Pre-Calculus 11 - VLN

Chapter 5: Radicals

Lesson 6: Simplifying Radicals Part 2 (Rationalizing The Denominator)

Question #1

Reference Q.20360

A student rationalized the denominator of $\frac{\sqrt{3}}{3\sqrt{7}}$ using two different methods. Their first steps are below. Continue from each of these steps and simplify the expression.

a. $= \frac{\sqrt{3}}{3\sqrt{7}} \times \frac{\sqrt{7}}{\sqrt{7}}$

b. $= \frac{\sqrt{3}}{3\sqrt{7}} \times \frac{3\sqrt{7}}{3\sqrt{7}}$

c. Which method required less steps? Explain why.

Question #2

Reference Q.13202

Simplify by rationalizing the denominator.

a. $\frac{1}{\sqrt{2}}$

b. $\frac{6}{\sqrt{6}}$

c. $\frac{\sqrt{5}}{\sqrt{3}}$

d. $\frac{\sqrt{3}}{-\sqrt{2}}$

e. $\frac{\sqrt{10}}{\sqrt{7}}$

f. $\frac{\sqrt{12}}{\sqrt{5}}$

g. $\frac{2}{5\sqrt{6}}$

h. $\frac{\sqrt{32}}{\sqrt{18}}$

i. $\frac{5}{\sqrt{50}}$

j. $\frac{14}{\sqrt{98}}$

k. $\frac{-2}{\sqrt{88}}$

l. $\frac{3\sqrt{500}}{-\sqrt{27}}$

Question #3

Reference Q.13198
Simplify.

a. $\dfrac{\sqrt{50}}{\sqrt{5}}$

b. $\dfrac{\sqrt{35}}{\sqrt{7}}$

c. $\dfrac{\sqrt[3]{39}}{\sqrt[3]{3}}$

d. $\dfrac{\sqrt{28}}{\sqrt{7}}$

e. $\dfrac{\sqrt{ab}}{\sqrt{b}}$

f. $\dfrac{8\sqrt{42}}{2\sqrt{6}}$

g. $\dfrac{25\sqrt{88}}{5\sqrt{8}}$

h. $\dfrac{12\sqrt[4]{51}}{-6\sqrt[4]{17}}$

i. $\dfrac{4\sqrt{50}}{8\sqrt{10}}$

j. $\dfrac{6\sqrt{xy^2}}{15\sqrt{xy}}$

Question #4

Reference Q.13199
Simplify.

a. $\dfrac{\sqrt{270}}{\sqrt{10}}$

b. $\dfrac{\sqrt{90}}{\sqrt{5}}$

c. $\dfrac{\sqrt{96}}{4\sqrt{3}}$

d. $\dfrac{3\sqrt{200}}{2\sqrt{5}}$

e. $\dfrac{4\sqrt[3]{144}}{\sqrt[3]{9}}$

Question #5

Reference Q.13200
Simplify.

a. $\dfrac{2\sqrt{150}}{\sqrt{8}}$

b. $\dfrac{4\sqrt{90}}{\sqrt{72}}$

c. $\dfrac{3\sqrt{240}}{\sqrt{108}}$

d. $\dfrac{18\sqrt{24}}{\sqrt{162}}$

e. $\dfrac{3\sqrt[3]{32}}{2\sqrt[3]{216}}$

Question #6

Reference Q.13203
Simplify.

a. $\sqrt{\dfrac{27}{10}}$

b. $\dfrac{5\sqrt{14}}{\sqrt{70}}$

c. $\sqrt{\dfrac{243}{2}}$

d. $\dfrac{20\sqrt{12}}{12\sqrt{20}}$

Question #7

Reference Q.13205
Express the following with rational denominators.

a. $\dfrac{\sqrt{7}-\sqrt{2}}{\sqrt{2}}$

b. $\dfrac{\sqrt{3}+2\sqrt{2}}{2\sqrt{3}}$

c. $\dfrac{\sqrt{5}+\sqrt{2}}{\sqrt{6}}$

Question #8

Reference Q.13201

Simplify.

