BOLETÍN DE RADICALES

1 Calcula las siguientes raíces

$\sqrt{64} = \sqrt{2^6} = 2^3 = 8$

$\sqrt{121} = \sqrt{11^2} = 11$

$\sqrt{\frac{16}{9}} = \frac{4}{3}$

$\sqrt{0'0016} = \sqrt{\frac{16}{10000}} = \sqrt{\frac{2^4}{10^4}} = \frac{2^2}{10^2} = \frac{4}{100} = \frac{1}{25}$

$\sqrt{-100}$ no es un número real

2 Opera y extrae factores

a) $\sqrt{4} \cdot \sqrt{16} = 2 \cdot 4 = 8$

b) $\frac{\sqrt{75}}{\sqrt{3}} = \sqrt{\frac{75}{3}} = \sqrt{25} = 5$

c) $\frac{\sqrt{98} \cdot \sqrt{2}}{\sqrt{18}} = \sqrt{\frac{98 \cdot \cancel{2}}{\cancel{18}}} = \sqrt{\frac{98}{9}} = \sqrt{\frac{2 \cdot 7^2}{3^2}} = \frac{7}{3}\sqrt{2}$

d) $(2 \cdot \sqrt{7})^2 = 4 \cdot 7 = 28$

e) $\frac{\sqrt{5} \cdot \sqrt{45}}{(\sqrt{5})^2} = \frac{\sqrt{5 \cdot 3^2 \cdot 5}}{5} = \frac{5 \cdot 3}{5} = 3$

3 Extraer factores de los siguientes radicales

$\sqrt{12} = \sqrt{2^2 \cdot 3} = 2\sqrt{3}$

$\sqrt{32} = \sqrt{2^5} = 2^2\sqrt{2} = 4\sqrt{2}$

$\sqrt{125} = \sqrt{5^3} = 5\sqrt{5}$

$\sqrt{128} = \sqrt{2^7} = 2^3\sqrt{2} = 8\sqrt{2}$

$\sqrt{180} = \sqrt{3^2 \cdot 2^2 \cdot 5} = 6\sqrt{5}$

$\sqrt{600} = \sqrt{3 \cdot 2^3 \cdot 5^2} = 10\sqrt{6}$

4 Introducir factores dentro del radical

$4\sqrt{3} = \sqrt{4^2 \cdot 3} = \sqrt{16 \cdot 3} = \sqrt{48}$

$9\sqrt{2} = \sqrt{9^2 \cdot 2} = \sqrt{81 \cdot 2} = \sqrt{162}$

$6\sqrt{5} = \sqrt{6^2 \cdot 5} = \sqrt{36 \cdot 5} = \sqrt{180}$

$2\sqrt{3} = \sqrt{2^2 \cdot 3} = \sqrt{4 \cdot 3} = \sqrt{12}$

5 - Suma los siguientes radicales

a) $3\sqrt{2} + 2\sqrt{32} + 3\sqrt{18} - \sqrt{32} = 3\sqrt{2} + 2\sqrt{2^5} + 3\sqrt{3^2 \cdot 2} - \sqrt{2^5} = 3\sqrt{2} + 2 \cdot 2^2\sqrt{2} + 3 \cdot 3\sqrt{2} - 2^2\sqrt{2} =$

$3\sqrt{2} + 8\sqrt{2} + 9\sqrt{2} - 4\sqrt{2} = 16\sqrt{2}$

b) $\sqrt{5} + \sqrt{45} - \sqrt{80} = \sqrt{5} + \sqrt{3^2 \cdot 5} - \sqrt{2^4 \cdot 5} = \sqrt{5} + 3\sqrt{5} - 2^2\sqrt{5} = 4\sqrt{5} - 4\sqrt{5} = 0$

c) $\sqrt{24} - 5\sqrt{6} + 2\sqrt{486} = \sqrt{2^3 \cdot 3} - 5\sqrt{6} + 2 \cdot \sqrt{2 \cdot 3^5} = 2\sqrt{6} - 5\sqrt{6} + 2 \cdot 3^2\sqrt{6} = 2\sqrt{6} - 5\sqrt{6} + 18\sqrt{6} = 15\sqrt{6}$

