Radikales III

1.- Simplificar los siguientes radicales:

1. $\sqrt{18}$
2. $3\sqrt{48}$
3. $\sqrt[3]{16}$
4. $\frac{1}{2}\sqrt[3]{128}$
5. $2\sqrt[4]{243}$
6. $\sqrt{50a^2b}$
7. $3\sqrt{81x^3y^4}$
8. $\frac{1}{2}\sqrt{108a^5b^7}$
9. $\frac{3}{5}\sqrt{125mn^6}$
10. $2a\sqrt{44a^3b^7c^9}$
11. $2\sqrt[3]{16x^2y^7}$
12. $\frac{2}{3}\sqrt[3]{27m^2n^8}$
13. $5a\sqrt[3]{160x^7y^9z^{13}}$
14. $\sqrt[4]{80a^4b^5c^{12}}$
15. $3\sqrt[4]{5x^8y^{14}z^{16}}$
16. $\frac{2}{5}\sqrt[5]{32x^2y^{11}}$
17. $2xy\sqrt[3]{128x^2y^8}$
18. $\frac{1}{3a}\sqrt{27a^3m^7}$
19. $\frac{3}{5x}\sqrt[3]{375a^8b}$
20. $\frac{1}{3}\sqrt[4]{81a^4b}$
21. $\sqrt{9a+18b}$
22. $\sqrt{3a^3b^2-3a^2b^2}$
23. $\sqrt{8x^2y^4+16xy^4}$
24. $\sqrt{2x^2-4xy+2y^2}$
25. $\sqrt{(a-b)(a^2-b^2)}$
26. $\sqrt{2am^2+4amn+2an^2}$
27. $\sqrt{9a^3-36a^2+36a}$

2.- Simplifica los siguientes radicales:

1. $\sqrt{\frac{1}{5}}$
2. $\sqrt{\frac{3}{8}}$
3. $2\sqrt{\frac{1}{2}}$
4. $3\sqrt{\frac{1}{6}}$
5. $\frac{1}{2}\sqrt{\frac{2}{3}}$
6. $\sqrt{\frac{a^2}{8x}}$
7. $\frac{3}{2}\sqrt{\frac{4a^2}{27y^3}}$
8. $5\sqrt{\frac{9n}{5m^3}}$
9. $6\sqrt{\frac{5a^3}{24x^2}}$
10. $\sqrt[3]{\frac{2}{3}}$
11. $5\sqrt[3]{\frac{1}{5}}$
12. $\sqrt[3]{\frac{8}{9x^2}}$
13. $2b^2\sqrt[3]{\frac{125}{4b^5}}$
14. $\frac{2}{3}\sqrt[3]{\frac{27x^2}{16a^2b^4}}$
15. $2xy\sqrt[4]{\frac{81a^2}{4x^3y}}$

3.- Simplificar

1. $\sqrt[4]{9}$
2. $\sqrt[6]{4}$
3. $\sqrt[9]{27}$
4. $\sqrt[8]{16}$
5. $3\sqrt[12]{64}$
6. $\sqrt[4]{25a^2b^2}$
7. $5\sqrt[6]{49a^2b^4}$
8. $\sqrt[8]{81x^4y^8}$
9. $\sqrt[10]{32x^{10}y^{15}}$
10. $\sqrt[12]{64m^6n^{18}}$
11. $\sqrt[6]{343a^9x^{12}}$
12. $\sqrt[15]{m^{10}n^{15}x^{20}}$

4.- Introducir factores en los radicales:

1. $2\sqrt{3}$
2. $3\sqrt{5}$
3. $5a\sqrt{b}$
4. $\frac{1}{2}\sqrt{2}$
5. $3a\sqrt{2a^2}$
6. $5x^2y\sqrt{3}$
7. $ab^2\sqrt[3]{a^2b}$
8. $4m\sqrt[3]{2m^2}$
9. $2a\sqrt[4]{8ab^3}$
10. $(a+b)\sqrt{\frac{a}{a+b}}$
11. $(x+1)\sqrt{\frac{2x}{x+1}}$
12. $(x-1)\sqrt{\frac{x-2}{x-1}}$

5.- Reducir los siguientes radicales a índice común:

