C. NTRA. SRA. DE LORETO	**MATEMÁTICAS 4º ESO** **RELACIÓN RADICALES III**

1. Multiplicar los siguientes radicales de distinto índice, reduciendo previamente a índice común, y simplificar:

a) $\sqrt{2}\,\sqrt[3]{32} = \sqrt{2}\,\sqrt[3]{2^5} = \sqrt[6]{2^3}\,\sqrt[6]{2^{10}} = \boxed{\sqrt[6]{2^{13}}}$

b) $\sqrt[3]{2}\,\sqrt[4]{8}$ $\left(Sol: \sqrt[12]{2^{13}}\right)$

c) $\sqrt[3]{2}\,\sqrt[5]{2}$ $\left(Sol: \sqrt[15]{2^{8}}\right)$

d) $\sqrt[3]{9}\,\sqrt[6]{3}$ $\left(Sol: \sqrt[6]{3^{5}}\right)$

e) $\sqrt[3]{2^2}\,\sqrt[4]{2}$ $\left(Sol: \sqrt[12]{2^{11}}\right)$

f) $\sqrt[4]{a^3}\,\sqrt[6]{a^5}$ $\left(Sol: \sqrt[12]{a^{19}}\right)$

g) $\sqrt[3]{2}\,\sqrt{3}\,\sqrt[4]{8}$ $\left(Sol: \sqrt[12]{2^{13}3^{6}}\right)$

h) $\sqrt[4]{8}\,\sqrt[3]{4}\,\sqrt{a^3}$ $\left(Sol: \sqrt[12]{2^{17}a^{18}}\right)$

2. Operar los siguientes radicales de distinto índice, reduciendo previamente a índice común:

a) $\dfrac{\sqrt{8}}{\sqrt[4]{2}} = \dfrac{\sqrt{2^3}}{\sqrt[4]{2}} = \dfrac{\sqrt[4]{2^6}}{\sqrt[4]{2}} = \boxed{\sqrt[4]{2^5}}$

b) $\dfrac{\sqrt[3]{9}}{\sqrt[6]{3}}$ $\left(Sol: \sqrt{3}\right)$

c) $\dfrac{\sqrt{2}}{\sqrt[3]{32}}$ $\left(Sol: \dfrac{1}{\sqrt[6]{2^7}}\right)$

d) $\dfrac{\sqrt[4]{4}}{\sqrt[6]{8}}$ $(Sol: 1)$

e) $\dfrac{\sqrt[3]{7^2}}{\sqrt{7}}$ $\left(Sol: \sqrt[6]{7}\right)$

f) $\dfrac{\sqrt{9}}{\sqrt[3]{3}}$ $\left(Sol: \sqrt[3]{9}\right)$

g) $\dfrac{\sqrt[5]{16}}{\sqrt{2}}$ $\left(Sol: \sqrt[10]{8}\right)$

h) $\dfrac{\sqrt{ab}}{\sqrt[3]{ab}}$ $\left(Sol: \sqrt[6]{ab}\right)$

3. Simplificar:

a) $\left(\sqrt[3]{a^2}\right)^6 = \sqrt[3]{a^{12}} = a^{12/3} = \boxed{a^4}$

b) $\left(\sqrt[6]{ab^2}\right)^2 =$ $\left(Sol: \sqrt[3]{ab^2}\right)$

c) $\left(\sqrt{x}\right)^3 \cdot \sqrt[3]{x} =$ $\left(Sol: \sqrt[6]{x^{11}}\right)$

d) $\dfrac{\left(\sqrt[3]{2}\right)^4}{\left(\sqrt[4]{2}\right)^2} =$ $\left(Sol: \sqrt[6]{2^5}\right)$

e) $\dfrac{\sqrt{2}\left(\sqrt[3]{2}\right)^4}{\left(\sqrt[4]{2}\right)^3} =$ $\left(Sol: \sqrt[12]{2^{13}}\right)$

f) $\sqrt{2}\left(\sqrt[4]{2}\right)^3\left(\sqrt[3]{2}\right)^2 =$ $\left(Sol: \sqrt[12]{2^{23}}\right)$

