

$$\begin{aligned}
 8. \quad & 4\sqrt{12} - \sqrt{3} + 2\sqrt{147} - 6\sqrt{300} + \sqrt{243} = \\
 & = 4\sqrt{3 \cdot 2^2} - \sqrt{3} + 2\sqrt{3 \cdot 7^2} - 6\sqrt{3 \cdot 5^2 \cdot 2^2} + \sqrt{3^5} = \\
 & = 4 \cdot 2\sqrt{3} - \sqrt{3} + 2 \cdot 7\sqrt{3} - 6 \cdot 5 \cdot 2\sqrt{3} + 3^2\sqrt{3} = \\
 & = 8\sqrt{3} - \sqrt{3} + 14\sqrt{3} - 60\sqrt{3} + 9\sqrt{3} = \\
 & = (8 - 1 + 14 - 60 + 9)\sqrt{3} = \boxed{-30\sqrt{3}}
 \end{aligned}$$

26. Realiza las raíces y simplifica el resultado:

$$a) \sqrt[3]{\sqrt[3]{8}} = \sqrt[6]{8}$$

$$b) \sqrt[4]{5\sqrt[3]{5}} = \sqrt[4]{\sqrt[3]{5 \cdot 5^3}} = \sqrt[4]{\sqrt[3]{5^4}} = \sqrt[12]{5^4}$$

$$\begin{aligned}
 c) \quad & \sqrt[3]{5\sqrt[6]{2^2\sqrt[7]{4}}} = \sqrt[3]{\sqrt[6]{5^6 \cdot 2^2\sqrt[7]{4}}} = \sqrt[3]{\sqrt[6]{4 \cdot (5^6)^7 \cdot (2^2)^7}} \\
 & = \sqrt[126]{4 \cdot 5^{42} \cdot 2^{14}}
 \end{aligned}$$

$$\begin{aligned}
 \sqrt[5]{\frac{5\sqrt{3}}{3}} &= \frac{\sqrt[5]{5\sqrt{3}}}{\sqrt[5]{3}} = \frac{\sqrt[5]{\sqrt{3 \cdot 5^2}}}{\sqrt[5]{3}} = \frac{\sqrt[10]{3 \cdot 5^2}}{\sqrt[5]{3}} = \sqrt[10]{\frac{3 \cdot 5^2}{3^2}} = \\
 &= \sqrt[10]{\frac{5^2}{3}}
 \end{aligned}$$

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

Pág 29: ej 26, 27 y 28.

26. Realiza las raíces y simplifica el resultado.

$$a) \sqrt[3]{\sqrt[3]{8}} = \sqrt[6]{8} = \sqrt[6]{2^3} = \sqrt{2}$$

$$b) \sqrt[5]{\sqrt[4]{\sqrt[3]{1.200}}} = \sqrt[60]{5^2 \cdot 2^4 \cdot 3}$$

$$c) \sqrt[3]{a^2 \cdot b^3} = \sqrt[6]{a^2 \cdot b^3}$$

$$d) \sqrt[3]{\frac{4}{25}} = \sqrt[6]{\frac{4}{25}} = \sqrt[6]{\frac{2^2}{5^2}} = \sqrt[3]{\frac{2}{5}}$$

27. Calcula

$$a) (\sqrt{\sqrt{1296}})^2 = \sqrt{\sqrt{3^4 \cdot 2^4}}^2 =$$

$$\sqrt{3^8 \cdot 2^8} = \sqrt[4]{3^8 \cdot 2^8} = 3^2 \cdot 2^2 = 36$$

$$b) (3 \sqrt[3]{729})^2 = (3 \sqrt[3]{3^6})^2 = 9 \sqrt[3]{3^6} = 9 \sqrt[3]{3^6} = 9 \cdot 3^2 = 81$$

$$c) (\sqrt{2} \cdot \sqrt{5})^3 = (\sqrt{10})^3 = \sqrt{10^3} = 10\sqrt{10}$$

$$d) \sqrt{\sqrt{2}} \cdot \sqrt{\sqrt{5}} = \sqrt[4]{2} \cdot \sqrt[4]{5} = \sqrt[4]{10}$$

