

Examples 2 in Irrationals in Arithmetic 3

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Examples 2 in Irrationals

0. $\sqrt{4} + \sqrt{9}$

1. $\sqrt{4} + \sqrt{8}$

2. $\sqrt{18} + \sqrt{8}$

3. $\sqrt{45} + \sqrt{20}$

4. $\sqrt{24} + \sqrt{54}$

5. $\sqrt{21} + \sqrt{35}$

6. $\sqrt{150} - \sqrt{24}$

7. $\sqrt{72} - \sqrt{18}$

8. $\sqrt{27} - \sqrt{12}$

9. $\sqrt{18} - \sqrt{162}$

A. $\sqrt{625} - \sqrt{125}$

B. $\sqrt{48} - \sqrt{108}$

C. $\sqrt{242} - \sqrt{338}$

D. $\sqrt{75} - \sqrt{432}$

E. $\sqrt[3]{27} - \sqrt[3]{64}$

F. $\sqrt[3]{250} - \sqrt[3]{432}$

G. $\sqrt[3]{108} - \sqrt[3]{32}$

H. $\sqrt[3]{72} - \sqrt[3]{243}$

I. $\sqrt[3]{-27} - \sqrt[3]{-64}$

J. $\sqrt[3]{-0.008} - \sqrt[3]{1.69}$

K. $\sqrt[3]{1.6} - \sqrt[3]{0.0016}$

L. $\sqrt[3]{270} - \sqrt[3]{-80}$

M. $\sqrt[3]{0.016} - \sqrt[3]{16}$

**Suggestions or Solutions
To the Examples 2 in Irrationals**

$$0. \sqrt{4} + \sqrt{9} = 2 + 3 = 5$$

$$1. \sqrt{4} + \sqrt{8} = 2 + 2\sqrt{2}$$

$$2. \sqrt{18} + \sqrt{8} = \sqrt{9 \cdot 2} + 2\sqrt{2} = 3\sqrt{2} + 2\sqrt{2} = 5\sqrt{2}$$

$$3. \sqrt{45} + \sqrt{20} = \sqrt{9 \cdot 5} + \sqrt{4 \cdot 5} = 3\sqrt{5} + 2\sqrt{5} = 5\sqrt{5}$$

$$4. \sqrt{24} + \sqrt{54} = \sqrt{4 \cdot 6} + \sqrt{6 \cdot 9} = 2\sqrt{6} + 3\sqrt{6} = 5\sqrt{6}$$

$$5. \sqrt{21} + \sqrt{35} = \sqrt{3 \cdot 7} + \sqrt{5 \cdot 7} = \sqrt{3}\sqrt{7} + \sqrt{5}\sqrt{7} = \sqrt{7}(\sqrt{3} + \sqrt{5})$$

Note however, it's just an example where you can see how we can change an expression (without changing its value, of course), so you can just leave $\sqrt{21} + \sqrt{35}$ as is.

$$6. \sqrt{150} - \sqrt{24} = \sqrt{25 \cdot 6} - \sqrt{6 \cdot 4} = 5\sqrt{6} - 2\sqrt{6} = 3\sqrt{6}$$

$$7. \sqrt{72} - \sqrt{18} = \sqrt{36 \cdot 2} - \sqrt{9 \cdot 2} = 6\sqrt{2} - 3\sqrt{2} = 3\sqrt{2} \quad \text{We can put it the way below, too.}$$

$$\sqrt{72} - \sqrt{18} = \sqrt{18 \cdot 4} - \sqrt{18} = 2\sqrt{18} - \sqrt{18} = \sqrt{18} = \sqrt{9 \cdot 2} = 3\sqrt{2}$$

$$8. \sqrt{27} - \sqrt{12} = \sqrt{9 \cdot 3} - \sqrt{4 \cdot 3} = 3\sqrt{3} - 2\sqrt{3} = \sqrt{3}$$

$$9. \sqrt{18} - \sqrt{162} = \sqrt{9 \cdot 2} - \sqrt{81 \cdot 2} = 3\sqrt{2} - 9\sqrt{2} = -6\sqrt{2},$$

$$A. \sqrt{625} - \sqrt{125} = \sqrt{25^2} - \sqrt{25 \cdot 5} = 25 - 5\sqrt{5} = 5(5 - \sqrt{5}) = 5(\sqrt{5}\sqrt{5} - \sqrt{5})$$