g) $\dfrac{\left(\sqrt[4]{3}\right)^5}{\left(\sqrt{3}\right)^2\left(\sqrt[3]{3}\right)^4} =$ $\left(Sol: \dfrac{1}{\sqrt[12]{3^{13}}}\right)$

h) $\sqrt{2}\left(\sqrt[4]{2}\sqrt[3]{4}\right)^3 =$ $\left(Sol: \sqrt[4]{2^{13}}\right)$

i) $\sqrt{\sqrt{2^6}} =$ $\left(Sol: \sqrt{8}\right)$

j) $\sqrt{\sqrt{12}} =$ $\left(Sol: \sqrt[4]{12}\right)$

k) $\left(\sqrt{\sqrt{\sqrt{2}}}\right)^8 =$ $(Sol: 2)$

l) $\sqrt[3]{\sqrt[4]{x^5x^7}} =$ $(Sol: x)$

m) $\sqrt[3]{\sqrt[4]{x^{15}}} =$ $\left(Sol: \sqrt[4]{x^5}\right)$

n) $\left(\sqrt[3]{\sqrt[7]{\sqrt{8x^3}}}\right)^7 =$ $\left(Sol: \sqrt{2x}\right)$

o) $\left(\sqrt{\sqrt[3]{5}}\right)^5\left(\sqrt[4]{5}\right)^3 =$ $\left(Sol: \sqrt[12]{5^{19}}\right)$

4. Calcular, dando el resultado lo más simplificado posible:

a) $\left(2\sqrt{2}\right)^2 =$ *(Soluc: 8)*

b) $\left(3\sqrt{5}\right)^2 =$ *(Soluc: 45)*

*

c) $(1+\sqrt{2})^2 =$ *(Soluc: $3+2\sqrt{2}$)*

d) $(\sqrt{2}+\sqrt{3})^2 =$ *(Soluc: $5+2\sqrt{6}$)*

e) $(\sqrt{3}-\sqrt{2})^2 =$ *(Soluc: $5-2\sqrt{6}$)*

f) $(\sqrt{2}+1)(\sqrt{2}-1)=$ *(Soluc: 1)*

g) $(\sqrt{3}+\sqrt{2})(\sqrt{3}-\sqrt{2})=$ *(Soluc: 1)*

h) $(1+\sqrt{2})(1-\sqrt{8})=$ *(Soluc: $-3-\sqrt{2}$)*

i) $(2-\sqrt{3})(1+\sqrt{12})=$

(Soluc: $-4+3\sqrt{3}$)

j) $2\sqrt{3}\cdot 3\sqrt{2} =$ *(Soluc: $6\sqrt{6}$)*

k) $2\sqrt{8}\cdot 8\sqrt{2} =$ *(Soluc: 64)*

l) $3\sqrt{6}\cdot 2\sqrt{3} =$ *(Soluc: $18\sqrt{2}$)*

m) $2\sqrt{15}\cdot 3\sqrt{15} =$ *(Soluc: 90)*

n) $(5\sqrt{3})^2 =$ *(Soluc: 75)*

o) $(5+\sqrt{3})^2 =$ *(Soluc: $28+10\sqrt{3}$)*

p) $(5-\sqrt{3})^2 =$ *(Soluc: $28-10\sqrt{3}$)*

q) $(5+\sqrt{3})(5-\sqrt{3})=$ *(Soluc: 22)*

r) $(\sqrt{5}+\sqrt{3})^2 =$ *(Soluc: $8+2\sqrt{15}$)*

s) $(\sqrt{5}-\sqrt{3})^2 =$ *(Soluc: $8-2\sqrt{15}$)*

t) $(2\sqrt{3}+5)^2 =$ *(Soluc: $37+20\sqrt{3}$)*

u) $(3\sqrt{2}+2\sqrt{3})^2 =$ *(Soluc: $30+12\sqrt{6}$)*

v) $(2\sqrt{3}+3\sqrt{2})(2\sqrt{3}-3\sqrt{2})=$ *(Soluc: -6)*

w) $\sqrt{2}(\sqrt{2}-4)=$ *(Soluc: $2-4\sqrt{2}$)*

x) $(2-\sqrt{3})\sqrt{3} =$ *(Soluc: $2\sqrt{3}-3$)*

y) $(3\sqrt{2}+2)(2\sqrt{3}-\sqrt{6})=$

(Soluc: $4\sqrt{6}-2\sqrt{3}$)