28. Efectúa las siguientes operaciones:

$$a) \sqrt{\frac{3}{2}} \sqrt{\frac{3}{2}} = \sqrt{\frac{3}{2} \cdot \left(\frac{3}{2}\right)^2} = \sqrt[4]{\frac{3}{2} \cdot \frac{9}{4}} = \sqrt[4]{\frac{27}{8}}$$

$$b) \sqrt[4]{\sqrt[3]{8}} = \sqrt[24]{8} = \sqrt[24]{2^3} = \sqrt[8]{2}$$

1296	2
648	2
324	2
162	2
81	3
27	3
9	3
3	3
1	

729	3
243	3
81	3
27	3
9	3
3	3
1	

$$c) (2 \sqrt[4]{2^2 \cdot 3})^3 = 2^3 \sqrt[4]{(2^2 \cdot 3)^3} = 8 \sqrt[4]{2^6 \cdot 3^3} = 8 \cdot 2 \sqrt[4]{2^2 \cdot 3^3} = \\ = 16 \sqrt[4]{2^2 \cdot 3^3}$$

$$d) \sqrt[3]{\frac{2\sqrt{3}}{5}} = \sqrt[3]{\frac{\sqrt{2^2 \cdot 3}}{5^2}} = \sqrt[6]{\frac{2^2 \cdot 3}{5^2}} = \sqrt[6]{\frac{12}{25}}$$

Pág 31: ej 33.

33. Realiza estas operaciones combinadas de radicales:

$$a) (3+a)\sqrt{5} - \sqrt{125} + \sqrt{20a^3} = \\ = (3+a)\sqrt{5} - \sqrt{5^3} + \sqrt{5 \cdot 2^2 a^3} = \\ = (3+a)\sqrt{5} - 5\sqrt{5} + 2a\sqrt{5a} = \\ = [(3+a)-5]\sqrt{5} + 2a\sqrt{5a} = \\ = (3+a-5)\sqrt{5} + 2a\sqrt{5a} = (a-2)\sqrt{5} + 2a\sqrt{5a}$$

$$b) \sqrt{4a^3} - \frac{1}{3}\sqrt{9a^2} + 3\sqrt[4]{a^2} - \frac{5\sqrt{25a}}{2} = \\ = \sqrt{2^2 a^3} - \frac{1}{3}\sqrt{3^2 a^2} + 3\sqrt[4]{a^2} - \frac{5\sqrt{5^2 a}}{2} = \\ = 2a\sqrt{a} - \frac{1}{3} \cdot 3 \cdot a + 3\sqrt[4]{a^2} - \frac{5 \cdot 5\sqrt{a}}{2} = \\ = 2a\sqrt{a} - a + 3\sqrt{a} - \frac{25\sqrt{a}}{2} = \\ = (2a - \frac{25}{2} + 3)\sqrt{a} - a = \\ = (2a + \frac{6}{2} - \frac{25}{2})\sqrt{a} - a = \boxed{(2a - \frac{19}{2})\sqrt{a} - a}$$

$$\begin{aligned}
 c) & (\sqrt[6]{4b^3c^4} : \sqrt[4]{2bc^3}) - 3(\sqrt[12]{2b^3} : \sqrt[12]{c}) = \\
 & = (\sqrt[12]{(4b^3c^4)^2} : (2bc^3)^3) - 3(\sqrt[12]{2b^3} : c) = \\
 & = (\sqrt[12]{(2^2)^2 b^6 c^8} : 2^3 b^3 c^9) - 3(\sqrt[12]{2b^3} : c) = \\
 & = \sqrt[12]{\frac{2^4 b^6 c^8}{2^3 b^3 c^9}} - 3(\sqrt[12]{2b^3} : c) = \\
 & = \sqrt[12]{\frac{2b^3}{c}} - 3\sqrt[12]{\frac{2b^3}{c}} = (1-3)\sqrt[12]{\frac{2b^3}{c}} = \boxed{-2\sqrt[12]{\frac{2b^3}{c}}}
 \end{aligned}$$

