

ALGEBRA Chapter 17

2th
SECONDARY
Session 2

RADICACION RADICALES DOBLES







MOTIVATING STRATEGY



"VIVEsegunidosses a morir mañana.

APRENDE como si fueses a vivir siempre."

Mahatma Gandhi



RADICACIÓN

Es la operación matemática en la cual, dada una variable real "x" y un número natural "n", existe un tercer número "r" llamado raíz, siempre que:

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\sqrt[n]{x} = r \iff r^n = x \qquad (n \in \mathbb{N} \ ; \ n \ge 2)
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n: indice
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PROPIEDADES

1)
$$\sqrt[n]{a.b} = \sqrt[n]{a} \sqrt[n]{b}$$

$$2) \quad \sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$$

3)
$$\sqrt[m]{\sqrt[n]{a}} = \sqrt[m.n]{a}$$



Extraer un factor de un radical: Ejemplo:

*
$$\sqrt{180} = \sqrt{36.5}$$

$$\sqrt{180} = \sqrt{36}.\sqrt{5}$$

$$\sqrt{180} = 6\sqrt{5}$$

Introducir un factor a un radical:

Ejemplo:

$$*2.\sqrt{17} = \sqrt{4}.\sqrt{17}$$

$$2.\sqrt{17} = \sqrt{4.17} = \sqrt{68}$$



TRANSFORMACIÓN DE RADICALES DOBLES A RADICALES SIMPLES

$$\sqrt{A \pm \sqrt{B}} = \sqrt{\frac{A+C}{2}} \pm \sqrt{\frac{A-C}{2}}$$

$$C = \sqrt{A^2 - B}$$

Ejemplo: Transforme a radicales simples $\sqrt{3 + \sqrt{5}}$

Resolución:
$$C = \sqrt{3^2 - 5} = \sqrt{4} = 2$$

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



Método práctico:

$$\sqrt{A \pm \sqrt{B}} = \sqrt{(x+y) \pm 2\sqrt{x} \cdot y} = \sqrt{x} \pm \sqrt{y} \qquad (x > y)$$

Ejemplo: Transforme a radicales simples $\sqrt{9 + \sqrt{72}}$

Resolución:

$$\sqrt{9+\sqrt{72}} = \sqrt{9+\sqrt{4.18}}$$

$$\sqrt{9 + \sqrt{72}} = \sqrt{9 + 2\sqrt{18}} \\ \frac{6+3}{6\times3}$$

$$\sqrt{9+\sqrt{72}}=\sqrt{6}+\sqrt{3}$$



1.- Calcule

$$F = \frac{\sqrt{75}}{\sqrt{3}} + \frac{\sqrt{98}}{\sqrt{2}} - \frac{\sqrt{27}}{\sqrt{3}}$$

$$F = \frac{\sqrt{75}}{\sqrt{3}} + \frac{\sqrt{98}}{\sqrt{2}} - \frac{\sqrt{27}}{\sqrt{3}}$$

$$F = \sqrt{\frac{75}{3}} + \sqrt{\frac{98}{2}} - \sqrt{\frac{27}{3}}$$

$$F = \sqrt{25} + \sqrt{49} - \sqrt{9}$$

$$F = 5 + 7 - 3 = 9$$





2.- Se cumple que

$$\sqrt{5+2\sqrt{6}}+\sqrt{8-2\sqrt{15}}\equiv\sqrt{A+2\sqrt{B}}$$

Calcule A + B.

RESOLUCIÓN

$$\sqrt{5} + 2\sqrt{6} + \sqrt{8} - 2\sqrt{15} \equiv \sqrt{A + 2\sqrt{B}}$$

$$\sqrt{3} + \sqrt{2} + \sqrt{5} - \sqrt{3} \equiv \sqrt{A + 2\sqrt{B}}$$

$$\sqrt{5} + \sqrt{2} \equiv \sqrt{x} + \sqrt{y}$$

$$A = x + y = 5 + 2 \rightarrow A = 7$$

$$B = x \cdot y = 5 \cdot 2 \rightarrow B = 10$$

Radicales dobles a simples (Forma práctica) $A \pm 2\sqrt{B} = \sqrt{x} \pm \sqrt{y}; x > y$ $x + y = x \cdot y$

Recuerdă

Rpta:

$$A+B=17$$



3.- Efectúe

$$T = \frac{4\sqrt{8} + 8\sqrt{32} - \sqrt{50}}{2\sqrt{18} - \sqrt{2}}$$

RESOLUCIÓN

$$T = \frac{4.\sqrt{81} + \sqrt{22}\sqrt{82}.\sqrt{160}/2 - \sqrt{25}.\sqrt{2}}{2\sqrt{182}\sqrt{9.2}/2 - \sqrt{2}}$$

$$T = \frac{4.2.\sqrt{2} + 8.4.\sqrt{2} - 5.\sqrt{2}}{2.3.\sqrt{2} - \sqrt{2}}$$

$$T = \frac{8\sqrt{2} + 32\sqrt{2} - 5\sqrt{2}}{6\sqrt{2} - \sqrt{2}} = \frac{35\sqrt{2}}{5\sqrt{2}}$$



Rpta:

