Hoja de ejercicios - Operaciones con radicales

Enunciados

1. Simplifica y calcula si es posible las siguientes raíces:

   (a) $\sqrt[3]{8}$
   (b) $\sqrt[3]{-1}$
   (c) $\sqrt[3]{-8}$
   (d) $\sqrt[3]{0,125}$
   (e) $\sqrt[3]{0,027}$
   (f) $\sqrt[4]{81}$
   (g) $\sqrt[3]{\frac{27}{64}}$
   (h) $\sqrt[4]{\frac{81}{16}}$
   (i) $\sqrt[5]{3^{15}}$

   Ir a solución

2. Simplifica las siguientes raíces:

   (a) $\sqrt[4]{3^2}$
   (b) $\sqrt[8]{5^4}$
   (c) $\sqrt[9]{27}$
   (d) $\sqrt[6]{5^3}$
   (e) $\sqrt[8]{(x^2 \cdot y^2)^2}$
   (f) $\sqrt[15]{2^{12}}$
   (g) $\sqrt[6]{8}$
   (h) $\sqrt[12]{x^8}$
   (i) $\sqrt[10]{a^8}$
   (j) $\sqrt[12]{x^4 \cdot y^8 \cdot z^4}$

   Ir a solución

3. Escribe los siguientes radicales con índice común

   (a) $\sqrt{5}$, $\sqrt[5]{2^3}$, $\sqrt[15]{7^2}$
   (b) $\sqrt[3]{5}$, $\sqrt[5]{7^3}$, $\sqrt[15]{3^2}$
   (c) $\sqrt[4]{3}$, $\sqrt[6]{16}$, $\sqrt[15]{9}$
   (d) $\sqrt[4]{31}$, $\sqrt[9]{13}$

   Ir a solución

4. Realiza las siguientes multiplicaciones, expresando el resultado con un sólo radical

   (a) $\sqrt{2} \cdot \sqrt[3]{32}$
   (b) $\sqrt[3]{2} \cdot \sqrt[4]{8}$
   (c) $\sqrt[3]{2} \cdot \sqrt[5]{2}$
   (d) $\sqrt[3]{2^2} \cdot \sqrt[4]{2}$
   (e) $\sqrt[3]{2^2} \cdot \sqrt{2} \cdot \sqrt[4]{8}$
   (f) $\sqrt[3]{a^2} \cdot \sqrt[6]{a^5}$

   Ir a solución

5. Opera y simplifica las siguientes expresiones con radicales

   (a) $\frac{\sqrt{32}}{\sqrt{2}}$
   (b) $\frac{\sqrt{8}}{\sqrt{2}}$
   (c) $\frac{\sqrt{15}}{\sqrt{3}}$
   (d) $\frac{\sqrt[3]{16}}{\sqrt[3]{2}}$
   (e) $\frac{\sqrt{8}}{\sqrt[4]{2}}$
   (f) $\frac{\sqrt[3]{7^2}}{\sqrt{7}}$
   (g) $\frac{\sqrt[3]{9}}{\sqrt[6]{3}}$
   (h) $\frac{\sqrt{9}}{\sqrt[3]{3}}$
   (i) $\frac{\sqrt[3]{16}}{\sqrt[3]{2}}$
   (j) $\frac{\sqrt[4]{4}}{\sqrt[6]{8}}$
   (k) $\frac{\sqrt{ab}}{\sqrt[3]{ab}}$

   Ir a solución

6. Opera y simplifica las siguientes expresiones con radicales. Racionaliza si es necesario.

(a) $(2\sqrt{5}-3\sqrt{2})^2+(2\sqrt{5}+3\sqrt{2})^2$

(b) $12\sqrt[3]{16}-\frac{3}{5}\sqrt[3]{128}$

(c) $\frac{\sqrt{24}\cdot\sqrt[5]{14}}{\sqrt{6}\cdot\sqrt[5]{7}}$

(d) $\frac{1}{3}\sqrt{125}-\frac{1}{3}\sqrt{180}-\frac{3}{2}\sqrt{5}-\frac{1}{5}\sqrt{80}$

