Rationalizing The Denominator – Part 1 Monomial Practice

1. The result of rationalizing the denominator of $\frac{\sqrt{2}}{5\sqrt{13}}$ is

   A) $\frac{\sqrt{26}}{65}$

   B) $\frac{\sqrt{26}}{13}$

   C) $\frac{26}{65}$

   D) $\frac{26}{13}$

Use the following information to answer the next question.

	Radical Expression	Rationalized Denominator
A math student was given 4 radical expressions and asked to rationalize the denominator for each. Analyze the chart below showing the questions and the answers.		
1.	$\frac{9}{\sqrt{2}}$	$\frac{9\sqrt{2}}{4}$
2.	$\frac{12}{\sqrt{7}}$	$\frac{\sqrt{7}}{7}$
3.	$\frac{1}{\sqrt{10}}$	$\frac{\sqrt{10}}{10}$
4.	$\frac{2}{\sqrt{3}}$	$\frac{\sqrt{3}}{3}$

2. The correct rationalization of the denominator is shown in number

   A) 1

   B) 2

   C) 3

   D) 4

3. When rationalizing the denominator of $\frac{1+\sqrt{2}}{\sqrt{5}}$, the result can be written in the form $\frac{\sqrt{5}+\sqrt{K}}{5}$. The value of K is _____.

Use the following information to answer the next question.

Analyze the following work. The task is to rationalize the denominator for $\frac{\sqrt{2}+\sqrt{3}}{3\sqrt{2}}$.

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

The student knows that the original expression, $\frac{\sqrt{2}+\sqrt{3}}{3\sqrt{2}}$ must be equal to their final answer of $\frac{\sqrt{6}}{3}$. But when it was checked,

$$\frac{\sqrt{2}+\sqrt{3}}{3\sqrt{2}} = 0.741\ldots$$

And

$$\frac{\sqrt{6}}{3} = 0.816\ldots.$$

Something is not right.

4. Explain the error and make the correction.

5. Given $\frac{2\sqrt{5}+7}{3\sqrt{6}}\left(\frac{\sqrt{K}}{\sqrt{K}}\right) = \frac{2\sqrt{M}+7\sqrt{K}}{N}$, when rationalizing the denominator, determine the integer values for K, M, and N. Explain.

<u>Rationalizing The Denominator – Part 1 Monomial Practice Solutions</u>

1. The result of rationalizing the denominator of $\frac{\sqrt{2}}{5\sqrt{13}}$ is

    A) $\frac{\sqrt{26}}{65}$ B) $\frac{\sqrt{26}}{13}$ C) $\frac{26}{65}$ D) $\frac{26}{13}$

Solution

In order to remove the root from the denominator, multiply the numerator and the denominator by the radical in the denominator. Any radical multiplied by itself is just the radicand, or the number under the radical sign.

$$\frac{\sqrt{2}}{5\sqrt{13}}\left(\frac{\sqrt{13}}{\sqrt{13}}\right)=\frac{\sqrt{26}}{65}$$

The correct answer is A.

Use the following information to answer the next question.

A math student was given 4 radical expressions and asked to rationalize the denominator for each. Analyze the chart below showing the questions and the answers.

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2. The correct rationalization of the denominator is shown in number

    A) 1   B) 2   C) 3   D) 4

Expression 1

$\frac{9}{\sqrt{2}}\left(\frac{\sqrt{2}}{\sqrt{2}}\right) = \frac{9\sqrt{2}}{2}$, which is not $\frac{9\sqrt{2}}{4}$. Number 1 is not correct.

Expression 2

$\frac{12}{\sqrt{7}}\left(\frac{\sqrt{7}}{\sqrt{7}}\right) = \frac{12\sqrt{7}}{7}$, which is not $\frac{\sqrt{7}}{7}$. Number 2 is not correct.

Expression 3

$\frac{1}{\sqrt{10}}\left(\frac{\sqrt{10}}{\sqrt{10}}\right) = \frac{\sqrt{10}}{10}$, which is correct.

Expression 4

$\frac{2}{\sqrt{3}}\left(\frac{\sqrt{3}}{\sqrt{3}}\right) = \frac{2\sqrt{3}}{3}$, which is not $\frac{\sqrt{3}}{3}$. Number 4 is not correct.

The correct answer is C.

3. When rationalizing the denominator of $\frac{1+\sqrt{2}}{\sqrt{5}}$, the result can be written in the form $\frac{\sqrt{5}+\sqrt{K}}{5}$. The value of K is __10__.

Solution

Multiply the numerator and the denominator by $\sqrt{5}$.

$\frac{1+\sqrt{2}}{\sqrt{5}}\left(\frac{\sqrt{5}}{\sqrt{5}}\right) = \frac{\sqrt{5}+\sqrt{10}}{5}$.

The value of K is 10.

Use the following information to answer the next question.

Analyze the following work. The task is to rationalize the denominator for $\frac{\sqrt{2}+\sqrt{3}}{3\sqrt{2}}$.

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

The student knows that the original expression, $\frac{\sqrt{2}+\sqrt{3}}{3\sqrt{2}}$ must be equal to their final answer of $\frac{\sqrt{6}}{3}$. But when it was checked,

$$\frac{\sqrt{2}+\sqrt{3}}{3\sqrt{2}} = 0.741\ldots$$

And

$$\frac{\sqrt{6}}{3} = 0.816\ldots.$$

Something is not right.

4. Explain the error and make the correction.

Solution

The first step of multiplying the numerator and the denominator by $\sqrt{2}$ is correct. The multiplication in the next step to get $\frac{2+\sqrt{6}}{6}$ is also correct.

The error occurs in the attempt to simplify the expression above. There are 2 terms in the numerator and 1 term in the denominator. In order to simplify, or divide out a common factor, it must be done for all 3 terms in the expression. In this case, a common factor of 2 was divided out of only 2 of the terms. The term $\sqrt{6}$ does not have a common 2 as a factor. Thus, no simplification can be performed at this step.

The final answer is $\frac{2+\sqrt{6}}{6}$.

5. Given $\dfrac{2\sqrt{5}+7}{3\sqrt{6}} \left(\dfrac{\sqrt{K}}{\sqrt{K}}\right) = \dfrac{2\sqrt{M}+7\sqrt{K}}{N}$, when rationalizing the denominator, determine the integer values for K, M, and N. Explain.

Solution

To remove the root from the denominator (in other words rationalize the denominator) the numerator and the denominator must be multiplied by the root in the denominator, or $\sqrt{6}$. Thus K = 6.

Using the distributive property in the numerator, $\sqrt{K}$, or $\sqrt{6}$, needs to be multiplied by both terms. M is determined when $\sqrt{5}$ is multiplied by $\sqrt{6}$. M is the product of these radicands. Thus, M = 30.

The denominator N is the product of $3\sqrt{6}$ and $\sqrt{6}$. Thus N = 18.