$$\begin{aligned}
 d) & (\sqrt{x}\sqrt{y}\sqrt{z}\sqrt{t})^{32} + 2(\sqrt{x^4} : \sqrt{y^2})^8 : (\sqrt{z^8} : \sqrt[4]{t^8}) = \\
 & = (\sqrt{\sqrt{x^2y}\sqrt{z}\sqrt{t}})^{32} + 2(\sqrt{x^{32}} : \sqrt{y^{16}}) : (z^4 : t^2) = \\
 & = (\sqrt{\sqrt{\sqrt{x^4y^2z}\sqrt{t}}})^{32} + 2\left(\frac{x^{16}}{y^8}\right) : \left(\frac{z^4}{t^2}\right) = \\
 & = (\sqrt{\sqrt{\sqrt{\sqrt{x^8y^4z^2t}}}})^{32} + 2\left(\frac{x^{16} \cdot t^2}{y^8 \cdot z^4}\right) = \\
 & = \sqrt[16]{(x^8y^4z^2t)^{32}} + 2\left(\frac{x^{16} \cdot t^2}{y^8 \cdot z^4}\right) = \\
 & = (x^8y^4z^2t)^2 + \frac{2x^{16} \cdot t^2}{y^8 z^4} = x^{16}y^8z^4t^2 + \frac{2x^{16}t^2}{y^8 z^4} = \\
 & = \frac{y^8 z^4 (x^{16}y^8z^4t^2) + 2x^{16}t^2}{y^8 z^4} = \\
 & = \frac{y^{16}z^8x^{16}t^2 + 2x^{16}t^2}{y^8 x^4} = \frac{x^{16}t^2(y^{16}z^8 + 2)}{y^8 x^4} = \\
 & = \boxed{x^{12}t^2(y^{16}z^8 + 2)}
 \end{aligned}$$

RACIONALIZACIÓN

Significa eliminar radicales del denominador

1^{er} CASO: $\frac{5}{\sqrt{3}} = \frac{5\sqrt{3}}{\sqrt{3}\sqrt{3}} = \frac{5\sqrt{3}}{\sqrt{3^2}} = \boxed{\frac{5\sqrt{3}}{3}}$

2^o CASO: $\frac{6}{\sqrt[7]{5}} = \frac{6\sqrt[7]{5^6}}{\sqrt[7]{5}\sqrt[7]{5^6}} = \frac{6\sqrt[7]{5^6}}{\sqrt[7]{5^7}} = \boxed{\frac{6\sqrt[7]{5^6}}{5}}$

3^{er} CASO: $\frac{5}{\sqrt{a} + \sqrt{2}} = \frac{5(\sqrt{a} - \sqrt{2})}{(\sqrt{a} + \sqrt{2})(\sqrt{a} - \sqrt{2})} = \frac{5\sqrt{a} - 5\sqrt{2}}{(\sqrt{a})^2 - (\sqrt{2})^2} = \frac{5\sqrt{a} - 5\sqrt{2}}{a - 2}$
(El conjugado)

Pag 31: ej 34

34. Indica si las siguientes igualdades son correctas:

a) $\frac{\sqrt{x} \cdot \sqrt{a^3} \cdot \sqrt[3]{3}}{\sqrt{x^3} \sqrt{a} \cdot \sqrt[3]{3^4}} = \frac{a}{3x} \Rightarrow$ Es correcta

$$= \frac{\sqrt[6]{x^3 \cdot a^9 \cdot 3^2}}{\sqrt[6]{x^9 \cdot a^3 \cdot 3^8}} = \sqrt[6]{\frac{a^6}{x^6 \cdot 3^6}} = \frac{a}{3x}$$

b) $27\sqrt{128a^2b^3} : 9\sqrt{32a^3b^2} = 6\sqrt{\frac{b}{a}}$

$$= 27\sqrt{2^7a^2b^3} : 9\sqrt{2^5a^3b^2} = \frac{27 \cdot 2^3ab\sqrt{2b}}{9 \cdot 2ab\sqrt{2a}} =$$

$$= \frac{3 \cdot 2\sqrt{2b}}{\sqrt{b}\sqrt{a}} = \frac{6\sqrt{2}\sqrt{b}}{\sqrt{b}\sqrt{a}} = 6\sqrt{\frac{b}{a}}$$