(e) $(2\sqrt{5}-\sqrt{2})^2-(4\sqrt{6}+\sqrt{2})^2$

(f) $4\sqrt{8}-7\sqrt{50}+\frac{8}{3}\sqrt{18}+\frac{5}{2}\sqrt{98}$

(g) $\frac{\sqrt{10}\cdot\sqrt[4]{8}}{\sqrt{15}\cdot\sqrt[4]{125}}$

(h) $\sqrt{\frac{98}{7}}+2\sqrt{56}-5\sqrt{126}-\sqrt[4]{196}$

Ir a solución

7. Racionaliza, opera y simplifica las siguientes expresiones con radicales

(a) $\frac{5}{\sqrt{7}}$

(b) $\frac{3}{\sqrt{2}\sqrt{11}}$

(c) $\frac{12}{\sqrt[6]{13}}$

(d) $\frac{1+\sqrt{2}}{\sqrt[3]{5}\sqrt[7]{11}}$

(e) $\frac{5}{3-\sqrt{11}}$

(f) $\frac{2}{\sqrt[5]{27}(\sqrt{3}+\sqrt{11})}$

(g) $\frac{\sqrt{8}-2}{\sqrt{8}+\sqrt{3}}+\frac{3}{\sqrt{3}}$

(h) $\frac{\sqrt{2}-\sqrt{3}}{\sqrt{2}+\sqrt{3}}-\frac{2}{\sqrt{6}}$

Ir a solución

Soluciones

1. Simplifica y calcula si es posible las siguientes raíces:

(a) $\sqrt[3]{8} = \sqrt[3]{2^3} = 2$

(b) $\sqrt[3]{-1} = -1$

(c) $\sqrt[3]{-8} = \sqrt{-2^3} = \sqrt{(-2)^3} = -2$

(d) $\sqrt[3]{0,125} = \sqrt[3]{\frac{125}{1000}} = \sqrt[3]{\frac{5^3}{10^3}} = \sqrt[3]{\left(\frac{5}{10}\right)^3} = \frac{5}{10} = \frac{1}{2}$

(e) $\sqrt[3]{0,027} = \sqrt[3]{\frac{27}{1000}} = \sqrt[3]{\frac{3^3}{10^3}} = \sqrt[3]{\left(\frac{3}{10}\right)^3} = \frac{3}{10}$

(f) $\sqrt[4]{81} = \sqrt[4]{3^4} = 3$

(g) $\sqrt[3]{\frac{27}{64}} = \sqrt[3]{\frac{3^3}{2^6}} = \frac{\sqrt[3]{3^3}}{\sqrt[3]{2^6}} = \frac{3}{2^{\frac{6}{3}}} = \frac{3}{2^2} = \frac{3}{4}$

(h) $\sqrt[4]{\frac{81}{16}} = \sqrt[4]{\frac{3^4}{2^4}} = \sqrt[4]{\left(\frac{3}{2}\right)^4} = \frac{3}{2}$

(i) $\sqrt[5]{3^{15}} = 3^{\frac{15}{5}} = 3^3$

Volver al enunciado

2. Simplifica las siguientes raíces:

(a) $\sqrt[4]{3^2} = 3^{\frac{2}{4}} = 3^{\frac{1}{2}} = \sqrt{3}$

(b) $\sqrt[8]{5^4} = 5^{\frac{4}{8}} = 5^{\frac{1}{2}} = \sqrt{5}$

(c) $\sqrt[9]{27} = \sqrt[9]{3^3} = (3^3)^{\frac{1}{9}} = 3^{\frac{3}{9}} = 3^{\frac{1}{3}} = \sqrt[3]{3}$

(d) $\sqrt[6]{5^3} = 5^{\frac{3}{6}} = 5^{\frac{1}{2}} = \sqrt{5}$

(e) $\sqrt[8]{(x^2 \cdot y^2)^2} = \left[(x^2 \cdot y^2)^2\right]^{\frac{1}{8}} = x^{\frac{4}{8}} y^{\frac{4}{8}} = x^{\frac{1}{2}} y^{\frac{1}{2}} = \sqrt{xy}$

(f) $\sqrt[15]{2^{12}} = 2^{\frac{12}{15}} = 2^{\frac{4}{5}} = \sqrt[5]{2^4}$

(g) $\sqrt[6]{8} = \sqrt[6]{2^3} = 2^{\frac{3}{6}} = 2^{\frac{1}{2}} = \sqrt{2}$

(h) $\sqrt[12]{x^8} = x^{\frac{8}{12}} = x^{\frac{2}{3}} = \sqrt[3]{x^2}$

(i) $\sqrt[10]{a^8} = a^{\frac{8}{10}} = a^{\frac{4}{5}} = \sqrt[5]{a^4}$

(j) $\sqrt[12]{x^4 \cdot y^8 \cdot z^4} = \left(x^4 \cdot y^8 \cdot z^4\right)^{\frac{1}{12}} = x^{\frac{4}{12}} \cdot y^{\frac{8}{12}} \cdot z^{\frac{4}{12}} = x^{\frac{1}{3}} \cdot y^{\frac{2}{3}} \cdot z^{\frac{1}{3}} = \sqrt[3]{xy^2z}$

