

11) Efectúa las siguientes operaciones:

$$a) 3\sqrt{2} \cdot 9\sqrt{8} = 27\sqrt{16} = 27\sqrt{2^4} = 27 \cdot 4 = \del{80} 108$$

$$b) (2\sqrt{48}) : \left(4\sqrt{\frac{1}{3}}\right) = 2\sqrt{2^4 \cdot 3} : 2^2\sqrt{\frac{1}{3}} = 2^3\sqrt{3} : 2^2\sqrt{\frac{1}{3}} = 2$$

$$c) 2\sqrt{5} \cdot 3\sqrt{20} = 2\sqrt{5} \cdot 3\sqrt{20} = 6\sqrt{100} = 60$$

$$d) 2\sqrt{0,3} \cdot 3\sqrt{27} = 2\sqrt{\frac{3}{10}} \cdot 3\sqrt{\frac{27}{3^3}} = \del{6\sqrt{\frac{7 \cdot 7}{10}}} 2\sqrt{\frac{3}{10}} \cdot 3^2\sqrt{3} =$$

$$= 18\sqrt{\frac{9}{10}}$$

$$e) \left(6\sqrt{\frac{1}{3}}\right) : \left(\frac{1}{4}\sqrt{\frac{1}{12}}\right) = \frac{6}{\frac{1}{4}} \cdot \frac{\sqrt{\frac{1}{3}}}{\sqrt{\frac{1}{12}}} = 24 \cdot \sqrt{\frac{12}{3}} = 2\sqrt{4} = 4$$

$$f) \frac{2\sqrt{5} \cdot 6\sqrt{25} \cdot \sqrt{3}}{15\sqrt{15}} = \frac{2 \cdot 6 \cdot \sqrt{5 \cdot 5^2 \cdot 3}}{15\sqrt{3 \cdot 5}} = \frac{12}{15} \sqrt{\frac{5 \cdot 5^2 \cdot 3}{3 \cdot 5}} = \frac{12 \cdot 5}{15} = \frac{12}{3} = 4$$

$$g) \frac{3\sqrt{15} \cdot 5\sqrt{125} \cdot \sqrt{243}}{30\sqrt{215}} = \frac{15}{30} \sqrt{\frac{3 \cdot 5^3 \cdot 3^5}{8 \cdot 43}} = \frac{15}{30} \sqrt{\frac{3^6 \cdot 5^3}{43}} = \frac{15 \cdot 3^3}{30} \sqrt{\frac{5^3}{43}}$$

$$= \frac{27}{2} \sqrt{\frac{125}{43}}$$

Pon bajo un único radical las siguientes expresiones, simplificando los resultados:

$$12) \sqrt{\sqrt{27}} = \sqrt[4]{3^3}$$

$$13) \sqrt{2\sqrt{2}} = \sqrt{\sqrt{2^3}} = \sqrt[4]{2^3}$$

$$14) \sqrt{2\sqrt{2^2}\sqrt{8}} = \sqrt{\sqrt{2^4}\sqrt{2^3}} = \sqrt[8]{2^{11}} = 2\sqrt[8]{2^3}$$

$$15) \sqrt[3]{\sqrt{128}} = \sqrt[6]{2^7} = 2\sqrt[6]{2}$$

$$16) \sqrt[9]{9\sqrt{\frac{1}{9}}} = \sqrt[9]{\frac{9^2}{9}} = \sqrt[9]{9^2} = \sqrt[9]{3^4}$$

$$17) \sqrt[3]{\sqrt[3]{3\sqrt{\frac{1}{3}\sqrt{3^3}}}} = \sqrt{\sqrt[3]{3^3}\sqrt{\frac{1}{3}\sqrt{3^3}}} = \sqrt{\sqrt[3]{3^9}\sqrt[3]{3^3}} = \sqrt{\sqrt[3]{3^{12}}}$$

$$\sqrt{\sqrt[3]{3^{12}}} = \sqrt[6]{3^{12}} = 3\sqrt[3]{3^2}$$

$$18) \sqrt{2\sqrt{\frac{1}{2}\sqrt[3]{4}}} = \sqrt{\sqrt{2^3}\sqrt[3]{2^2}} = \sqrt{\sqrt[3]{2^5}} = \sqrt[6]{2^5}$$

$$19) \sqrt[3]{\frac{a}{b}\sqrt{\frac{b}{a}}} = \sqrt[3]{\sqrt[4]{\frac{a^3 b^2}{b^3 a}}} = \sqrt[12]{\frac{a^2}{b^2}}$$

Efectúa las siguientes adiciones y sustracciones:

$$\begin{aligned} 26) \sqrt{12} + 2\sqrt{27} + 3\sqrt{75} - 9\sqrt{48} &= \sqrt{2^2 \cdot 3} + 2\sqrt{3^3} + 3\sqrt{5^2 \cdot 3} - 9\sqrt{2^4 \cdot 3} = \\ &= 2\sqrt{3} + 6\sqrt{3} + 15\sqrt{3} - 36\sqrt{3} = \underline{-13\sqrt{3}} \end{aligned}$$

$$\begin{aligned} 27) \sqrt{24} + \sqrt{54} - \sqrt{6} &= \sqrt{2^3 \cdot 3} + \sqrt{3^3 \cdot 2} - \sqrt{2 \cdot 3} = 2\sqrt{6} + 3\sqrt{6} - \sqrt{6} = \\ &= \underline{4\sqrt{6}} \end{aligned}$$