1. $\sqrt{5}, \sqrt[3]{2}$
2. $\sqrt{2}, \sqrt[4]{3}$
3. $\sqrt{3}, \sqrt[3]{4}, \sqrt[4]{8}$
4. $\sqrt{2}, \sqrt[3]{3}, \sqrt[4]{5}, \sqrt[6]{7}$
5. $\sqrt{5x}, \sqrt[3]{4x^2y}, \sqrt[6]{7a^3b}$
6. $\sqrt[3]{2ab}, \sqrt[5]{3a^2x}, \sqrt[15]{5a^3x^2}$
7. $\sqrt[4]{8a^2x^3}, \sqrt[6]{3a^5m^4}$
8. $\sqrt[3]{x^2}, \sqrt[6]{2y^3}, \sqrt[9]{5m^7}$
9. $\sqrt[4]{3a}, \sqrt[5]{2b^2}, \sqrt[10]{7x^3}$
10. $2\sqrt[3]{a}, 3\sqrt{2b}, 4\sqrt[4]{5x^2}$
11. $3\sqrt[3]{a^2}, \frac{1}{2}\sqrt[6]{b^3}, 4\sqrt[9]{x^5}$
12. $\sqrt{2m}, 3\sqrt[5]{a^3x^4}, 2\sqrt[10]{x^7y^2}$

6.- Ordena de mayor a menor los siguientes números:

1. $\sqrt{5}, \sqrt[3]{2}$
2. $\sqrt[6]{15}, \sqrt[4]{7}$
3. $\sqrt{11}, \sqrt[3]{43}$
4. $\sqrt{3}, \sqrt[3]{5}, \sqrt[6]{32}$
5. $\sqrt[4]{3}, \sqrt[5]{4}, \sqrt[10]{15}$
6. $\sqrt[3]{2}, \sqrt[6]{3}, \sqrt[9]{9}$

7.- Opera los siguientes radicales semejantes:

1. $7\sqrt{2}-15\sqrt{2}$
2. $4\sqrt{3}-20\sqrt{3}+19\sqrt{3}$
3. $\sqrt{5}-22\sqrt{5}-8\sqrt{5}$
4. $\sqrt{2}-9\sqrt{2}+30\sqrt{2}-40\sqrt{2}$
5. $\frac{3}{4}\sqrt{2}-\frac{1}{2}\sqrt{2}$
6. $\frac{3}{5}\sqrt{3}-\sqrt{3}$
7. $2\sqrt{5}-\frac{1}{2}\sqrt{5}+\frac{3}{4}\sqrt{5}$
8. $\frac{1}{4}\sqrt{3}+5\sqrt{3}-\frac{1}{8}\sqrt{3}$
9. $a\sqrt{b}-3a\sqrt{b}+7a\sqrt{b}$
10. $3x\sqrt{y}+(a-x)\sqrt{y}-2x\sqrt{y}$
11. $(x-1)\sqrt{3}+(x-3)\sqrt{3}+4\sqrt{3}$
12. $\frac{1}{3}\sqrt[3]{2}-\frac{2}{3}\sqrt[3]{2}+2\sqrt[3]{2}$
13. $\frac{3}{5}\sqrt[3]{2}-\frac{1}{4}\sqrt[3]{2}+\frac{1}{6}\sqrt[3]{2}$
14. $x\sqrt[3]{a^2}-(a-2x)\sqrt[3]{a^2}+(2a-3x)\sqrt[3]{a^2}$