5. Sumar los siguientes radicales, reduciéndolos previamente a radicales semejantes (Fíjate en el 1$^{\underline{er}}$ ejemplo):

a) $\sqrt{2}+\sqrt{8}+\sqrt{18}-\sqrt{32}=\sqrt{2}+\sqrt{2^3}+\sqrt{3^2 2}-\sqrt{2^5}=\sqrt{2}+2\sqrt{2}+3\sqrt{2}-2^2\sqrt{2}=\sqrt{2}+2\sqrt{2}+3\sqrt{2}-4\sqrt{2}=\boxed{2\sqrt{2}}$

FACTORIZAMOS RADICANDOS — EXTRAEMOS FACTORES — SUMAMOS RADICALES SEMEJANTES

b) $\sqrt{5}+\sqrt{45}+\sqrt{180}-\sqrt{80}$ *(Soluc: $6\sqrt{5}$)*

c) $\sqrt{24}-5\sqrt{6}+\sqrt{486}$ *(Soluc: $6\sqrt{6}$)*

d) $\sqrt[3]{54}-2\cdot\sqrt[3]{16}$ *(Soluc: $-\sqrt[3]{2}$)*

e) $27\sqrt{3}-5\sqrt{27}-9\sqrt{12}$ *(Soluc: $-6\sqrt{3}$)*

f) $\sqrt{75}-\sqrt{20}-\sqrt{12}+\sqrt{45}$ *(Soluc: $3\sqrt{3}+\sqrt{5}$)*

g) $2\sqrt{8}+5\sqrt{72}-7\sqrt{18}-\sqrt{50}$ *(Soluc: $8\sqrt{2}$)*

h) $5\sqrt[6]{256}-2\sqrt[3]{16}-\sqrt[3]{128}=$ *(Soluc: $2\sqrt[3]{2}$)*

i) $\sqrt{32}+2\sqrt{3}-\sqrt{8}+\sqrt{2}-2\sqrt{12}$ *(Soluc: $3\sqrt{2}-2\sqrt{3}$)*

j) $3\sqrt{24}-\frac{1}{3}\sqrt{54}+\sqrt{150}$ *(Soluc: $10\sqrt{6}$)*

k) $5\sqrt{2}+4\sqrt{8}+3\sqrt{18}+2\sqrt{32}+\sqrt{50}$ *(Soluc: $35\sqrt{2}$)*

l) $\sqrt{20}-\frac{1}{5}\sqrt{5}+\sqrt{45}$ *(Soluc: $\frac{24}{5}\sqrt{5}$)*

m) $2\sqrt{108}-\sqrt{75}-\sqrt{27}-\sqrt{12}-\sqrt{3}$ *(Soluc: $\sqrt{3}$)*

n) $\sqrt{128}+5\sqrt{12}-2\sqrt{18}-3\sqrt{27}-\sqrt{2}=$ *(Soluc: $\sqrt{2}+\sqrt{3}$)*

o) $\sqrt{5}+\sqrt{\frac{45}{4}}$ *(Soluc: $\frac{5}{2}\sqrt{5}$)*

p) $\sqrt{\frac{2}{3}}+\sqrt{\frac{18}{75}}$ *(Soluc: $\frac{8}{5}\sqrt{\frac{2}{3}}$)*

