INSTITUTO TECNOLÓGICO METROPOLITANO

Matemáticas Básicas

Radicación y Expresiones Algebraicas

Profesor: Grupo de docentes.[1]

Evaluar, sin usar calculadora, y simplifique cuando sea posible

1. $\sqrt[6]{4096}$
2. $\sqrt[3]{-64/27}$
3. $\sqrt[5]{-32}$
4. $\sqrt[3]{3}\sqrt[3]{9}$
5. $\sqrt[3]{9\sqrt{9}}$
6. $\sqrt[4]{4/9} \times \sqrt[4]{4/9}$
7. $\dfrac{\sqrt{48}}{\sqrt{3}}$
8. $(-125)^{-1/3}$
9. $7^{2/5}7^{3/5}$
10. $3^{1/2}9^{1/4}$
11. $\sqrt{(1024)^{1/5}}$
12. $\sqrt{\sqrt[3]{\sqrt[4]{64^4}}}$
13. $\dfrac{\left(\sqrt[4]{9}\right)^2\left(\sqrt[3]{3}\right)^6}{\left(\sqrt[12]{81}\right)^6}$
14. $\dfrac{1}{5}\sqrt{5} \times \dfrac{1}{2}\sqrt[3]{2} \times \sqrt[6]{80} \times \sqrt[3]{5}$
15. $3\sqrt{45} - \sqrt{20} + 7\sqrt{5}$
16. $5\sqrt{20} - \sqrt{45} + 2\sqrt{80}$
17. $3\sqrt[4]{162} - 7\sqrt[4]{32} + \sqrt[4]{1250}$
18. $\sqrt[4]{4} + \sqrt[6]{8} - \sqrt[12]{64}$
19. $5\sqrt[3]{81} - 7\sqrt[3]{192} + 4\sqrt[3]{648}$
20. $\left(2\sqrt{3} + 3\sqrt{27} - 5\sqrt{6}\right)\sqrt{6}$

[2]

Simplificar y expresar con exponentes positivos:

1. $\sqrt{3ab^3c}\sqrt{2a^2bc^4}\sqrt{6a^3b^4c^3}$
2. $x^{1/2}y^{1/3}\left(\dfrac{y^{1/4}}{x^{1/6}}\right)^2 \div \dfrac{y^{-1/4}}{x^{1/4}}$
3. $\sqrt[3]{ab^{-2}c^{-2}}\left(a^{-1}b^{-2}c^{-9}\right)^{-1/6}$
4. $\dfrac{b}{\sqrt{a}} \cdot \sqrt[3]{ac} \cdot \dfrac{\sqrt[4]{c^3}}{\sqrt{b}} \cdot \dfrac{\sqrt{b^{-1}}}{a^{-1/6}}$
5. $\sqrt[3]{a^8} \cdot \sqrt[5]{a^7} \cdot a^{-2/3} \div a^{3/5}$
6. $\dfrac{3a}{x}\sqrt{\dfrac{a^2}{x}} \cdot \dfrac{4}{3}\sqrt{\dfrac{2x^3}{a^4}}$
7. $\left(\dfrac{a^3b}{a^4b^{-3}}\right)^3 \div \left(\dfrac{\sqrt{a^{-1/2}}\sqrt[6]{b^{-4}}}{a^3b^2}\right)^4$
8. $\left(\sqrt[5]{\dfrac{b^2c^{-1/2}}{b^{-1/2}c^2}} \cdot \sqrt[3]{\dfrac{b^{-1/2}c}{c^{-1/2}b}}\right)^{-4}$
9. $\sqrt[3]{\dfrac{(-2t)^{12}}{-w^6}}$
10. $\sqrt{\dfrac{-32x^4}{-2x^{-4}}}$

[1] Si la gente no cree que las matemáticas son simples, es solo porque no se dan cuente de lo complicado que es la vida. – John Louis von Neumann

[2] Respuestas:

1. 4	4. 3	7. 4	10. 3	13. 3	16. 32	19. $11\sqrt[3]{3}$
2. $-4/3$	5. 3	8. $-1/5$	11. 2	14. 1	17. $\sqrt{2}$	
3. -2	6. 2/3	9. 7	12. 2	15. $14\sqrt{5}$	18. $\sqrt{2}$	20. $33\sqrt{2} - 30$

