

Division of Radicals Practice

1. After rationalizing the denominator, the simplified form of $\frac{5}{\sqrt{2}}$ is
A) $\frac{5\sqrt{4}}{2}$ B) $\frac{2\sqrt{2}}{5}$ C) $\frac{5\sqrt{2}}{2}$ D) $\frac{\sqrt{2}}{5}$
2. Divide and simplify $\frac{-27\sqrt{40}}{9\sqrt{2}}$.
A) $-3\sqrt{20}$ B) $-6\sqrt{5}$ C) $-3\sqrt{38}$ D) $-6\sqrt{2}$
3. The radical expression $\frac{4\sqrt{11}}{3\sqrt{22}}$ can be simplified in the form, $\frac{2\sqrt{2}}{k}$. The value of k is ____.
4. Simplify and rationalize the denominator of $\sqrt{\frac{27}{5}}$.
A) $\frac{3\sqrt{15}}{5}$ B) $\frac{15\sqrt{3}}{5}$ C) $\frac{3\sqrt{3}}{\sqrt{5}}$ D) $\frac{5\sqrt{15}}{3}$
5. Which of the following would require the use of a conjugate to rationalize the denominator?
A) $\frac{1+\sqrt{10}}{3\sqrt{2}}$ B) $\frac{-8\sqrt{6}}{3\sqrt{5}}$ C) $\frac{2\sqrt{12}}{\sqrt{3}+4}$ D) $\frac{5\sqrt{2}-\sqrt{3}}{7\sqrt{3}}$

6. Simplify $\frac{6}{3\sqrt{2}} + \frac{\sqrt{5}}{3\sqrt{2}}$.

A) $\sqrt{2} + \sqrt{10}$

B) $\frac{6 + \sqrt{5}}{12}$

C) $\frac{6\sqrt{2} + \sqrt{10}}{12}$

D) $\frac{6\sqrt{2} + \sqrt{10}}{6}$

7. Rationalize the denominator of $\frac{-5\sqrt{3}}{4 + 2\sqrt{2}}$

Use the following information to answer the next question.

A math student was asked to rationalize the denominator for the expression $\frac{4\sqrt{2} - \sqrt{3}}{6\sqrt{6} + \sqrt{2}}$. The student's work is shown below.

| | |
|--------|---|
| Step 1 | $\frac{4\sqrt{2} - \sqrt{3}}{6\sqrt{6} + \sqrt{2}} \times \left(\frac{6\sqrt{6} - \sqrt{2}}{6\sqrt{6} - \sqrt{2}} \right)$ |
| Step 2 | $\frac{24\sqrt{12} - 8 - 6\sqrt{18} + \sqrt{6}}{216 - 4}$ |
| Step 3 | $\frac{24\sqrt{4}\sqrt{3} - 8 - 6\sqrt{9}\sqrt{2} + \sqrt{6}}{212}$ |
| Step 4 | $\frac{48\sqrt{3} - 8 - 18\sqrt{2} + \sqrt{6}}{212}$ |

8. The student made an error. Identify the error and make the correction.

Division of Radicals Practice Solutions

1. After rationalizing the denominator, the simplified form of $\frac{5}{\sqrt{2}}$ is

A) $\frac{5\sqrt{4}}{2}$

B) $\frac{2\sqrt{2}}{5}$

C) $\frac{5\sqrt{2}}{2}$

D) $\frac{\sqrt{2}}{5}$

Solution

Multiply the numerator and the denominator by the square root of 2. Any radical multiplied by itself is **just** the radicand.

$$\frac{5}{\sqrt{2}} \left(\frac{\sqrt{2}}{\sqrt{2}} \right) = \frac{5\sqrt{2}}{2}$$

The correct answer is C.

2. Divide and simplify $\frac{-27\sqrt{40}}{9\sqrt{2}}$.

A) $-3\sqrt{20}$

B) $-6\sqrt{5}$

C) $-3\sqrt{38}$

D) $-6\sqrt{2}$

Solution

Divide the coefficients and divide the radicals separately.

$$\frac{-27\sqrt{40}}{9\sqrt{2}} = -3\sqrt{\frac{40}{2}} = -3\sqrt{20}$$

$$= -3\sqrt{4}\sqrt{5}$$

$$= -6\sqrt{5}$$

The correct answer is B.