Volver al enunciado

3. **Escribe los siguientes radicales con índice común**

Para hacer lo que nos piden lo más fácil es trabajar con potencias fraccionarias, de modo que encontrar un índice común para todos los radicales es equivalente a poner todas las fracciones con igual denominador.

(a) $\sqrt{5},\ \sqrt[5]{2^3},\ \sqrt[15]{7^2}$

$$\sqrt[30]{5^{15}},\ \sqrt[30]{2^{18}},\ \sqrt[30]{7^4}$$

(b) $\sqrt[3]{5},\ \sqrt[5]{7^3},\ \sqrt[15]{3^2}$

$$\sqrt[15]{5^5},\ \sqrt[15]{7^9},\ \sqrt[15]{3^2}$$

(c) $\sqrt[4]{3},\ \sqrt[6]{16},\ \sqrt[15]{9}$

$$\sqrt[60]{3^{15}},\ \sqrt[60]{2^{40}},\ \sqrt[60]{3^8}$$

(d) $\sqrt[4]{31},\ \sqrt[9]{13}$

$$\sqrt[36]{31^9},\ \sqrt[36]{13^4}$$

Volver al enunciado

4. **Realiza las siguientes multiplicaciones, expresando el resultado con un sólo radical**

(a) $\sqrt{2}\cdot\sqrt[3]{32} = 2^{\frac{1}{2}}\cdot 2^{\frac{5}{3}} = 2^{\frac{1}{2}+\frac{5}{3}} = 2^{\frac{3}{6}+\frac{10}{6}} = 2^{\frac{13}{6}} = 2^{2+\frac{1}{6}} = 2^2\cdot 2^{\frac{1}{6}} = 4\sqrt[6]{2}$

(b) $\sqrt[3]{2}\cdot\sqrt[4]{8} = 2^{\frac{1}{3}}\cdot 2^{\frac{3}{4}} = 2^{\frac{1}{3}+\frac{3}{4}} = 2^{\frac{4}{12}+\frac{9}{12}} = 2^{\frac{13}{12}} = 2^{1+\frac{1}{12}} = 2\cdot 2^{\frac{1}{12}} = 2\sqrt[12]{2}$

(c) $\sqrt[3]{2}\cdot\sqrt[5]{2} = 2^{\frac{1}{2}}\cdot 2^{\frac{1}{2}} = 2^{\frac{1}{3}+\frac{1}{5}} = 2^{\frac{5}{15}+\frac{3}{15}} = 2^{\frac{8}{15}} = \sqrt[15]{2^8}$

(d) $\sqrt[3]{2^2}\cdot\sqrt[4]{2} = 2^{\frac{2}{3}}\cdot 2^{\frac{1}{4}} = 2^{\frac{2}{3}+\frac{1}{4}} = 2^{\frac{8}{12}+\frac{3}{12}} = 2^{\frac{11}{12}} = \sqrt[12]{2^{11}}$

(e) $\sqrt[3]{2^2}\cdot\sqrt{2}\cdot\sqrt[4]{8} = 2^{\frac{2}{3}}\cdot 2^{\frac{1}{2}}\cdot 2^{\frac{3}{4}} = 2^{\frac{2}{3}+\frac{1}{2}+\frac{3}{4}} = 2^{\frac{8}{12}+\frac{6}{12}+\frac{9}{12}} = 2^{\frac{23}{12}} = 2^{1+\frac{11}{12}} = 2\cdot 2^{\frac{11}{12}} = 2\sqrt[12]{2^{11}}$

(f) $\sqrt[3]{a^2}\cdot\sqrt[6]{a^5} = a^{\frac{2}{3}}\cdot a^{\frac{5}{6}} = a^{\frac{2}{3}+\frac{5}{6}} = a^{\frac{4}{6}+\frac{5}{6}} = a^{\frac{9}{6}} = a^{\frac{3}{2}} = a^{1+\frac{1}{2}} = a\cdot a^{\frac{1}{2}} = a\sqrt{a}$