6. Racionalizar denominadores, y simplificar:

a) $\frac{1}{\sqrt{5}}$ (Soluc: $\frac{\sqrt{5}}{5}$)

b) $\frac{5}{2\sqrt{3}}$ (Soluc: $\frac{5\sqrt{3}}{6}$)

c) $\frac{5}{3\sqrt{5}}$ (Soluc: $\frac{\sqrt{5}}{3}$)

d) $\frac{\sqrt{2}}{\sqrt{3}}$ (Soluc: $\frac{\sqrt{6}}{3}$)

e) $\sqrt{\frac{3}{2}}$ (Soluc: $\frac{\sqrt{6}}{2}$)

f) $\frac{2-\sqrt{2}}{\sqrt{7}}$ (Soluc: $\frac{2\sqrt{7}-\sqrt{14}}{7}$)

g) $\frac{2+\sqrt{2}}{\sqrt{2}}$ (Soluc: $\sqrt{2}+1$)

h) $\frac{4}{\sqrt{6}}$ (Soluc: $\frac{2\sqrt{6}}{3}$)

i) $\frac{1}{\sqrt{27}} =$ (Soluc: $\frac{\sqrt{3}}{9}$)

7. Racionalizar denominadores, y simplificar:

a) $\frac{1}{\sqrt[3]{2}}$ (Soluc: $\frac{\sqrt[3]{4}}{2}$)

b) $\frac{3}{\sqrt[5]{9}}$ (Soluc: $\sqrt[5]{27}$)

c) $\frac{8}{\sqrt[6]{8}}$ (Soluc: $4\sqrt{2}$)

d) $\frac{10}{3\sqrt[4]{125}}$ (Soluc: $\frac{2}{3}\sqrt[4]{5}$)

e) $\frac{\sqrt[5]{25}}{5\sqrt[3]{5}}$ (Soluc: $\frac{\sqrt[15]{5}}{5}$)

f) $\frac{10}{\sqrt[5]{128}} =$ (Soluc: $\frac{5}{2}\sqrt[5]{8}$)

8.

Racionalizar denominadores, y simplificar:

a) $\dfrac{1+\sqrt{2}}{1-\sqrt{3}}$ *(Soluc:* $-\dfrac{1+\sqrt{2}+\sqrt{3}+\sqrt{6}}{2}$ *)*

b) $\dfrac{9}{\sqrt{7}-\sqrt{3}}$ *(Soluc:* $\dfrac{9}{4}\sqrt{7}+\dfrac{9}{4}\sqrt{3}$ *)*

c) $\dfrac{4(\sqrt{5}+2)}{\sqrt{5}-1}$ *(Soluc:* $7+3\sqrt{5}$ *)*

d) $\dfrac{3(\sqrt{7}+1)}{\sqrt{7}+2}$ *(Soluc:* $5-\sqrt{7}$ *)*

e) $\dfrac{\sqrt{3}+1}{\sqrt{3}-1}$ *(Soluc:* $2+\sqrt{3}$ *)*

f) $\dfrac{1+\sqrt{2}}{2-\sqrt{2}}$ *(Soluc:* $2+\dfrac{3}{2}\sqrt{2}$ *)*

g) $\dfrac{5-7\sqrt{3}}{1+\sqrt{3}}$ *(Soluc:* $-13+6\sqrt{3}$ *)*

j) $\frac{3}{2\sqrt{3}}$ *(Soluc:* $\frac{\sqrt{3}}{2}$*)*

k) $\frac{12}{\sqrt{8}} =$ *(Soluc:* $3\sqrt{2}$ *)*

l) $\frac{\sqrt{2}-4}{3\sqrt{2}} =$ *(Soluc:* $\frac{1}{3}-\frac{2\sqrt{2}}{3}$*)*

m) $\frac{15\sqrt{3}}{2\sqrt{5}}$ *(Soluc:* $\frac{3\sqrt{15}}{2}$*)*

n) $\frac{\sqrt{3}+3}{2\sqrt{3}} =$ *(Soluc:* $\frac{1+\sqrt{3}}{2}$*)*

o) $\frac{-2\sqrt{7}}{7\sqrt{2}}$ *(Soluc:* $-\frac{\sqrt{14}}{7}$*)*

p) $\frac{\sqrt{11}}{\sqrt{12}}$ *(Soluc:* $\frac{\sqrt{33}}{6}$*)*