6 Calcula

a) $2\sqrt[5]{5}+8\sqrt[5]{5}-3\sqrt[5]{5}=7\sqrt[5]{5}$

b) $\sqrt{18}+2\sqrt{50}-5\sqrt{8}=\sqrt{3^2\cdot 2}+2\cdot\sqrt{5^2\cdot 2}-5\sqrt{2^3}=3\sqrt{2}+2\cdot 5\sqrt{2}-5\cdot 2\sqrt{2}=3\sqrt{2}$

c) $\sqrt[4]{32}+3\sqrt[4]{162}-3\sqrt[4]{1250}=\sqrt[4]{2^5}+3\sqrt[4]{3^4\cdot 2}-3\sqrt[4]{5^4\cdot 2}=2\sqrt[4]{2}+3\cdot 3\sqrt[4]{2}-3\cdot 5\sqrt[4]{2}=$
$=-4\sqrt[4]{2}$

d) $(3-2\sqrt{2})^2=3^2+(2\sqrt{2})^2-2\cdot 3\cdot 2\sqrt{2}=9+8-12\sqrt{2}=17-2\sqrt{2}$

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

7 Calcula

a) $\sqrt{\frac{1}{3}}+\sqrt{\frac{1}{12}}=\sqrt{\frac{1}{3}}+\sqrt{\frac{1}{2^2\cdot 3}}=\sqrt{\frac{1}{3}}+\frac{1}{2}\sqrt{\frac{1}{3}}=\left(1+\frac{1}{2}\right)\sqrt{\frac{1}{3}}=\frac{3}{2}\sqrt{\frac{1}{3}}$

b) $\sqrt{3}\cdot\sqrt[3]{2}=\sqrt[6]{3^3}\cdot\sqrt[6]{2^2}=\sqrt[6]{27\cdot 4}=\sqrt[6]{108}$

c) $(1+\sqrt{3})-(1-\sqrt{3})^2=1+\sqrt{3}-\left(1+(\sqrt{3})^2-2\cdot 1\cdot\sqrt{3}\right)=1+\sqrt{3}-(1+3-2\sqrt{3})=1+\sqrt{3}-1-3+2\sqrt{3}=-3+3\sqrt{3}$

d) $\sqrt{2^3}\cdot\sqrt{3^3}=\sqrt{2^3\cdot 3^3}=2\cdot 3\sqrt{2\cdot 3}=6\sqrt{6}$

e) $4\sqrt[3]{16}-\frac{5}{2}\sqrt[3]{54}+\frac{2}{3}\sqrt[3]{250}=4\sqrt[3]{2^4}-\frac{5}{2}\sqrt[3]{3^3\cdot 2}+\frac{2}{3}\sqrt[3]{5^3\cdot 2}=4\cdot 2\sqrt[3]{2}-\frac{5}{2}\cdot 3\sqrt[3]{2}+\frac{2}{3}\cdot 5\sqrt[3]{2}=$
$=8\sqrt[3]{2}-\frac{15}{2}\sqrt[3]{2}+\frac{10}{3}\sqrt[3]{2}=\left(\frac{48-45+20}{6}\right)\sqrt[3]{2}=\frac{23}{6}\sqrt[3]{2}$

f) $\sqrt{27}-3\sqrt{3}+5\sqrt{12}-\sqrt{48}=\sqrt{3^3}-3\sqrt{3}+5\sqrt{2^2\cdot 3}-\sqrt{2^4\cdot 3}=\cancel{3\sqrt{3}}-\cancel{3\sqrt{3}}+5\cdot 2\sqrt{3}-2^2\sqrt{3}=10\sqrt{3}-4\sqrt{3}=6\sqrt{3}$

