Rationalizing The Denominator – Part 2 Practice

1. When rationalizing the denominator for $\frac{8}{3+\sqrt{10}}$, since there is a binomial in the denominator, the numerator and denominator need to be multiplied by the conjugate. In this example, the conjugate is

   A) $3+\sqrt{10}$ B) $3-\sqrt{10}$ C) $\sqrt{10}$ D) $-\sqrt{10}$

2. Which expression below is the correct rationalization of the denominator for $\frac{\sqrt{2}}{\sqrt{2}-1}$?

   A) $\frac{2+\sqrt{2}}{3}$ B) $\frac{2+2\sqrt{2}}{3}$ C) $2+\sqrt{2}$ D) $2+2\sqrt{2}$

3. After rationalizing the denominator of $\frac{9+\sqrt{6}}{\sqrt{8}-2}$, the result can be written in the form $\frac{9\sqrt{2}+9+2\sqrt{K}+\sqrt{6}}{M}$, where K and M are integers. The sum of K and M is ____.

Use the following information to answer the next question.

A math student was asked to rationalize the denominator of $\frac{12}{2\sqrt{6}+\sqrt{3}}$.
Analyze their work below.
Unfortunately, an error was made. The final correct answer can be written in the form $\frac{K\sqrt{6}-4\sqrt{3}}{7}$

Step 1	$\frac{12}{2\sqrt{6}+\sqrt{3}}\left(\frac{\sqrt{6}-\sqrt{3}}{\sqrt{6}-\sqrt{3}}\right)$
Step 2	$\frac{12\sqrt{6}-12\sqrt{3}}{12-3}$
Step 3	$\frac{12\sqrt{6}-12\sqrt{3}}{9}$
Step 4	$\frac{4\sqrt{6}-4\sqrt{3}}{3}$

4. The step where the first error occurred **and** the value of K are

   A) Step 1 and K = 24
   B) Step 1 and K = 8
   C) Step 4 and K = 24
   D) Step 4 and K = 8

5. Show that $\frac{1}{\sqrt{2}} + \frac{\sqrt{2}}{\sqrt{3}-1}$ is equal to $\frac{2\sqrt{2}+\sqrt{6}}{2}$ by

   a) Rationalizing the denominator
   b) Determining their decimal equivalents

6. Rationalizing the denominator for $\frac{2}{\sqrt{x}+1}$ will result in the expression

   A) $\frac{2\sqrt{x}-2}{x-1}$

   B) $\frac{2\sqrt{x}-1}{x-1}$

   C) $\frac{2\sqrt{x}-1}{x^2-1}$

   D) $\frac{2\sqrt{x}-2}{x^2-1}$

Rationalizing The Denominator – Part 2 Practice Solutions

1. When rationalizing the denominator for $\frac{8}{3+\sqrt{10}}$, since there is a binomial in the denominator, the numerator and denominator need to be multiplied by the conjugate. In this example, the conjugate is

$A)\ 3+\sqrt{10}$ B) $3-\sqrt{10}$ C) $\sqrt{10}$ D) $-\sqrt{10}$

Solution

Two binomials are conjugates if the terms are identical except one binomial has an addition sign and the other binomial has a subtraction sign.

The correct answer is B.

2. Which expression below is the correct rationalization of the denominator for $\frac{\sqrt{2}}{\sqrt{2}-1}$?

$A)\ \frac{2+\sqrt{2}}{3}$ B) $\frac{2+2\sqrt{2}}{3}$ C) $2+\sqrt{2}$ D) $2+2\sqrt{2}$

Solution

Multiply the numerator and the denominator by the conjugate of the denominator.

$$\frac{\sqrt{2}}{\sqrt{2}-1}\left(\frac{\sqrt{2}+1}{\sqrt{2}+1}\right)=\frac{2+\sqrt{2}}{2-1}=2+\sqrt{2}$$

The correct answer is C.

3. After rationalizing the denominator of $\frac{9+\sqrt{6}}{\sqrt{8}-2}$, the result can be written in the form $\frac{9\sqrt{2}+9+2\sqrt{K}+\sqrt{6}}{M}$, where K and M are integers. The sum of K and M is __5__.

