

Topic 7: Adding Expressions with Radicals and Rational Exponents

Expressions

Adding Expressions with Radicals and Rational Exponents

Independent Practice

1. Perform the following operations and write the answers in radical form.

$$\sqrt{7} + \sqrt{3} + \sqrt{98} - \sqrt{18}$$

$$\sqrt{7} + \sqrt{3} + \sqrt{49\sqrt{2}} - \sqrt{9\sqrt{2}}$$

$$\sqrt{7} + \sqrt{3} + 7\sqrt{2} - 3\sqrt{2}$$

$$\sqrt{7} + \sqrt{3} + 4\sqrt{2}$$

$$3\sqrt{5} - 3\sqrt{11} + 2\sqrt{121} - 3\sqrt{90}$$

$$3\sqrt{5} - 3\sqrt{11} + 2(11) - 3\sqrt{9}\sqrt{10}$$

$$3\sqrt{5} - 3\sqrt{11} + 22 - 9\sqrt{10}$$

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2. Perform the following operations and write the answers in radical form.

$$8^{\frac{1}{2}} + 16^{\frac{1}{4}} - 12^{\frac{1}{2}} + 81^{\frac{1}{4}}$$

$$\sqrt{8} + \sqrt[4]{16} - \sqrt{12} + \sqrt[4]{81}$$

$$\sqrt{4\sqrt{2}} + 2 - 2\sqrt{3} + 3$$

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

$$(2)^4 = 2 \cdot 2 \cdot 2 \cdot 2 = 16$$

$$(3)^4 = 3 \cdot 3 \cdot 3 \cdot 3 = 81$$

$$8 \cdot 2^{\frac{1}{2}} - 24^{\frac{1}{4}} - 3^{\frac{1}{2}} + 128^{\frac{1}{4}}$$

$$8\sqrt{2} - \sqrt[4]{24} - \sqrt{3} + \sqrt[4]{128}$$

$$8\sqrt{2} - \sqrt[4]{24} - \sqrt{3} + 2\sqrt[4]{8}$$

128 = 16 * 8

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3. Which of the following expressions are equivalent to $7\sqrt{5}$?

$14^{\frac{1}{2}} \cdot 25^{\frac{1}{2}}$ $2\sqrt{14} \cdot \sqrt{25} = 5\sqrt{14}$

$49^{\frac{1}{2}} \cdot 5^{\frac{1}{2}}$ $\sqrt{49} \cdot \sqrt{5} = 7\sqrt{5}$

$\sqrt{70}$ $\sqrt{7}\sqrt{10}$

$\sqrt{155}$ $\sqrt{5}\sqrt{31}$

$\sqrt{7} \cdot \sqrt{5}$

$\frac{\sqrt{196} \cdot \sqrt{5}}{2}$ $\frac{14 \cdot \sqrt{5}}{2} = 7\sqrt{5}$

$\frac{\sqrt{49+25}}{5}$

$\frac{7+5}{5} = \frac{12}{5}$

$\frac{5+55}{31}$

$\frac{14}{2} = \frac{7}{1}$

$7(\sqrt{5})'$

$7 \cdot 5^{\frac{1}{2}}$

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4. Which of the following expressions are equivalent to $4\sqrt{3}$?

$4^{\frac{1}{3}} + 3^{\frac{1}{3}}$ $3\sqrt[3]{4} + \sqrt[3]{3}$

$27^{\frac{1}{2}} + 3^{\frac{1}{2}}$ $\sqrt{27} + \sqrt{3} = \sqrt{9}\sqrt{3} + \sqrt{3} = 3\sqrt{3} + \sqrt{3} = 4\sqrt{3}$

$\sqrt{32}$ $\sqrt{16}\sqrt{2} = 4\sqrt{2}$

$\sqrt{48}$ $\sqrt{16}\sqrt{3} = 4\sqrt{3}$

$2\sqrt{12}$ $2 \cdot \sqrt{4}\sqrt{3} = 2 \cdot 2 \cdot \sqrt{3} = 4\sqrt{3}$

$2\sqrt{18}$ $2 \cdot \sqrt{9}\sqrt{2} = 2 \cdot 3 \cdot \sqrt{2} = 6\sqrt{2}$

$\sqrt{27} + \sqrt{3}$

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

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

$4\sqrt{3}$

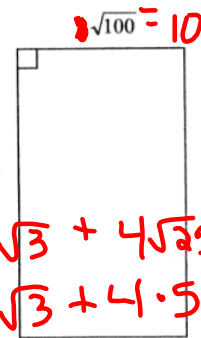
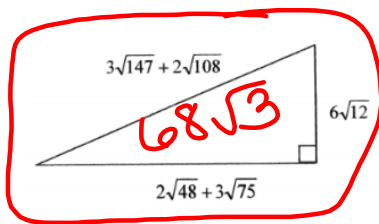
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5. Prove that $\sqrt{8} + \sqrt{2} = 3 \cdot 2^{\frac{1}{2}}$

$$\begin{aligned} & \swarrow \quad \downarrow \\ & \sqrt{4}\sqrt{2} \\ & 2\sqrt{2} + 1\sqrt{2} \\ & 3\sqrt{2} \\ & 3 \cdot (\sqrt{2})^1 = 3 \cdot 2^{\frac{1}{2}} \end{aligned}$$