g) $2\sqrt{18}+3\sqrt{50}-2\sqrt{32}+\sqrt{2}=2\sqrt{3^2\cdot 2}+3\sqrt{5^2\cdot 2}-2\sqrt{2^5}+\sqrt{2}=2\cdot 3\sqrt{2}+3\cdot 5\sqrt{2}-2\cdot 2^2\sqrt{2}+\sqrt{2}=6\sqrt{2}+15\sqrt{2}-8\sqrt{2}+\sqrt{2}=14\sqrt{2}$

h) $4\sqrt{\frac{12}{25}}-\frac{3}{2}\sqrt{48}+\frac{2}{3}\sqrt{27}-\frac{3}{5}\sqrt{\frac{75}{4}}=4\sqrt{\frac{2^2\cdot 3}{5^2}}-\frac{3}{2}\sqrt{3\cdot 2^4}+\frac{2}{3}\sqrt{3^3}-\frac{3}{5}\sqrt{\frac{5^2\cdot 3}{2^2}}=4\cdot\frac{2}{5}\sqrt{3}-\frac{3}{2}\cdot 2^2\sqrt{3}+\frac{2}{3}\cdot 3\sqrt{3}-\frac{3}{5}\cdot\frac{5}{2}\sqrt{3}=$
$\frac{8}{5}\sqrt{3}-6\sqrt{3}+2\sqrt{3}-\frac{3}{2}\sqrt{3}=\left(\frac{8}{5}-6+2-\frac{3}{2}\right)\sqrt{3}=\left(\frac{8}{5}-4-\frac{3}{2}\right)\sqrt{3}=\left(\frac{16-40-15}{10}\right)\sqrt{3}=-\frac{39}{10}\sqrt{3}$

i) $\sqrt{3}\cdot\sqrt[4]{3^3}=\sqrt[4]{3^2}\cdot\sqrt[4]{3^3}=\sqrt[4]{3^5}=3\sqrt[4]{3}$

j) $\sqrt[4]{4^3}\cdot\sqrt[6]{8^5}=\sqrt[4]{(2^2)^3}\cdot\sqrt[6]{(2^3)^5}=\sqrt[4]{2^6}\cdot\sqrt[6]{2^{15}}=\sqrt{2^3}\cdot\sqrt{2^5}=\sqrt{2^8}=2^4=16$

$4=2^2$
$8=2^3$

$\sqrt[4]{2^6}=\sqrt{2^3}$
$\sqrt[6]{2^{15}}=\sqrt{2^5}$

l) $$\frac{\sqrt[3]{5^2\cdot 7}\cdot\sqrt[4]{5\cdot 7^2}}{\sqrt[9]{5^7\cdot 7^8}}=\sqrt[36]{\frac{(5^2\cdot 7)^{12}\cdot(5\cdot 7^2)^9}{(5^7\cdot 7^8)^4}}=\sqrt[36]{\frac{5^{24}\cdot 7^{12}\cdot 5^9\cdot 7^{18}}{5^{28}\cdot 7^{32}}}=\sqrt[36]{\frac{5^{33}\cdot 7^{30}}{5^{28}\cdot 7^{32}}}=\sqrt[36]{\frac{5^5}{7^2}}$$

m) $$\frac{\sqrt[3]{135}-4\sqrt[3]{5}+\sqrt[3]{5000}}{3\sqrt{12}}=\frac{\sqrt[3]{3^3\cdot 5}-4\sqrt[3]{5}+\sqrt[3]{5\cdot 10^3}}{3\sqrt{2^2\cdot 3}}=\frac{3\sqrt[3]{5}-4\sqrt[3]{5}+10\sqrt[3]{5}}{3\cdot 2\sqrt{3}}=\frac{9\sqrt[3]{5}}{6\sqrt{3}}=\frac{3}{2}\sqrt[6]{\frac{5^2}{3^3}}=\frac{3}{2}\sqrt[6]{\frac{25}{27}}$$