8.- Opera

1. $\sqrt{45}-\sqrt{27}-\sqrt{20}$
2. $\sqrt{175}+\sqrt{243}-\sqrt{63}-2\sqrt{75}$
3. $\sqrt{80}-2\sqrt{252}+3\sqrt{405}-3\sqrt{500}$
4. $7\sqrt{450}-4\sqrt{320}+3\sqrt{80}-5\sqrt{800}$
5. $\frac{1}{2}\sqrt{12}-\frac{1}{3}\sqrt{18}+\frac{3}{4}\sqrt{48}+\frac{1}{6}\sqrt{72}$
6. $\frac{3}{4}\sqrt{176}-\frac{2}{3}\sqrt{45}+\frac{1}{8}\sqrt{320}+\frac{1}{5}\sqrt{275}$
7. $\frac{1}{7}\sqrt{147}-\frac{1}{5}\sqrt{700}+\frac{1}{10}\sqrt{28}+\frac{1}{3}\sqrt{2{,}187}$
8. $\sqrt{\frac{1}{3}}-\sqrt{\frac{1}{2}}+\sqrt{\frac{3}{4}}$
9. $\sqrt{\frac{9}{5}}-\sqrt{\frac{1}{6}}-\sqrt{\frac{1}{20}}+\sqrt{6}$
10. $\frac{5}{3}\sqrt{\frac{3}{5}}-\frac{1}{2}\sqrt{\frac{3}{4}}-5\sqrt{\frac{1}{15}}+3\sqrt{\frac{1}{12}}$
11. $5\sqrt{128}-\frac{1}{3}\sqrt{\frac{1}{3}}-5\sqrt{98}+\sqrt{\frac{1}{27}}$
12. $2\sqrt{700}-15\sqrt{\frac{1}{45}}+4\sqrt{\frac{5}{16}}-56\sqrt{\frac{1}{7}}$
13. $\sqrt{25ax^2}+\sqrt{49b}-\sqrt{9ax^2}$
14. $2\sqrt{m^2n}-\sqrt{9m^2n}+\sqrt{16mn^2}-\sqrt{4mn^2}$
15. $a\sqrt{320x}-7\sqrt{5a^2x}-(a-4b)\sqrt{5x}$
16. $\sqrt{9x-9}+\sqrt{4x-4}-5\sqrt{x-1}$
17. $2\sqrt{a^4x+3a^4y}-a^2\sqrt{9x+27y}+\sqrt{25a^4x+75a^4y}$
18. $3a\sqrt{\frac{a+1}{a^2}}-\sqrt{4a+4}+(a+1)\sqrt{\frac{1}{a+1}}$
19. $(a-b)\sqrt{\frac{a+b}{a-b}}-(a+b)\sqrt{\frac{a-b}{a+b}}+(2a-2b)\sqrt{\frac{1}{a-b}}$

9.- Desarrolla:

1. $(4\sqrt{2})^2$
2. $(2\sqrt{3})^2$
3. $(5\sqrt{7})^2$
4. $(2\sqrt[3]{4})^2$
5. $(3\sqrt[3]{2a^2b})^4$
6. $(\sqrt[4]{8x^3})^2$
7. $(\sqrt[5]{81ab^3})^3$
8. $(\sqrt[6]{18})^3$
9. $(4a\sqrt{2x})^2$
10. $(2\sqrt{x+1})^2$
11. $(3\sqrt{x-a})^2$
12. $(4\sqrt[6]{9a^3b^4})^3$

Elevar al cuadrado

13. $\sqrt{2}-\sqrt{3}$
14. $4\sqrt{2}+\sqrt{3}$
15. $\sqrt{5}-\sqrt{7}$
16. $5\sqrt{7}-6$
17. $\sqrt{x}+\sqrt{x-1}$
18. $\sqrt{x+1}-4\sqrt{x}$
19. $\sqrt{a+1}-\sqrt{a-1}$
20. $2\sqrt{2x-1}+\sqrt{2x+1}$

10.- Calcula:

1. $\sqrt[3]{54}-\sqrt[3]{24}-\sqrt[3]{16}$
2. $\sqrt[3]{40}+\sqrt[3]{1{,}029}-\sqrt[3]{625}$
3. $2\sqrt[3]{250}-4\sqrt[3]{24}-6\sqrt[3]{16}+\sqrt[3]{2{,}187}$
4. $5\sqrt[3]{48}-3\sqrt[3]{3{,}645}-2\sqrt[3]{384}+4\sqrt[3]{1{,}715}$
5. $\sqrt[3]{81}-3\sqrt[3]{375}+\sqrt[3]{686}+2\sqrt[3]{648}$
6. $\frac{1}{2}\sqrt[3]{24}-\frac{2}{3}\sqrt[3]{54}+\frac{3}{5}\sqrt[3]{375}-\frac{1}{4}\sqrt[3]{128}$
7. $\frac{3}{5}\sqrt[3]{625}-\frac{3}{2}\sqrt[3]{192}+\frac{1}{7}\sqrt[3]{1{,}715}-\frac{3}{8}\sqrt[3]{1{,}536}$
8. $\sqrt[3]{\frac{1}{4}}+\sqrt[3]{\frac{1}{3}}-\sqrt[3]{\frac{2}{27}}$
9. $6\sqrt[3]{\frac{1}{24}}+\sqrt[3]{\frac{1}{25}}-2\sqrt[3]{\frac{5}{64}}$
10. $7\sqrt[3]{\frac{1}{49}}+\sqrt[3]{\frac{1}{16}}+\sqrt[3]{\frac{1}{2}}-2\sqrt[3]{\frac{7}{8}}$
11. $\frac{2}{3}\sqrt[3]{135}+\frac{1}{2}\sqrt[3]{\frac{1}{32}}+\frac{7}{4}\sqrt[3]{\frac{1}{4}}-20\sqrt[3]{\frac{1}{200}}$
12. $3\sqrt[3]{-24}-4\sqrt[3]{-81}-\sqrt[3]{-375}$
13. $4\sqrt[3]{-320}-10\sqrt[3]{-40}-2\sqrt[3]{-54}+3\sqrt[3]{-1{,}024}$
14. $3\sqrt[3]{2a^3}-b\sqrt[3]{128}+(4b-3a)\sqrt[3]{2}$
15. $a\sqrt[3]{250b}-\sqrt[3]{3ab^3}-5\sqrt[3]{2a^3b}+3b\sqrt[3]{3a}$