Es correcta

128	2
64	2
32	2
16	2
8	2
4	2
2	2
1	

WOLFRAM

$$\begin{aligned} c) \sqrt{\frac{16}{mn}} + \sqrt{\frac{b^2}{m^3n^3}} - \sqrt{\frac{25}{mn}} &= \left(4 + \frac{b}{mn} - 5\right) \cdot \sqrt{\frac{1}{mn}} \\ &= \sqrt{\frac{2^4}{mn}} + \sqrt{\frac{b^2}{m^3n^3}} - \sqrt{\frac{5^2}{mn}} = 2^2 \sqrt{\frac{1}{mn}} + \frac{b}{mn} \sqrt{\frac{1}{mn}} - 5 \sqrt{\frac{1}{mn}} = \\ &= \left(4 + \frac{b}{mn} - 5\right) \sqrt{\frac{1}{mn}} = \left(\frac{b}{mn} - 1\right) \sqrt{\frac{1}{mn}} \end{aligned}$$

$$d) \sqrt{a^3b^2} + \sqrt{a^3b^4} - \sqrt{4ab^4} \neq 2b\sqrt{a} \Rightarrow \text{Es incorrecta}$$

$$\begin{aligned} &= \sqrt{a^3b^2} + \sqrt{a^3b^4} - \sqrt{2^2ab^4} = ab\sqrt{a} + ab^2\sqrt{a} - 2b^2\sqrt{a} = \\ &= (ab + ab^3 - 2b^2) \sqrt{a} \end{aligned}$$

35. Racionaliza las siguientes fracciones:

$$b) \frac{4}{5\sqrt{3}} = \frac{4}{5\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{4\sqrt{3}}{5\sqrt{3^2}} = \frac{4\sqrt{3}}{5 \cdot 3} = \frac{4\sqrt{3}}{15}$$

$$\begin{aligned} e) \frac{\sqrt{2}}{3-\sqrt{2}} &= \frac{\sqrt{2}}{3-\sqrt{2}} \cdot \frac{3+\sqrt{2}}{3+\sqrt{2}} = \frac{\sqrt{2}(3+\sqrt{2})}{3^2-(\sqrt{2})^2} = \frac{\sqrt{2}(3+\sqrt{2})}{9-2} = \\ &= \frac{3\sqrt{2} + \sqrt{2^2}}{7} = \frac{3\sqrt{2} + 2}{7} \end{aligned}$$

$$a) \frac{5}{\sqrt{5}} = \frac{5\sqrt{5}}{\sqrt{5}\sqrt{5}} = \frac{5\sqrt{5}}{\sqrt{5^2}} = \frac{5\sqrt{5}}{5} = \sqrt{5}$$

$$c) \frac{\sqrt{2}}{\sqrt[3]{5^2}} = \frac{\sqrt{2}}{\sqrt[3]{5^2}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{\sqrt{10}}{\sqrt[3]{5^3}} = \frac{\sqrt{10}}{5}$$

$$d) \frac{12}{5\sqrt[6]{4}} = \frac{12}{5\sqrt[6]{2^2}} = \frac{12}{5\sqrt[3]{2}} = \frac{12\sqrt[3]{2^2}}{5\sqrt[3]{2} \cdot \sqrt[3]{2^2}} = \frac{12\sqrt[3]{2^2}}{5\sqrt[3]{2^3}} =$$

$$= \frac{12\sqrt[3]{2^2}}{5 \cdot 2} = \frac{12\sqrt[3]{2^2}}{10} = \frac{6\sqrt[3]{2^2}}{5}$$

$$f) \frac{4}{\sqrt{2}-\sqrt{5}} = \frac{4(\sqrt{2}+\sqrt{5})}{(\sqrt{2}-\sqrt{5})(\sqrt{2}+\sqrt{5})} = \frac{4\sqrt{2}+4\sqrt{5}}{(\sqrt{2})^2-(\sqrt{5})^2} =$$

$$= \frac{4\sqrt{2}+4\sqrt{5}}{2-5} = \frac{4\sqrt{2}+4\sqrt{5}}{-3} = \frac{-4\sqrt{2}-4\sqrt{5}}{3}$$