3. The radical expression $\frac{4\sqrt{11}}{3\sqrt{22}}$ can be simplified in the form, $\frac{2\sqrt{2}}{k}$. The value of k is 3.

Solution

$$\begin{aligned}\frac{4\sqrt{11}}{3\sqrt{22}} &= \frac{4\sqrt{11}}{3\sqrt{11}\sqrt{2}} \\ &= \frac{4}{3\sqrt{2}}\end{aligned}$$

Multiply the numerator and the denominator by $\sqrt{2}$

$$\begin{aligned}&= \frac{4}{3\sqrt{2}} \left(\frac{\sqrt{2}}{\sqrt{2}} \right) \\ &= \frac{4\sqrt{2}}{6} \\ &= \frac{2\sqrt{2}}{3}\end{aligned}$$

The value of K is 3.

4. Simplify and rationalize the denominator of $\sqrt{\frac{27}{5}}$.

A) $\frac{3\sqrt{15}}{5}$ **Ans**

B) $\frac{15\sqrt{3}}{5}$

C) $\frac{3\sqrt{3}}{\sqrt{5}}$

D) $\frac{5\sqrt{15}}{3}$

Solution

$$\begin{aligned}\sqrt{\frac{27}{5}} &= \frac{\sqrt{27}}{\sqrt{5}} \\ &= \frac{\sqrt{9}\sqrt{3}}{\sqrt{5}}\end{aligned}$$

$$= \frac{3\sqrt{3}}{\sqrt{5}}$$

To rationalize the denominator, multiply the numerator and the denominator by the square root of 5.

$$= \frac{3\sqrt{3}(\sqrt{5})}{\sqrt{5}(\sqrt{5})}$$

$$= \frac{3\sqrt{15}}{5}$$

The correct answer is A.

5. Which of the following would require the use of a conjugate to rationalize the denominator?

A) $\frac{1+\sqrt{10}}{3\sqrt{2}}$

B) $\frac{-8\sqrt{6}}{3\sqrt{5}}$

C) $\frac{2\sqrt{12}}{\sqrt{3}+4}$

D) $\frac{5\sqrt{2}-\sqrt{3}}{7\sqrt{3}}$

Solution

A conjugate is needed when there are two terms in the denominator. The only expression with two terms in the denominator is C.

The correct answer is C.

6. Simplify $\frac{6}{3\sqrt{2}} + \frac{\sqrt{5}}{3\sqrt{2}}$.

A) $\sqrt{2} + \sqrt{10}$

B) $\frac{6+\sqrt{5}}{12}$

C) $\frac{6\sqrt{2}+\sqrt{10}}{12}$

D) $\frac{6\sqrt{2}+\sqrt{10}}{6}$

Solution

Combine the two terms into one term, since the denominator is common.

$$\frac{6}{3\sqrt{2}} + \frac{\sqrt{5}}{3\sqrt{2}} = \frac{6 + \sqrt{5}}{3\sqrt{2}}$$

Multiply the numerator and the denominator by the square root of 2.

$$\frac{6 + \sqrt{5}}{3\sqrt{2}} \left(\frac{\sqrt{2}}{\sqrt{2}} \right)$$

$$= \frac{6\sqrt{2} + \sqrt{10}}{6}$$

The correct answer is D.

7. Rationalize the denominator of $\frac{-5\sqrt{3}}{4 + 2\sqrt{2}}$

Solution

The conjugate of the denominator is $4 - 2\sqrt{2}$.

Multiply the numerator and the denominator by the conjugate.

$$\frac{-5\sqrt{3}}{4 + 2\sqrt{2}} \left(\frac{4 - 2\sqrt{2}}{4 - 2\sqrt{2}} \right)$$

$$= \frac{-20\sqrt{3} + 10\sqrt{6}}{16 - 8}$$

$$= \frac{-20\sqrt{3} + 10\sqrt{6}}{8}$$

$$= \frac{-10\sqrt{3} + 5\sqrt{6}}{4}$$

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8. The student made an error. Identify the error and make the correction.

Solution

The student made the error in step 2. The denominator should be $216 - 2$. Any radical multiplied by itself is **just** the radicand; thus, $\sqrt{2} \times \sqrt{2} = 2$, not 4.

The final answer should be:

$$\frac{48\sqrt{3} - 8 - 18\sqrt{2} + \sqrt{6}}{214}$$