

1. Reduce lo que puedas:

$$\begin{array}{ll}
 \text{(a)} \quad \frac{(-2 \cdot 3)^2 \cdot (3^2 \cdot 2)^3}{(2^3 \cdot 3 \cdot 2^{-1})^2} & \text{(e)} \quad \left(\frac{-2a^{-2}}{9b^2} \right)^{-1} : \left(\frac{3a^2b}{4} \right)^4 \\
 \text{(b)} \quad \frac{4^{-2} \cdot 9 \cdot 2^3 \cdot 3^{-2}}{(2 \cdot 3)^2 (3^{-1} \cdot 8)^{-2}} & \text{(g)} \quad \left[\frac{2a^3b^{-2}}{(3ab^{-1})^{-1}} \right]^{-2} : \left[\frac{a^{-2}b^2}{6a^2} \right]^3 \\
 \text{(c)} \quad \frac{-a^{-3} \cdot a^5 \cdot a^2}{(a \cdot a^3)^2 (-a^3)^{-5} \cdot a^{-2}} & \text{(f)} \quad \frac{(a^3b^2)^{-2} : b^{-5}}{(a^{-2})^{-\frac{1}{2}}} \\
 \text{(d)} \quad \frac{64 \cdot (x^2y^{-1})^{-2}}{24 \cdot (x^{-1}2y)^3} &
 \end{array}$$

2. Expresa en notación científica, opera y simplifica:

$$\begin{array}{ll}
 \text{(a)} \quad \frac{0'0001 \cdot 0'01 \cdot 10000}{0'1 \cdot 100 \cdot 0'01} & \text{(c)} \quad \frac{1000 \cdot 12000 \cdot 0'02 \cdot 0'01}{400 \cdot 0'00003} \\
 \text{(b)} \quad \frac{0'2 \cdot 100 \cdot 1000}{8000 \cdot 0'1 \cdot 10000} & \text{(d)} \quad \frac{0'0012 \cdot 0'002 \cdot 100000}{8000 \cdot 0'0003 \cdot 0'01}
 \end{array}$$

3. Extrae los factores que puedas:

$$\begin{array}{lll}
 \text{(a)} \quad \frac{1}{4} \sqrt[5]{64} & \text{(b)} \quad \sqrt[5]{\frac{5x^{10}}{y^8}} & \text{(d)} \quad \sqrt{300a^3b^{15}} \\
 & \text{(c)} \quad \sqrt[3]{-900x^3} & \text{(e)} \quad \sqrt{a^4 + a^3} \\
 & & \text{(f)} \quad \sqrt{27x^8 - 108x^6y^2}
 \end{array}$$

4. Introduce los factores en el radical:

$$\begin{array}{lll}
 \text{(a)} \quad \frac{3}{5} \sqrt{\frac{5}{3}} & \text{(c)} \quad 5x \sqrt[3]{x} & \text{(e)} \quad 2xy^2 \sqrt[3]{x^2y} \\
 \text{(b)} \quad 2x^3 \sqrt{6x} & \text{(d)} \quad \frac{1}{2} x^2 y \sqrt[3]{\frac{2}{xy}} & \text{(f)} \quad (x+y) \sqrt{\frac{x-y}{x+y}}
 \end{array}$$

5. Opera y simplifica:

$$\begin{array}{lll}
 \text{(a)} \quad 2\sqrt{3} \cdot 3\sqrt{2} \cdot 5\sqrt{6} & \text{(g)} \quad \sqrt[4]{x^3y^2} : \sqrt{xy} & \text{(m)} \quad \sqrt[4]{a^3\sqrt{a}} \cdot \sqrt{a\sqrt{a}} \cdot \sqrt[6]{a^5\sqrt{a^5}} \\
 \text{(b)} \quad \sqrt[3]{81} : \sqrt[3]{9} & \text{(h)} \quad \frac{\sqrt{8a^2b} \sqrt[3]{9ab^2}}{\sqrt[6]{2a}} & \text{(n)} \quad \sqrt{a^3\sqrt{\frac{2b}{a}}} \cdot \sqrt[3]{\frac{2}{a}\sqrt{\frac{1}{2b}}} \\
 \text{(c)} \quad \frac{\sqrt{2ab^2} \cdot \sqrt{4a^2b}}{\sqrt{2a^3b}} & \text{(i)} \quad \sqrt[5]{3^2} \cdot \sqrt[8]{2^5} \cdot \sqrt[4]{5^3} & \text{(\tilde{n})} \quad \sqrt[3]{\sqrt[3]{\frac{1}{3}}\sqrt{3^3}} \\
 \text{(d)} \quad \sqrt{2} \sqrt[3]{2} \sqrt[4]{2} & \text{(j)} \quad \sqrt[8]{4} \cdot \sqrt[6]{16} \cdot \sqrt[12]{8^5} & \\
 \text{(e)} \quad \sqrt{2ab} \sqrt{4a^2b} \sqrt[6]{2a^5b^5} & \text{(k)} \quad \sqrt{x \sqrt[3]{y}} & \\
 \text{(f)} \quad \sqrt[4]{\frac{ac^5}{b}} \sqrt[8]{\frac{a^6b^5}{c^2}} & \text{(l)} \quad \sqrt[3]{\frac{a}{b}} \sqrt{\frac{b}{a}} & \text{(o)} \quad \sqrt{3a^2 + \sqrt{6a^4 - \sqrt{25a^8}}}
 \end{array}$$

6. Calcula las siguientes sumas:

(a) $3\sqrt{2} - 5\sqrt{8} + 7\sqrt{32}$

(b) $\frac{5}{6}\sqrt{27} + 4\sqrt{75} - \frac{3}{4}\sqrt{48} - \frac{5}{4}\sqrt{12}$

(c) $\sqrt{98} + \sqrt{18} + \sqrt{8}$

(d) $\sqrt{45x^3} + \sqrt{5x^2y} - \sqrt{80x^3}$

(e) $\frac{1}{2}\sqrt{12} + \frac{1}{3}\sqrt{27} + \frac{1}{5}\sqrt{75}$

(f) $\sqrt{8b^3} - \sqrt{18b^3} + \sqrt{128b^5}$

(g) $\sqrt[3]{54} - 2\sqrt[3]{16}$

(h) $\sqrt{\frac{1}{3}} + \sqrt{27}$

(i)

$$x\sqrt{4(3x+1)} - \sqrt{27x^3 + 9x^2} + \sqrt{3x^3 + x^2}$$

7. Calcula, racionalizando si fuera necesario::

(a) $\frac{3}{\sqrt{3}}$

(c) $\frac{1}{\sqrt{2}-1}$

(e) $\frac{6}{\sqrt[4]{4}}$

(b) $\frac{2}{\sqrt[3]{7}}$

(d) $\frac{6}{\sqrt{3}-1}$

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