Volver al enunciado

5. Opera y simplifica las siguientes expresiones con radicales

(a) $\dfrac{\sqrt{32}}{\sqrt{2}} = \dfrac{\sqrt{2^5}}{\sqrt{2}} = \dfrac{2^{\frac{5}{2}}}{2^{\frac{1}{2}}} = 2^{\frac{5}{2}-\frac{1}{2}} = 2^{\frac{4}{2}} = 2^2 = 4$

(b) $\dfrac{\sqrt{8}}{\sqrt{2}} = \dfrac{\sqrt{2^3}}{\sqrt{2}} = \dfrac{2^{\frac{3}{2}}}{2^{\frac{1}{2}}} = 2^{\frac{3}{2}-\frac{1}{2}} = 2^{\frac{2}{2}} = 2$

(c) $\dfrac{\sqrt{15}}{\sqrt{3}} = \dfrac{\sqrt{5\cdot 3}}{\sqrt{3}} = \dfrac{\sqrt{5}\sqrt{3}}{\sqrt{3}} = \sqrt{5}$

(d) $\dfrac{\sqrt[3]{16}}{\sqrt[3]{2}} = \dfrac{\sqrt[3]{2^4}}{\sqrt[3]{2}} = \dfrac{2^{\frac{4}{3}}}{2^{\frac{1}{3}}} = 2^{\frac{4}{3}-\frac{1}{3}} = 2^{\frac{3}{3}} = 2$

(e) $\dfrac{\sqrt{8}}{\sqrt[4]{2}} = \dfrac{\sqrt{2^3}}{\sqrt[4]{2}} = \dfrac{2^{\frac{3}{2}}}{2^{\frac{1}{4}}} = 2^{\frac{3}{2}-\frac{1}{4}} = 2^{\frac{6}{4}-\frac{1}{4}} = 2^{\frac{5}{4}} = 2^{1+\frac{1}{4}} = 2\cdot 2^{\frac{1}{4}} = 2\sqrt[4]{2}$

(f) $\dfrac{\sqrt[3]{7^2}}{\sqrt{7}} = \dfrac{7^{\frac{2}{3}}}{7^{\frac{1}{2}}} = 7^{\frac{2}{3}-\frac{1}{2}} = 7^{\frac{4}{6}-\frac{3}{6}} = 7^{\frac{1}{6}} = \sqrt[6]{7}$

(g) $\dfrac{\sqrt[3]{9}}{\sqrt[6]{3}} = \dfrac{\sqrt[3]{3^2}}{\sqrt[6]{3}} = \dfrac{3^{\frac{2}{3}}}{3^{\frac{1}{6}}} = 3^{\frac{2}{3}-\frac{1}{6}} = 3^{\frac{4}{6}-\frac{1}{6}} = 3^{\frac{3}{6}} = 3^{\frac{1}{2}} = \sqrt{3}$

(h) $\dfrac{\sqrt{9}}{\sqrt[3]{3}} = \dfrac{\sqrt{3^2}}{\sqrt[3]{3}} = \dfrac{3}{3^{\frac{1}{3}}} = 3^{1-\frac{1}{3}} = 3^{\frac{2}{3}} = \sqrt[3]{3^2}$

(i) $\dfrac{\sqrt[3]{16}}{\sqrt[3]{2}} = \dfrac{\sqrt[3]{2^4}}{\sqrt[3]{2}} = \dfrac{2^{\frac{4}{3}}}{2^{\frac{1}{3}}} = 2^{\frac{4}{3}-\frac{1}{3}} = 2^{\frac{3}{3}} = 2$

(j) $\dfrac{\sqrt[4]{4}}{\sqrt[6]{8}} = \dfrac{\sqrt[4]{2^2}}{\sqrt[6]{2^3}} = \dfrac{2^{\frac{2}{4}}}{2^{3/6}} = \dfrac{2^{\frac{1}{2}}}{2^{\frac{1}{2}}} = 1$

(k) $\dfrac{\sqrt{ab}}{\sqrt[3]{ab}} = \dfrac{(ab)^{\frac{1}{2}}}{(ab)^{\frac{1}{3}}} = (ab)^{\frac{1}{2}-\frac{1}{3}} = (ab)^{\frac{3}{6}-\frac{2}{6}} = (ab)^{\frac{1}{6}} = \sqrt[6]{ab}$