T = 7



4.- Transforme a radicales simples

$$F = \sqrt{7 + 2\sqrt{10}} - \sqrt{5 - 2\sqrt{6}} - \sqrt{5} + \sqrt{3}$$

$$M = \sqrt{7 + 2\sqrt{10}} - \sqrt{5 - 2\sqrt{6}} - \sqrt{5} + \sqrt{3}$$

$$M = \sqrt{5} + \sqrt{2} - (\sqrt{3} - \sqrt{2}) - \sqrt{5} + \sqrt{3}$$

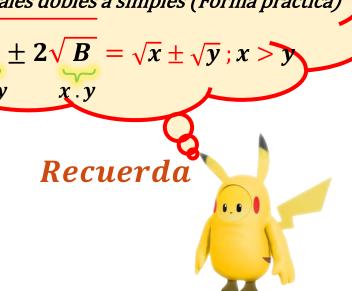
$$M = \sqrt{5} + \sqrt{2} - \sqrt{3} + \sqrt{2} - \sqrt{5} + \sqrt{3}$$

$$M = 2\sqrt{2}$$

$$Recuerda$$

$$Recuerda$$

$$M=2\sqrt{2}$$





5.- Calcule

$$M = \sqrt{9 + \sqrt{56}} + \sqrt{10 - \sqrt{84}} + \sqrt{3} - \sqrt{2}$$

$$M = \sqrt{9 + \sqrt{56} + \sqrt{10 - \sqrt{84} + \sqrt{3} - \sqrt{2}}}$$

$$M = \sqrt{\frac{9}{x+3}} + 2\sqrt{\frac{14}{x+3}} + \sqrt{\frac{10}{7+3}} - 2\sqrt{\frac{21}{x+3}} + \sqrt{3} - \sqrt{2}\sqrt{\frac{x+y}{x+y}}$$

$$M = \sqrt{7} + \sqrt{2} + \sqrt{7} - \sqrt{3} + \sqrt{3} - \sqrt{2}$$

Rpta:
$$M = 2\sqrt{7}$$



$$A \pm 2\sqrt{B} = \sqrt{x} \pm \sqrt{y}; x > y$$

$$x + y$$
 $x \cdot y$







6.- Reduzca

$$M = \sqrt{12 + 4\sqrt{5}} - \sqrt{16 - 4\sqrt{15}} - \sqrt{6} + \sqrt{8}$$

$$M = \sqrt{12 + 4\sqrt{5}} - \sqrt{16 - 4\sqrt{15}} - \sqrt{6} + \sqrt{8}$$

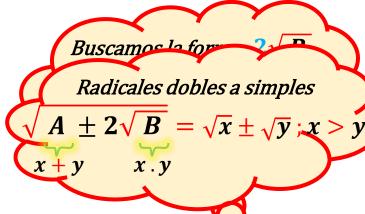
$$M = \sqrt{12 + 2.2\sqrt{5}} - \sqrt{16 - 2.2\sqrt{15}} - \sqrt{6} + \sqrt{8}$$

$$M = \sqrt{\frac{12}{10 + 2} + 2\sqrt{\frac{20}{10 \cdot 2}}} - \sqrt{\frac{16}{10 \cdot 6}} - 2\sqrt{\frac{60}{60}} - \sqrt{6} + 2\sqrt{2}$$

$$M = \sqrt{10} + \sqrt{2} - (\sqrt{10} - \sqrt{6}) - \sqrt{6} + 2\sqrt{2}$$

$$M = \sqrt{10} + \sqrt{2} - \sqrt{10} + \sqrt{6} - \sqrt{6} + 2\sqrt{2}$$
 Rpta: $M = 3\sqrt{2}$

$$M=3\sqrt{2}$$







7.- Efectúe

$$M=\sqrt{11+6\sqrt{2}}$$

$$M = \sqrt{11 + 6\sqrt{2}}$$

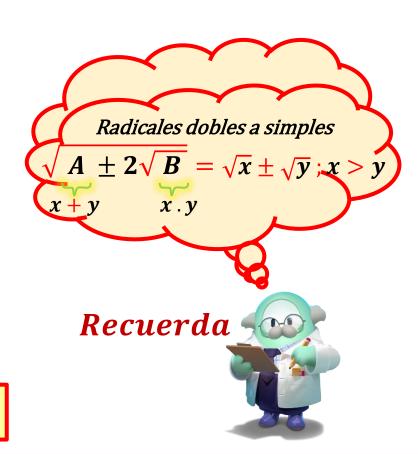
$$M = \sqrt{11 + (2.3\sqrt{2})}$$

$$M = \sqrt{11 + 2\sqrt{18}}$$

$$\sqrt{2 + 2}$$

$$M = \sqrt{9} + \sqrt{2}$$

Rpta:
$$M = 3 + \sqrt{2}$$





8.- Calcule A + B si

$$\sqrt{7+\sqrt{40}}+\sqrt{9-\sqrt{56}}\equiv\sqrt{A+2\sqrt{B}}$$

Sabiendo además que el valor de A+B representa la edad de Catalina

hace 2 años. ¿Cuál es la edad de Catalina?

RESOLUCIÓN

$$\sqrt{7} + \sqrt{40} + \sqrt{9} - \sqrt{56} = \sqrt{A + 2\sqrt{B}}$$

$$\sqrt{7} + 2\sqrt{10} + \sqrt{9} - 2\sqrt{14} = \sqrt{A + 2\sqrt{B}}$$

$$\frac{5 + 2}{5 + 2} = \frac{5 \cdot 2}{5 \cdot 2} = \frac{7 \cdot 2}{7 \cdot 2}$$

$$\frac{Hace 2 \text{ años}}{A + B} = 47 = 47$$

A + B = 47

Actual

49 años

 $\sqrt{7} + \sqrt{5} \equiv \sqrt{x} + \sqrt{y}$

$$\int A = x + y = 7 + 5 \rightarrow A = 12$$

Recuerda 👊

Radicales dobles a simples

 $A \pm 2\sqrt{B} = \sqrt{x} \pm \sqrt{y}; x > y$