36. Racionaliza estas fracciones:

$$a) \frac{2+\sqrt{5}}{\sqrt{7}-\sqrt{5}} = \frac{(2+\sqrt{5})(\sqrt{7}+\sqrt{5})}{(\sqrt{7}-\sqrt{5})(\sqrt{7}+\sqrt{5})} = \frac{2\sqrt{7}+2\sqrt{5}+\sqrt{35}+\sqrt{25}}{(\sqrt{7})^2-(\sqrt{5})^2}$$

$$= \frac{2\sqrt{7}+2\sqrt{5}+\sqrt{35}+\sqrt{5^2}}{7-5} = \frac{2\sqrt{7}+2\sqrt{5}+\sqrt{35}+5}{2}$$

$$b) \frac{2-\sqrt{3}}{2+\sqrt{3}} = \frac{(2-\sqrt{3})(2-\sqrt{3})}{(2+\sqrt{3})(2-\sqrt{3})} = \frac{(2-\sqrt{3})^2}{2^2-(\sqrt{3})^2} = \frac{4-4\sqrt{3}+(\sqrt{3})^2}{4-3}$$

$$= \frac{4-4\sqrt{3}+3}{1} = 7-4\sqrt{3}$$

$$c) \frac{5}{2-3\sqrt{3}} = \frac{5(2+3\sqrt{3})}{(2-3\sqrt{3})(2+3\sqrt{3})} = \frac{10+15\sqrt{3}}{2^2-(3\sqrt{3})^2} = \frac{5(2+3\sqrt{3})}{4-9 \cdot 3}$$

$$= \frac{10+15\sqrt{3}}{-23} = \frac{-10-15\sqrt{3}}{23}$$

$$d) \frac{\sqrt[5]{3}}{\sqrt[3]{3}} = \frac{\sqrt[5]{3} \cdot \sqrt[3]{3^2}}{\sqrt[3]{3} \cdot \sqrt[3]{3^2}} = \frac{\sqrt[15]{3^3 \cdot (3^2)^5}}{\sqrt[3]{3^3}} = \frac{\sqrt[15]{3^3 \cdot 3^{10}}}{3} = \frac{\sqrt[15]{3^{13}}}{3}$$

$$e) \frac{3\sqrt{3}}{\sqrt{2}-\sqrt{3}} = \frac{(3\sqrt{3})(\sqrt{2}+\sqrt{3})}{(\sqrt{2}-\sqrt{3})(\sqrt{2}+\sqrt{3})} = \frac{3\sqrt{6} + 3\sqrt{9}}{(\sqrt{2})^2 - (\sqrt{3})^2}$$

$$= \frac{3\sqrt{6} + 9}{2-3} = \frac{3\sqrt{6} + 9}{-1} = -3\sqrt{6} - 9 = -3(\sqrt{6} + 3)$$

$$f) \frac{3\sqrt{2} - \sqrt{2}}{\sqrt{2} + \sqrt{3}} = \frac{(3\sqrt{2} - \sqrt{2})(\sqrt{2} - \sqrt{3})}{(\sqrt{2} + \sqrt{3})(\sqrt{2} - \sqrt{3})} =$$

$$= \frac{3\sqrt{4} - 3\sqrt{6} - \sqrt{24} + \sqrt{36}}{(\sqrt{2})^2 - (\sqrt{3})^2} = \frac{3 \cdot 2 - 3\sqrt{6} - \sqrt{2^3 \cdot 3} + 6}{-1} =$$

$$= \frac{6 - 3\sqrt{6} - 2\sqrt{6} + 6}{-1} = \frac{12 - 5\sqrt{6}}{-1} = -12 + 5\sqrt{6}$$

$$\sqrt{4a^3} - \frac{1}{3}\sqrt{9a^2} + 3\sqrt[3]{a^2} - \frac{5\sqrt{25a}}{2} =$$

$$= \sqrt{2^2 a^3} - \frac{1}{3}\sqrt{3^2 a^2} + 3\sqrt{a} - \frac{5\sqrt{5^2 a}}{2} =$$

$$= 2a\sqrt{a} - \frac{1}{3} \cdot 3 \cdot a + 3\sqrt{a} - \frac{5 \cdot 5\sqrt{a}}{2}$$

$$= 2a\sqrt{a} - \frac{3}{3}a + 3\sqrt{a} - \frac{25}{2}\sqrt{a} =$$

$$= \left(2a + 3 - \frac{25}{2}\right)\sqrt{a} - a = \left(\frac{4a + 6 - 25}{2}\right)\sqrt{a} - a =$$

$$= \left(\frac{4a - 19}{2}\right)\sqrt{a} - a$$