Volver al enunciado

6. Opera y simplifica las siguientes expresiones con radicales

(a) $(2\sqrt{5}-3\sqrt{2})^2+(2\sqrt{5}+3\sqrt{2})^2$

$$\begin{aligned}(2\sqrt{5}-3\sqrt{2})^2+(2\sqrt{5}+3\sqrt{2})^2 &= (2\sqrt{5})^2-2(2\sqrt{5})(3\sqrt{2})+(3\sqrt{2})^2\\ &+ (2\sqrt{5})^2+2(2\sqrt{5})(3\sqrt{2})+(3\sqrt{2})^2\\ &= 2(2\sqrt{5})^2+2(3\sqrt{2})^2\\ &= 2\cdot 2^2(\sqrt{5})^2+2\cdot 3^2(\sqrt{2})^2\\ &= 40+36\\ &= 76\end{aligned}$$

(b) $12\sqrt[3]{16}-\dfrac{3}{5}\sqrt[3]{128}$

$$\begin{aligned}12\sqrt[3]{16}-\frac{3}{5}\sqrt[3]{128} &= 12\sqrt[3]{2^4}-\frac{3}{5}\sqrt[3]{2^7}\\ &+ 12\cdot 2\sqrt[3]{2}-\frac{3}{5}\cdot 2^2\sqrt[3]{2}\\ &= \left(12\cdot 2-\frac{3}{5}\cdot 2^2\right))\sqrt[3]{2}\\ &= \left(24-\frac{12}{5}\right))\sqrt[3]{2}\\ &= \frac{108}{5}\sqrt[3]{2}\end{aligned}$$

(c) $\dfrac{\sqrt{24}\cdot\sqrt[5]{14}}{\sqrt{6}\cdot\sqrt[5]{7}}$

$$\begin{aligned}\frac{\sqrt{24}\cdot\sqrt[5]{14}}{\sqrt{6}\cdot\sqrt[5]{7}} &= \frac{\sqrt{2^3\cdot 3}\cdot\sqrt[5]{7\cdot 2}}{\sqrt{2\cdot 3}\cdot\sqrt[5]{7}}\\ &= \frac{2^{\frac{3}{2}}\cdot 3^{\frac{1}{2}}\cdot 7^{\frac{1}{5}}\cdot 2^{\frac{1}{5}}}{2^{\frac{1}{2}}\cdot 3^{\frac{1}{2}}\cdot 7^{\frac{1}{5}}}\\ &= 2^{\frac{3}{2}+\frac{1}{5}-\frac{1}{2}}\\ &= 2^{1+\frac{1}{5}}\\ &= 2\sqrt[5]{2}\end{aligned}$$

(d) $\dfrac{1}{3}\sqrt{125}-\dfrac{1}{3}\sqrt{180}-\dfrac{3}{2}\sqrt{5}-\dfrac{1}{5}\sqrt{80}$

$$\begin{aligned}
\frac{1}{3}\sqrt{125}-\frac{1}{3}\sqrt{180}-\frac{3}{2}\sqrt{5}-\frac{1}{5}\sqrt{80} &= \frac{1}{3}\sqrt{5^3}-\frac{1}{3}\sqrt{3^2\cdot 2^2\cdot 5}-\frac{3}{2}\sqrt{5}-\frac{1}{5}\sqrt{2^4\cdot 5}\\
&= \frac{1}{3}5\sqrt{5}-\frac{1}{3}3\cdot 2\cdot\sqrt{\cdot 5}-\frac{3}{2}\sqrt{5}-\frac{1}{5}2^2\cdot\sqrt{5}\\
&= \left(\frac{5}{3}-2-\frac{3}{2}-\frac{4}{5}\right)\sqrt{5}\\
&= \left(\frac{50}{30}-\frac{60}{30}-\frac{45}{30}-\frac{24}{30}\right)\sqrt{5}\\
&= -\frac{79}{30}\sqrt{5}
\end{aligned}$$