a. $\dfrac{\sqrt{35}-\sqrt{21}}{\sqrt{7}}$

b. $\dfrac{9\sqrt{20}-3\sqrt{10}}{3\sqrt{2}}$

c. $\dfrac{8\sqrt{42}+12\sqrt{75}}{4\sqrt{3}}$

d. $\dfrac{8\sqrt{20}+10\sqrt{125}}{2\sqrt{5}}$

e. $\dfrac{\sqrt{75}+\sqrt{48}-\sqrt{27}}{\sqrt{3}}$

f. $\dfrac{\sqrt{90}+2\sqrt{40}-\sqrt{160}}{\sqrt{5}}$

Question #9

Reference Q.13209

Simplify and express in lowest terms.

a. $\dfrac{10\sqrt{18}-5\sqrt{24}}{\sqrt{5}}$

b. $\dfrac{15\sqrt{18}-3\sqrt{242}}{-3\sqrt{8}}$

Question #10

Reference Q.13207

a. Students are asked to simplify the radical expression $\dfrac{6\sqrt{40}-8\sqrt{20}}{2\sqrt{5}}$. Erica decides to simplify the expression by rationalizing the denominator, whereas Jaclyn divides each term in the numerator by the denominator. Determine the simplification by each method, and state which method you prefer.

b. Without doing the simplification, explain why Jaclyn's method would be more difficult if the radical expression was $\dfrac{6\sqrt{40}-8\sqrt{20}}{2\sqrt{7}}$.

Question #11

Reference Q.13210

A rectangular garden has length $3\sqrt{6}$ meters and area $(9\sqrt{2}-6\sqrt{3})$ square meters.

a. Write and simplify an expression for the width of the garden.

b. Determine the perimeter of the garden to the nearest tenth of a meter.

Question #12

Reference Q.13211

A triangle has an area of $(3\sqrt{288}-2\sqrt{12})$ square metres with a base of $3\sqrt{2}$ metres. Express the height of the triangle

a. as an exact value in simplest form.

b. as a decimal to the nearest 0.01 m.

Question #13

Reference Q.13214

If $\dfrac{\sqrt{10}\times\sqrt{12}}{\sqrt{6}}=2\sqrt{t},$ then t is equal to

A. $\sqrt{5}$
B. $\sqrt{10}$
C. 5
D. 10

Question #14

Reference Q.13215

The expression $\dfrac{1}{\sqrt{27}}-\dfrac{5\sqrt{3}}{4\sqrt{24}}$ can be written in the form $a\sqrt{3}-b\sqrt{2}, a, b>0.$ To the nearest hundredth, the value of b is ____.

Question #15

Reference Q.13216

When the equation $\sqrt{2}+a\sqrt{5}=\sqrt{72}$ is solved for a, the solution is $a=\sqrt{t},$ where $t\in W.$ The value of t is ____.

Question #16

Reference Q.13204
Simplify by rationalizing the denominator.

a. $\dfrac{4}{\sqrt{5}-1}$

b. $\dfrac{1}{\sqrt{6}+2}$

c. $\dfrac{3}{3-\sqrt{3}}$

d. $\dfrac{\sqrt{7}}{\sqrt{7}-2}$

e. $\dfrac{3}{\sqrt{2}-\sqrt{3}}$

f. $\dfrac{\sqrt{2}}{\sqrt{6}+\sqrt{2}}$

Question #17

Reference Q.13206
Simplify by rationalizing the denominator.

a. $\dfrac{2\sqrt{3}}{3\sqrt{2}+\sqrt{3}}$

b. $\dfrac{3\sqrt{11}}{3\sqrt{11}+10}$

c. $\dfrac{\sqrt{2}}{\sqrt{12}-\sqrt{8}}$

d. $\dfrac{\sqrt{7}}{4-\sqrt{14}}$

Question #18

Reference Q.13208
Simplify, leaving an integer denominator.