Solution

$$\frac{9+\sqrt{6}}{\sqrt{8}-2}\left(\frac{\sqrt{8}+2}{\sqrt{8}+2}\right)=\frac{9\sqrt{8}+18+\sqrt{48}+2\sqrt{6}}{4}$$

Simplify $\sqrt{8}$ and $\sqrt{48}$, since they both have perfect square factors.

$$\sqrt{8}=(\sqrt{4})(\sqrt{2}), which\ is\ equal\ to\ 2\sqrt{2}$$

$$\sqrt{48}=(\sqrt{16})(\sqrt{3}), which\ is\ equal\ to\ 4\sqrt{3}$$

Now substitute these equivalent values.

$$\frac{9(2\sqrt{2})+18+(4\sqrt{3})+2\sqrt{6}}{4}$$

=

$$\frac{18\sqrt{2}+18+4\sqrt{3}+2\sqrt{6}}{4}$$

Divide a common 2 from each term.

=

$$\frac{9\sqrt{2}+9+2\sqrt{3}+\sqrt{6}}{2}$$

K = 3 and M = 2

The sum of K and M is 5.

Use the following information to answer the next question.

A math student was asked to rationalize the denominator of $\frac{12}{2\sqrt{6}+\sqrt{3}}$.

Analyze their work below.

Unfortunately, an error was made. The final correct answer can be written in the form $\frac{K\sqrt{6}-4\sqrt{3}}{7}$

Step 1	$\frac{12}{2\sqrt{6}+\sqrt{3}}\left(\frac{\sqrt{6}-\sqrt{3}}{\sqrt{6}-\sqrt{3}}\right)$
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Step 3	$\frac{12\sqrt{6}-12\sqrt{3}}{9}$
Step 4	$\frac{4\sqrt{6}-4\sqrt{3}}{3}$

4. The step where the first error occurred **and** the value of K are

A) Step 1 and K = 24
B) Step 1 and K = 8
C) Step 4 and K = 24
D) Step 4 and K = 8

Solution

There is an error in step 1. The conjugate should be $2\sqrt{6}-\sqrt{3}$.

The correction is made, and the process continues below.

$$\frac{12}{2\sqrt{6}+\sqrt{3}}\left(\frac{2\sqrt{6}-\sqrt{3}}{2\sqrt{6}-\sqrt{3}}\right)=\frac{24\sqrt{6}-12\sqrt{3}}{24-3}=\frac{24\sqrt{6}-12\sqrt{3}}{21}=\frac{8\sqrt{6}-4\sqrt{3}}{7}$$

K = 8.

The correct answer is B.

5. Show that $\frac{1}{\sqrt{2}}+\frac{\sqrt{2}}{\sqrt{3}-1}$ is equal to $\frac{2\sqrt{2}+\sqrt{6}}{2}$ by

   a) Rationalizing the denominator
   b) Determining their decimal equivalents

Solution

a) Rationalize the denominator of each term separately.

$$\frac{1}{\sqrt{2}}\left(\frac{\sqrt{2}}{\sqrt{2}}\right)=\frac{\sqrt{2}}{2}$$

$$\frac{\sqrt{2}}{\sqrt{3}-1}\left(\frac{\sqrt{3}+1}{\sqrt{3}+1}\right)=\frac{\sqrt{6}+\sqrt{2}}{2}$$

Now add.

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

b) The decimal equivalent for $\frac{1}{\sqrt{2}}+\frac{\sqrt{2}}{\sqrt{3}-1}$ is 2.638…

The decimal equivalent for $\frac{2\sqrt{2}+\sqrt{6}}{2}$ is 2.638…

6. Rationalizing the denominator for $\frac{2}{\sqrt{x}+1}$ will result in the expression

$A)\ \frac{2\sqrt{x}-2}{x-1}$

$B)\ \frac{2\sqrt{x}-1}{x-1}$

$C)\ \frac{2\sqrt{x}-1}{x^2-1}$

$D)\ \frac{2\sqrt{x}-2}{x^2-1}$

Solution

$$\frac{2}{\sqrt{x}+1}\left(\frac{\sqrt{x}-1}{\sqrt{x}-1}\right)=\frac{2\sqrt{x}-2}{x-1}$$

The correct answer is A.