$$\begin{aligned} 28) 2\sqrt{8} + 5\sqrt{72} - 7\sqrt{18} - \sqrt{50} &= 2\sqrt{2^3} + 5\sqrt{3^2 \cdot 2^3} - 7\sqrt{3^2 \cdot 2} - \sqrt{2 \cdot 5^2} = \\ &= 4\sqrt{2} + 30\sqrt{2} - 21\sqrt{2} - 5\sqrt{2} = \underline{8\sqrt{2}} \end{aligned}$$

$$\begin{aligned} 29) \sqrt{12} - \sqrt{27} + \sqrt{48} - \sqrt{75} &= \sqrt{2^2 \cdot 3} - \sqrt{3^3} + \sqrt{2^4 \cdot 3} - \sqrt{5^2 \cdot 3} = \\ &= 2\sqrt{3} - 3\sqrt{3} + 4\sqrt{3} - 5\sqrt{3} = \underline{-2\sqrt{3}} \end{aligned}$$

$$\begin{aligned} 30) \sqrt{45x^3} - \sqrt{80x^3} + \sqrt{5x^3} &= \sqrt{3^2 \cdot 5 \cdot x^3} - \sqrt{2^4 \cdot 5 \cdot x^3} + \sqrt{5x^3} = \\ 3 \cdot x \sqrt{5x} - 2^2 \cdot x \sqrt{5x} + \sqrt{5x} &= (3x - 4x + 1) \sqrt{5x} = \\ (-x + 1) \sqrt{5x} & \end{aligned}$$

$$\begin{aligned} 31) 4\sqrt{12} - \frac{3}{2}\sqrt{48} + \frac{2}{3}\sqrt{27} + \frac{3}{5}\sqrt{75} &= 4\sqrt{2^2 \cdot 3} - \frac{3}{2}\sqrt{2^4 \cdot 3} + \frac{2}{3}\sqrt{3^3} + \frac{3}{5}\sqrt{5^2 \cdot 3} = \\ 8\sqrt{3} - 6\sqrt{3} + 2\sqrt{3} + 3\sqrt{3} &= \underline{7\sqrt{3}} \end{aligned}$$

$$\begin{aligned} 32) 2a\sqrt{3} - \sqrt{27a^2} + a\sqrt{12} &= 2a\sqrt{3} - \sqrt{3^3 a^2} + a\sqrt{2^2 \cdot 3} = \\ 2a\sqrt{3} - 3a\sqrt{3} + 2a\sqrt{3} &= \underline{a\sqrt{3}} \end{aligned}$$

$$33) 7\sqrt{54} - 3\sqrt{18} + \sqrt{24} - \frac{3}{5}\sqrt{50} - \sqrt{6} = 7\sqrt{3^3 \cdot 2} - 3\sqrt{3^2 \cdot 2} + \sqrt{2^3 \cdot 3} - \frac{3}{5}\sqrt{5^2 \cdot 2} - \sqrt{6}$$

$$21\sqrt{6} - 9\sqrt{2} + 2\sqrt{6} - 3\sqrt{2} - \sqrt{6} = \underline{22\sqrt{6} - 12\sqrt{2}}$$

$$34) \frac{1}{2}\sqrt{2} + \sqrt{2} + \sqrt[4]{4} + \sqrt[8]{16} + \sqrt[4]{64} = \frac{1}{2}\sqrt{2} + \sqrt{2} + \sqrt{2^2} + \sqrt{2^4} + \sqrt{2^6} =$$

$$\frac{1}{2}\sqrt{2} + \sqrt{2} + \sqrt{2} + \sqrt{2} + 2\sqrt{2} = (5 + \frac{1}{2})\sqrt{2} = \underline{\frac{11}{2}\sqrt{2}}$$

$$35) 5\sqrt{18x^3y^2} - 3\sqrt{8xy^4} - 3\sqrt{32x^3} = 5\sqrt{3^2 \cdot 2x^3y^2} - 3\sqrt{2^3xy^4} - 3\sqrt{2^5x^3} =$$

$$= 5 \cdot 3 \cdot xy\sqrt{2x} - 3 \cdot 2y^2\sqrt{2x} - 3 \cdot 2^2x\sqrt{2x} =$$

$$(15xy - 6y^2 - 12x)\sqrt{2x}$$

$$36) \sqrt[3]{16} + \sqrt[3]{40} - \sqrt[3]{54} + \sqrt[3]{625} = \sqrt[3]{2^4} + \sqrt[3]{2^3 \cdot 5} - \sqrt[3]{3^3 \cdot 2} + \sqrt[3]{5^4} =$$

$$= 2\sqrt[3]{2} + 2\sqrt[3]{5} - 3\sqrt[3]{2} + 5\sqrt[3]{5} = \underline{-\sqrt[3]{2} + 7\sqrt[3]{5}}$$

$$37) \sqrt[3]{2ab^6} + \sqrt[3]{2a^7} - \sqrt[3]{16a^4b^3} = \sqrt[3]{2a^6b^6} + \sqrt[3]{2a^7} - \sqrt[3]{\frac{16a^4b^3}{2^4}} =$$

$$b^2\sqrt{2a} + a^2\sqrt{2a} - 2ab\sqrt{2a} = \underline{(b^2 + a^2 - 2ab)\sqrt{2a}}$$

$$38) \sqrt[3]{54a} - \sqrt[3]{16a} - \sqrt[3]{250a} + 3\sqrt[3]{2a} = \sqrt[3]{3^3 \cdot 2a} - \sqrt[3]{2^4a} - \sqrt[3]{5^3 \cdot 2a} + 3\sqrt[3]{2a} =$$

$$3\sqrt[3]{2a} - 2\sqrt[3]{2a} - 5\sqrt[3]{2a} + 3\sqrt[3]{2a} = \underline{-\sqrt[3]{2a}}$$