a. $\dfrac{\sqrt{3}-1}{\sqrt{3}+1}$

b. $\dfrac{\sqrt{5}-2}{\sqrt{5}-1}$

c. $\dfrac{\sqrt{6}+\sqrt{2}}{\sqrt{6}-\sqrt{2}}$

d. $\dfrac{5-\sqrt{10}}{3+\sqrt{10}}$

Question #19

Reference Q.13225
Simplify, leaving a whole number in the denominator.

a. $\dfrac{\sqrt{11}+5\sqrt{2}}{\sqrt{11}-2\sqrt{2}}$

b. $\dfrac{2\sqrt{6}-\sqrt{3}}{3\sqrt{3}+\sqrt{6}}$

c. $\dfrac{\sqrt{30}+3\sqrt{3}}{\sqrt{30}-3\sqrt{3}}$

d. $\dfrac{3\sqrt{5}-2\sqrt{3}}{3\sqrt{5}+2\sqrt{3}}$

Question #20

Reference Q.13242
Simplify by rationalizing the denominator.

a. $\dfrac{3}{2\sqrt{x}+3}$

b. $\dfrac{x+\sqrt{10}}{x-\sqrt{10}}$

c. $\dfrac{\sqrt{k}+\sqrt{2}}{\sqrt{k}-\sqrt{2}}$

Question #21

Reference Q.13243

The area of a rectangle is $5\ \mathrm{m}^2$ and the length is $3+\sqrt{3}\ \mathrm{m}.$ Calculate the width of the rectangle, expressing the answer

a. as an exact value with a whole number in the denominator

b. as a decimal to the nearest hundredth

Question #22

Reference Q.13244

A triangle has area $(2\sqrt{15}-3\sqrt{6})$ square units and base $(\sqrt{15}+\sqrt{6})$ units.
Determine the exact value of the height of the triangle, giving the answer with a rational denominator.

Question #23

Reference Q.13245

The fraction $\dfrac{2}{\sqrt{5}-\sqrt{3}}$ expressed with a rational denominator is

A. $\dfrac{\sqrt{5}+\sqrt{3}}{4}$
B. $\dfrac{\sqrt{5}+\sqrt{3}}{8}$
C. $\sqrt{5}+\sqrt{3}$
D. $\dfrac{2\sqrt{5}+\sqrt{3}}{2}$

Question #24

Reference Q.13246

When $\dfrac{1}{2(2+\sqrt{3})}$ is expressed with a rational denominator, the result is

A. $\dfrac{2-\sqrt{3}}{2}$
B. $\dfrac{2-\sqrt{3}}{-1}$
C. $\dfrac{2-\sqrt{3}}{14}$
D. $\dfrac{2-\sqrt{3}}{-10}$

Question #25

Reference Q.13248

$\dfrac{p}{q-\sqrt{r}},$ expressed with a rational denominator, may be written as

A. $\dfrac{p}{q^2-r}$
B. $\dfrac{p(q+\sqrt{r})}{q^2-r^2}$
C. $\dfrac{p(q+\sqrt{r})}{q^2-r}$
D. $\dfrac{p(q-\sqrt{r})}{q^2+r}$

Question #26

Reference Q.13249

When the denominator is rationalized, $\dfrac{\sqrt{10}-\sqrt{2}}{\sqrt{10}+\sqrt{2}}$ can be expressed in the form $a-b\sqrt{5},$ where $a, b \in Q.$ The value of $a+b,$ to the nearest tenth, is _____.

Question #27

Reference Q.13247

$\dfrac{3\sqrt{5}+\sqrt{3}}{2\sqrt{5}+\sqrt{3}},$ expressed with a rational denominator in simplest form, is

A. $\dfrac{33+5\sqrt{15}}{23}$
B. $\dfrac{33+5\sqrt{15}}{17}$
C. $\dfrac{27-\sqrt{15}}{23}$
D. $\dfrac{27-\sqrt{15}}{17}$