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6. Find the perimeter of the following figures and circle the figure with the greatest perimeter.



$$\begin{aligned} & 2\sqrt{48} + 4\sqrt{75} \\ & 2\sqrt{16}\sqrt{3} + 4\sqrt{25}\sqrt{3} \\ & 2 \cdot 4 \cdot \sqrt{3} + 4 \cdot 5 \cdot \sqrt{3} \\ & 8\sqrt{3} + 20\sqrt{3} \\ & 28\sqrt{3} \end{aligned}$$

$$\begin{aligned} 2^4 &= 2 \cdot 2 \cdot 2 \cdot 2 = 8 \\ 3^4 &= 3 \cdot 3 \cdot 3 \cdot 3 = 81 \end{aligned}$$

$$\begin{aligned} & 28\sqrt{3} + 28\sqrt{3} + 20 \\ & \underline{\hspace{2cm}} \\ & 56\sqrt{3} + 20 \end{aligned}$$

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$$5^{\frac{1}{2}} \cdot 8^{\frac{1}{2}} \qquad \frac{\sqrt[3]{15}}{\sqrt[3]{3}} = \sqrt{\frac{15}{3}} = \boxed{\sqrt[3]{5}}$$

$$\begin{aligned} & \underbrace{\sqrt{5} \cdot \sqrt{8}} \\ & \sqrt{40} \\ & \sqrt{4} \sqrt{10} \\ & \boxed{2\sqrt{10}} \end{aligned}$$

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$$\frac{5\sqrt{3}}{\sqrt{10}} \cdot \frac{\sqrt{10}}{\sqrt{10}} = \frac{5\sqrt{30}}{\sqrt{100}} = \frac{\cancel{5}\sqrt{30}}{\cancel{10}_2} = \boxed{\frac{\sqrt{30}}{2}}$$

$$\frac{10}{10} = 1$$

$$\frac{5}{10} = \frac{1}{2}$$

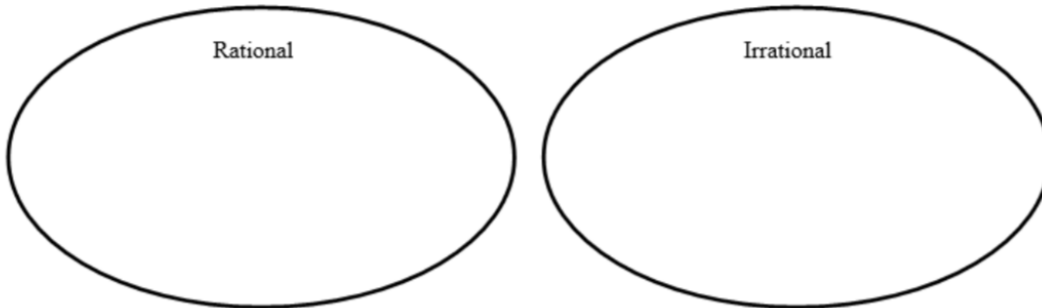
$$\frac{10\sqrt{6}}{\sqrt{15}} \cdot \frac{\sqrt{15}}{\sqrt{15}} = \frac{10\sqrt{90}}{15} = \frac{10 \cdot \sqrt{9} \cdot \sqrt{10}}{15} = \frac{10 \cdot 3 \cdot \sqrt{10}}{15} = \frac{\cancel{30}^2 \sqrt{10}}{\cancel{15}_1} = \boxed{2\sqrt{10}}$$

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Topic 9: Operations with Rational and Irrational Numbers

Sort the numbers into 2 groups, rational or irrational. Write the numbers in the appropriate bubble.

0.8 $\sqrt{64}$ 0 $\sqrt{32}$ -19 $-\sqrt{100}$ 2.343443444...
 $\frac{3}{7}$ $\sqrt{75}$ $6\frac{2}{7}$ $12.\overline{67}$ $\sqrt{121}$ $\frac{12}{5}$ π



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Always, Sometimes or Never True

Provide numerical examples to justify your answer.

The sum of a rational number and an irrational number is irrational	The sum of two rational numbers is rational
The product of a rational number and an irrational number is irrational	The sum of two irrational numbers is irrational
The product of two rational numbers is irrational	The product of two irrational numbers is irrational

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Test Yourself! Practice Tool

Direct your students to the Test Yourself! Practice Tool found at the end of the section. These 10 questions will assess your students' mastery of the topics found in this section. Upon completion, students will see their results along with a video solution for each problem. Students can take the Test Yourself! Practice Tool as many times as they wish, with new problems generated each time. Encourage your students to complete the tool until they reach a 7/10.

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