdot \sqrt{2} + \sqrt{81} - 3\sqrt{36} \cdot \sqrt{2}$$

$$\textcircled{10} + \textcircled{7\sqrt{2}} + \textcircled{9} - \textcircled{18\sqrt{2}}$$

$$= \boxed{19 - 11\sqrt{2}}$$

Constants are placed ahead of any root.

$$f) \quad \sqrt[3]{128} - \sqrt[3]{16} - \sqrt[3]{54}$$

$$\sqrt[3]{64} \cdot \sqrt[3]{2} - \sqrt[3]{8} \cdot \sqrt[3]{2} - \sqrt[3]{27} \cdot \sqrt[3]{2}$$

$$4\sqrt[3]{2} - 2\sqrt[3]{2} - 3\sqrt[3]{2}$$

$$= \boxed{-\sqrt[3]{2}}$$

$$g) \quad \sqrt[3]{24} + \sqrt{75} + \sqrt[3]{81} + \sqrt{12}$$

$$\sqrt[3]{8} \cdot \sqrt[3]{3} + \sqrt{25} \cdot \sqrt{3} + \sqrt[3]{27} \cdot \sqrt[3]{3} \cdot \sqrt{4} \cdot \sqrt{3}$$

$$\textcircled{2\sqrt[3]{3}} + \textcircled{5\sqrt{3}} + \textcircled{3\sqrt[3]{3}} + \textcircled{2\sqrt{3}}$$

$$= \boxed{5\sqrt[3]{3} + 7\sqrt{3}}$$

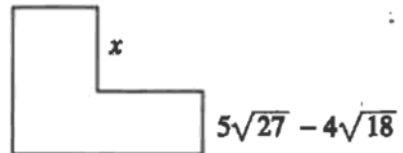
Higher index is placed ahead of lower index.

Assignment: Adding & Subtracting Radicals Assignment #1 - 5

Find the length of  $x$ 

- a) as an exact value  
b) as a decimal to the nearest tenth.

$$8\sqrt{2} + 2\sqrt{12}$$



Complete Assignment Questions #6 - #12

## Assignment

1. Simplify.

a)  $5\sqrt{7} - 2\sqrt{7}$       b)  $\sqrt{3} + 4\sqrt{3}$       c)  $4\sqrt{11} - 9\sqrt{11} + \sqrt{11}$

d)  $4\sqrt{5} - 2\sqrt{2} + 8\sqrt{2}$       e)  $-3\sqrt{2} + 6\sqrt{3} - 9\sqrt{3} + 4\sqrt{2}$

2. Write each expression in terms of a single radical.

a)  $\sqrt{125} - \sqrt{5}$       b)  $\sqrt{27} + \sqrt{12}$       c)  $\sqrt{24} - \sqrt{54} + 2\sqrt{6}$

d)  $\sqrt{150} + \sqrt{216}$       e)  $\sqrt[3]{16} + \sqrt[3]{128}$       f)  $-3\sqrt{175} + 8\sqrt{28} - \sqrt{63}$

g)  $\sqrt[4]{16} + \sqrt[4]{162}$       h)  $2\sqrt{700} - 6\sqrt{63}$       i)  $-7\sqrt[3]{54} - 2\sqrt[3]{250}$

132 Radicals Lesson #5: Adding and Subtracting Radicals

---

3. Simplify by combining like radicals.

a)  $\sqrt{20} + \sqrt{72} - \sqrt{45}$

b)  $\sqrt{27} + \sqrt{12} - \sqrt{32} - \sqrt{8}$

c)  $\sqrt{98} - \sqrt{20} + \sqrt{18}$

d)  $2\sqrt{252} - \sqrt{726} - 5\sqrt{63}$

e)  $-3\sqrt{810} - 6\sqrt{360} + 3\sqrt{1440}$

f)  $12\sqrt{150} - 5\sqrt{54} + 3\sqrt{24}$

g)  $2\sqrt[3]{108} + \sqrt[3]{32} + 3\sqrt[3]{256}$

h)  $8\sqrt{45} + 7\sqrt{243} + \sqrt{507} - \sqrt{169}$

4. Write in simplest radical form.

$$\sqrt[3]{128} + 3\sqrt[3]{375} - 7\sqrt[3]{27} - 2\sqrt[3]{250} - 5\sqrt[3]{432} + 8\sqrt[3]{2000}$$

5. Simplify.

a)  $\frac{1}{3}\sqrt{63} + \frac{2}{5}\sqrt{700} - \frac{2}{3}\sqrt{112} + \frac{3}{2}\sqrt{28}$

b)  $\frac{3\sqrt{200}}{5} + 5\sqrt{20} - \frac{4\sqrt{500}}{5} + \frac{3\sqrt{363}}{11}$

c)  $\frac{7\sqrt[3]{1024}}{2} + \frac{5\sqrt[3]{2000}}{12} - 3\sqrt[3]{686} + \frac{1}{8}\sqrt[3]{128}$

12. When simplified, the expression  $\frac{9}{2}\sqrt[3]{48} + \frac{3}{4}\sqrt[3]{162} - \frac{3}{5}\sqrt[3]{750}$  can be written in the form  $a\sqrt[3]{b}$ . The value of  $a$ , to the nearest hundredth, is \_\_\_\_\_.

(Record your answer in the numerical response box from left to right)

--	--	--	--	--

**Answer Key**

1. a)  $3\sqrt{7}$  b)  $5\sqrt{3}$  c)  $-4\sqrt{11}$  d)  $4\sqrt{5} + 6\sqrt{2}$  e)  $\sqrt{2} - 3\sqrt{3}$

2. a)  $4\sqrt{5}$  b)  $5\sqrt{3}$  c)  $\sqrt{6}$  d)  $11\sqrt{6}$  e)  $6\sqrt[3]{2}$  f)  $-2\sqrt{7}$  g)  $2 + 3\sqrt[4]{2}$

h)  $2\sqrt{7}$  i)  $-31\sqrt[3]{2}$

3. a)  $6\sqrt{2} - \sqrt{5}$  b)  $5\sqrt{3} - 6\sqrt{2}$  c)  $10\sqrt{2} - 2\sqrt{5}$  d)  $-3\sqrt{7} - 11\sqrt{6}$

e)  $-27\sqrt{10}$  f)  $51\sqrt{6}$  g)  $20\sqrt[3]{4}$  h)  $24\sqrt{5} + 76\sqrt{3} - 13$

4.  $15\sqrt[3]{3} + 44\sqrt[3]{2} - 21$

5. a)  $\frac{16}{3}\sqrt{7}$  b)  $6\sqrt{2} + 2\sqrt{5} + 3\sqrt{3}$  c)  $\frac{35}{3}\sqrt[3]{2}$

6. a)  $66\sqrt{5} - 12\sqrt{6}$  b)  $24\sqrt{7} + 15\sqrt{2} + 28$

7.  $7\sqrt{11} - \sqrt{13}$ ,  $4\sqrt{5} + 7\sqrt{6}$

8. A    9. D    10. C    11. 

6	5		
---	---	--	--

12. 

8	.	2	5
---	---	---	---