(e) $(2\sqrt{5}-\sqrt{2})^2-(4\sqrt{6}+\sqrt{2})^2$

$$\begin{aligned}
(2\sqrt{5}-\sqrt{2})^2-(4\sqrt{6}+\sqrt{2})^2 &= (2\sqrt{5})^2-2(2\sqrt{5})(\sqrt{2})+(\sqrt{2})^2\\
&- (4\sqrt{6})^2-2(4\sqrt{6})(\sqrt{2})-(\sqrt{2})^2\\
&= 4\cdot 5-4\sqrt{5}\sqrt{2}-16\cdot 6-8\sqrt{2\cdot 3}\sqrt{2}\\
&= -76-4\sqrt{10}-16\sqrt{3}
\end{aligned}$$

(f) $4\sqrt{8}-7\sqrt{50}+\frac{8}{3}\sqrt{18}+\frac{5}{2}\sqrt{98}$

$$\begin{aligned}
4\sqrt{8}-7\sqrt{50}+\frac{8}{3}\sqrt{18}+\frac{5}{2}\sqrt{98} &= 4\sqrt{2^3}-7\sqrt{5^2\cdot 2}+\frac{8}{3}\sqrt{3^2\cdot 2}+\frac{5}{2}\sqrt{2\cdot 7^2}\\
&= 4\cdot 2\sqrt{2}-7\cdot 5\cdot\sqrt{2}+\frac{8}{3}\cdot 3\sqrt{2}+\frac{5}{2}\cdot 7\sqrt{2}\\
&= \left(8-35+8+\frac{35}{2}\right)\\
&= -\frac{3}{2}\sqrt{2}
\end{aligned}$$

(g) $\dfrac{\sqrt{10}\cdot\sqrt[4]{8}}{\sqrt{15}\cdot\sqrt[4]{125}}$

$$\begin{aligned}
\frac{\sqrt{10}\cdot\sqrt[4]{8}}{\sqrt{15}\cdot\sqrt[4]{125}} &= \frac{\sqrt{5\cdot 2}\cdot\sqrt[4]{2^3}}{\sqrt{5\cdot 3}\cdot\sqrt[4]{5^3}}\\
&= \frac{5^{\frac{1}{2}}\cdot 2^{\frac{1}{2}}\cdot 2^{\frac{3}{4}}}{5^{\frac{1}{2}}\cdot 3^{\frac{1}{2}}\cdot 5^{\frac{3}{4}}}\\
&= \frac{2^{\frac{1}{2}+\frac{3}{4}}}{3^{\frac{1}{2}}5^{\frac{3}{4}}}\\
&= \frac{2^{\frac{5}{4}}}{3^{\frac{1}{2}}5^{\frac{3}{4}}}\cdot\frac{5^{\frac{1}{4}}}{5^{\frac{1}{4}}}\cdot\frac{3^{\frac{1}{2}}}{3^{\frac{1}{2}}}\\
&= \frac{2\sqrt[4]{2}\sqrt[4]{5}\sqrt{3}}{3\cdot 5}\\
&= \frac{2\sqrt[4]{2\cdot 5\cdot 9}}{15}\\
&= \frac{2\sqrt[4]{90}}{15}
\end{aligned}$$

(h) $\sqrt{\dfrac{98}{7}}+2\sqrt{56}-5\sqrt{126}-\sqrt[4]{196}$

$$\begin{aligned}
\sqrt{\frac{98}{7}}+2\sqrt{56}-5\sqrt{126}-\sqrt[4]{196} &= \sqrt{\frac{7^2\cdot 2}{7}}+2\sqrt{2^3\cdot 7}-5\sqrt{2\cdot 3^2\cdot 7}-\sqrt[4]{2^2\cdot 7^2}\\
&= \sqrt{14}+2\cdot 2\sqrt{14}-5\cdot 3\sqrt{14}-\sqrt{14}\\
&= (1+4-15-1)\sqrt{14}\\
&= -11\sqrt{14}
\end{aligned}$$

Volver al enunciado

7. **Racionaliza, opera y simplifica las siguientes expresiones con radicales**

(a) $\dfrac{5}{\sqrt{7}} = \dfrac{5}{\sqrt{7}} \cdot \dfrac{\sqrt{7}}{\sqrt{7}} = \dfrac{5\sqrt{7}}{7}$

(b) $\dfrac{3}{\sqrt{2}\sqrt{11}} = \dfrac{3}{\sqrt{2}\sqrt{11}} \cdot \dfrac{\sqrt{2}}{\sqrt{2}} \cdot \dfrac{\sqrt{11}}{\sqrt{11}} = \dfrac{3\sqrt{2}\sqrt{11}}{2\cdot 11} = \dfrac{2\sqrt{22}}{22}$