$$= 5\sqrt{5}(\sqrt{5} - 1) = 5\sqrt{5}(\sqrt{5} - \frac{\sqrt{5}}{\sqrt{5}}) = 5\sqrt{5}\sqrt{5}(1 - \frac{1}{\sqrt{5}})$$

$$= 25(1 - \frac{1}{\sqrt{5}}) = 25 - \frac{25}{\sqrt{5}} = 25 - \frac{25\sqrt{5}}{\sqrt{5}\sqrt{5}} = 25 - \frac{25\sqrt{5}}{5} = 25 - 5\sqrt{5}$$

$$B. \sqrt{48} - \sqrt{108} = \sqrt{16 \cdot 3} - \sqrt{36 \cdot 3} = 4\sqrt{3} - 6\sqrt{3} = -2\sqrt{3}$$

$$C. \sqrt{242} - \sqrt{338} = \sqrt{121 \cdot 2} - \sqrt{169 \cdot 2} = \sqrt{11^2} \sqrt{2} - \sqrt{13^2} \sqrt{2} = 11\sqrt{2} - 13\sqrt{2} = -2\sqrt{2}$$

$$D. \sqrt{75} - \sqrt{432} = \sqrt{25 \cdot 3} - \sqrt{144 \cdot 3} = 5\sqrt{3} - \sqrt{12^2} \sqrt{3} = -7\sqrt{3}$$

$$E. \sqrt[3]{27} - \sqrt[3]{64} = \sqrt[3]{3^3} - \sqrt[3]{4^3} = 3 - 4 = -1$$

$$F. \sqrt[3]{250} - \sqrt[3]{432} = \sqrt[3]{125 \cdot 2} - \sqrt[3]{216 \cdot 2} = \sqrt[3]{5^3 2} - \sqrt[3]{6^3 2} = 5\sqrt[3]{2} - 6\sqrt[3]{2} = -\sqrt[3]{2}$$

$$G. \sqrt[3]{108} - \sqrt[3]{32} = \sqrt[3]{27 \cdot 4} - \sqrt[3]{8 \cdot 4} = 3\sqrt[3]{4} - 2\sqrt[3]{4} = \sqrt[3]{4}$$

$$H. \sqrt[3]{72} - \sqrt[3]{243} = \sqrt[3]{9 \cdot 8} - \sqrt[3]{27 \cdot 9} = 2\sqrt[3]{9} - 3\sqrt[3]{9} = -\sqrt[3]{9}$$

$$I. \sqrt[3]{-27} - \sqrt[3]{-64} = \sqrt[3]{(-3)^3} - \sqrt[3]{(-4)^3} = -3 - (-4) = 1$$

$$J. \sqrt[3]{-0.008} - \sqrt{1.69} = \sqrt[3]{(-0.2)^3} - \sqrt{(1.3)^2} = -0.2 - 1.3 = -1.5$$

$$\begin{aligned} K. \sqrt[3]{1.6} - \sqrt[3]{0.0016} &= \sqrt[3]{8 \cdot 0.2} - \sqrt[3]{8 \cdot 0.0002} = 2\sqrt[3]{0.2} - \sqrt[3]{0.008} \cdot \sqrt[3]{0.2} \\ &= 2\sqrt[3]{0.2} - 0.2\sqrt[3]{0.2} = 1.8\sqrt[3]{0.2} \end{aligned}$$

$$L. \sqrt[3]{270} - \sqrt[3]{-80} = \sqrt[3]{270} + \sqrt[3]{80} = \sqrt[3]{27 \cdot 10} + \sqrt[3]{8 \cdot 10} = 3\sqrt[3]{10} + 2\sqrt[3]{10} = 5\sqrt[3]{10}$$

$$\begin{aligned} M. \sqrt[3]{0.016} - \sqrt[3]{16} &= \sqrt[3]{0.001 \cdot 16} - \sqrt[3]{16} = \sqrt[3]{0.001} \sqrt[3]{16} - \sqrt[3]{16} = 0.1\sqrt[3]{16} - \sqrt[3]{16} \\ &= (0.1 - 1)\sqrt[3]{16} = -0.9\sqrt[3]{8 \cdot 2} = -1.8\sqrt[3]{2} \end{aligned}$$