11.- Racionaliza

1. $\frac{1}{\sqrt{3}}$
2. $\frac{5}{\sqrt{2}}$
3. $\frac{3}{4\sqrt{5}}$
4. $\frac{2a}{\sqrt{2ax}}$
5. $\frac{5}{\sqrt[3]{4a^2}}$
6. $\frac{1}{\sqrt[3]{9x}}$
7. $\frac{3}{\sqrt[4]{9a}}$
8. $\frac{6}{5\sqrt[3]{3x}}$
9. $\frac{x}{\sqrt[4]{27x^2}}$
10. $\frac{1}{\sqrt[5]{8a^4}}$
11. $\frac{5n^2}{3\sqrt{mn}}$
12. $\frac{1}{5a\sqrt[4]{25x^3}}$

12.- Racionalizar el denominador:

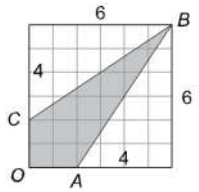
1. $\frac{3-\sqrt{2}}{1+\sqrt{2}}$
2. $\frac{5+2\sqrt{3}}{4-\sqrt{3}}$
3. $\frac{\sqrt{2}-\sqrt{5}}{\sqrt{2}+\sqrt{5}}$
4. $\frac{\sqrt{7}+2\sqrt{5}}{\sqrt{7}-\sqrt{5}}$
5. $\frac{\sqrt{2}-3\sqrt{5}}{2\sqrt{2}+\sqrt{5}}$
6. $\frac{19}{5\sqrt{2}-4\sqrt{3}}$
7. $\frac{3\sqrt{2}}{7\sqrt{2}-6\sqrt{3}}$
8. $\frac{4\sqrt{3}-3\sqrt{7}}{2\sqrt{3}+3\sqrt{7}}$
9. $\frac{5\sqrt{2}-6\sqrt{3}}{4\sqrt{2}-3\sqrt{3}}$
10. $\frac{\sqrt{7}+3\sqrt{11}}{5\sqrt{7}+4\sqrt{11}}$
11. $\frac{\sqrt{5}+\sqrt{2}}{7+2\sqrt{10}}$
12. $\frac{9\sqrt{3}-3\sqrt{2}}{6-\sqrt{6}}$
13. $\frac{\sqrt{a}+\sqrt{x}}{2\sqrt{a}+\sqrt{x}}$
14. $\frac{\sqrt{x}-\sqrt{x-1}}{\sqrt{x}+\sqrt{x-1}}$
15. $\frac{\sqrt{a}-\sqrt{a+1}}{\sqrt{a}+\sqrt{a+1}}$
16. $\frac{\sqrt{x+2}+\sqrt{2}}{\sqrt{x+2}-\sqrt{2}}$
17. $\frac{\sqrt{a+4}-\sqrt{a}}{\sqrt{a+4}+\sqrt{a}}$
18. $\frac{\sqrt{a+b}-\sqrt{a-b}}{\sqrt{a+b}+\sqrt{a-b}}$

13.- Problemas

a) Calcula el área y el perímetro de un triángulo equilátero de lado a cm.

b) Calcula el volumen, el área y la diagonal de un cubo de arista 2 cm. Expresa el resultado con radicales.

c) Calcula el perímetro de la figura sombreada expresando el resultado con radicales. ¿Cuánto vale la cuarta parte de ese perímetro?



d) Se tiene una mesa de superficie cilíndrica de 2 m de diámetro y 1 m de altura (ver figura). Se quiere cubrir con un mantel cuadrado de manera que roce ligeramente el piso. ¿Cuál debe ser la medida que corresponde al lado del mantel?