(c) $\dfrac{12}{\sqrt[6]{13}} = \dfrac{12}{13^{\frac{1}{6}}} = \dfrac{12}{13^{\frac{1}{6}}} \cdot \dfrac{13^{\frac{5}{6}}}{13^{\frac{5}{6}}} = \dfrac{12\sqrt[6]{13^5}}{13}$

(d) $\dfrac{1+\sqrt{2}}{\sqrt[3]{5}\sqrt[7]{11}} = \dfrac{1+\sqrt{2}}{5^{\frac{1}{3}}\cdot 11^{\frac{1}{7}}} = \dfrac{1+\sqrt{2}}{5^{\frac{1}{3}}\cdot 11^{\frac{1}{7}}} \cdot \dfrac{5^{\frac{2}{3}}}{5^{\frac{2}{3}}} \cdot \dfrac{11^{\frac{6}{7}}}{11^{\frac{6}{7}}} = \dfrac{(1+\sqrt{2})\sqrt[3]{5^2}\sqrt[7]{11^6}}{55}$

(e) $\dfrac{5}{3-\sqrt{11}} = \dfrac{5}{3-\sqrt{11}} \cdot \dfrac{3+\sqrt{11}}{3+\sqrt{11}} = \dfrac{5(3+\sqrt{11})}{9-11} = -\dfrac{15+5\sqrt{11}}{2}$

(f) $\dfrac{2}{\sqrt[5]{27}(\sqrt{3}+\sqrt{11})} = \dfrac{2}{3^{\frac{3}{5}}(\sqrt{3}+\sqrt{11})} \cdot \dfrac{3^{\frac{2}{5}}}{3^{\frac{2}{5}}} \cdot \dfrac{(\sqrt{3}-\sqrt{11})}{(\sqrt{3}-\sqrt{11})} = \dfrac{2\sqrt[5]{3^2}(\sqrt{3}-\sqrt{11})}{3(3-11)} = -\dfrac{\sqrt[5]{3^2}(\sqrt{3}-\sqrt{11})}{12}$

(g) $\dfrac{\sqrt{8}-2}{\sqrt{8}+\sqrt{3}} + \dfrac{3}{\sqrt{3}}$

$$\begin{aligned}
\frac{\sqrt{8}-2}{\sqrt{8}+\sqrt{3}} + \frac{3}{\sqrt{3}} &= \frac{\sqrt{8}-2}{\sqrt{8}+\sqrt{3}} \cdot \frac{\sqrt{8}-\sqrt{3}}{\sqrt{8}-\sqrt{3}} + \frac{3}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} \\
&= \frac{(\sqrt{8}-2)(\sqrt{8}-\sqrt{3})}{8-3} + \sqrt{3} = \frac{8-\sqrt{24}-2\sqrt{8}+2\sqrt{3}}{5} + \sqrt{3} \\
&= \frac{(\sqrt{8}-2)(\sqrt{8}-\sqrt{3})}{8-3} + \sqrt{3} \\
&= \frac{8-\sqrt{24}-2\sqrt{8}+2\sqrt{3}}{5} + \frac{5\sqrt{3}}{5} \\
&= \frac{8-\sqrt{24}-2\sqrt{8}+7\sqrt{3}}{5} \\
&= \frac{8-2\sqrt{6}-4\sqrt{2}+7\sqrt{3}}{5}
\end{aligned}$$

(h) $\dfrac{\sqrt{2}-\sqrt{3}}{\sqrt{2}+\sqrt{3}} - \dfrac{2}{\sqrt{6}}$

$$\begin{aligned}
\frac{\sqrt{2}-\sqrt{3}}{\sqrt{2}+\sqrt{3}} - \frac{2}{\sqrt{6}} &= \frac{\sqrt{2}-\sqrt{3}}{\sqrt{2}+\sqrt{3}} \cdot \frac{\sqrt{2}-\sqrt{3}}{\sqrt{2}-\sqrt{3}} - \frac{2}{\sqrt{6}} \cdot \frac{\sqrt{6}}{\sqrt{6}} \\
&= \frac{2-2\sqrt{2}\sqrt{3}+3}{2-3} - \frac{2\sqrt{6}}{6} \\
&= 2\sqrt{6}-5-\frac{\sqrt{6}}{3} \\
&= \frac{5}{3}\sqrt{6}-5
\end{aligned}$$

Volver al enunciado

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