11. $\dfrac{\sqrt[3]{32xy}\sqrt[3]{4xy^2z^9}}{\sqrt[3]{2x^2z^3}}$

12. $\sqrt[3]{\sqrt[4]{\left(x^6y^{10}\right)^2}}$

13. $\sqrt[3]{\dfrac{\sqrt{x}x^{-1/4}}{\sqrt[4]{x^3}}}$

14. $\sqrt{x\sqrt{x\sqrt[3]{x}}}$

15. $\dfrac{\sqrt[3]{\sqrt{x^3}}\sqrt{x\sqrt{x}}}{\sqrt[4]{x\sqrt[3]{x}}}$

16. $\dfrac{\sqrt[3]{xy\sqrt{x}}}{x^2y^{-2/3}} \div \dfrac{y^{3/2}}{\sqrt{x^5y^3}}$

17. $\dfrac{\left(x^{3/2}y^{-1/3}\right)^{-1}}{\sqrt{x}z} \div \sqrt[3]{\dfrac{y^{-2}}{x^6z^3}}$

18. $\dfrac{\sqrt{\sqrt[3]{x^2y^3}}}{(xy)^{1/6}} \div \dfrac{\sqrt[6]{xy^2z^3}}{z^{1/2}}$

[3]

Lleve a cabo las operaciones indicadas y simplifique el resultado:

1. $3\left(x^2-2x+5\right)+5\left(x^3-4x^2+7\right)$
2. $3\left(x^3-2x^2+5\right)-8\left(x^3-4x^2+7x\right)$
3. $7x^2+2x+5+x\left(x+7\right)$
4. $3\left(x^4-2x^2+5\right)-x\left(x^3-4x^2+7\right)$
5. $y^6+4y^3-y^2-\left(-y^3-y^2-3y\right)$
6. $(y-6)(2y+3)$
7. $(x-1)(x+2)(x-3)$
8. $(xy+3y^2-5x^2)(5x-2y)$
9. $10\left(t^3-4t^2+1\right)-t\left(2t+6\right)+8\left(t^3-t-5\right)$
10. $\left(\frac{7}{3}n^2-6n+4n^3-0{,}5\right)-\left(\frac{-1}{3}n+\frac{2}{5}n^2+\frac{3}{5}-11n^3\right)$
11. $\left(-4x^3-5x+11x^2\right)-4\left(\frac{1}{2}x-x^3+\frac{13}{2}x^2-7\right)-\left(x-1\right)\left(x-2\right)\left(x+1\right)$
12. $\frac{3}{2}\left(w^3-\frac{2}{7}w+4w^2-\frac{8}{3}\right)+\left(2w-\frac{7}{2}w^3-\frac{3}{4}w^2+5\right)-2\left(3w^2+4-\frac{2}{7}w-4w^3\right)$
13. $\left(3a^2b-5ab+\frac{2}{3}ab^2+4\right)-\left(\frac{4}{3}ab+a^2b+4ab^2+\frac{5}{9}\right)$
14. $\left(3a-2b^2\right)\left(3a+2b^2\right)-3\left(4a-b^2\right)^2+2\left(-2a-b^2\right)\left(2a-b^2\right)$
15. $3x\left(x-y\right)^2+2\left(x-y\right)\left(x+y\right)-\left(x+y\right)^3$
16. $\left(a-3b\right)\left(a^2+3ab+9b^2\right)-\left(9a^3-3ab^2+12a^2b\right)$

[4]

[3]Respuestas:

1. $6a^3b^4c^3$
2. $x^{5/12}y^{13/12}$
3. $\dfrac{a^{1/2}c^{5/6}}{b^{1/3}}$
4. $c^{13/12}$
5. $a^{14/5}$
6. $4\sqrt{2}$
7. $a^{10}b^{68/3}$
8. 1
9. $\dfrac{-16t^4}{w^2}$
10. $4x^4$
11. $4yz^2$
12. $xy^{5/3}$
13. $\dfrac{1}{x^{1/6}}$
14. $x^{5/6}$
15. $x^{11/12}$
16. xy
17. y
18. 1

[4]Respuestas:

Si $p(x)$ es un polinomio de grado 5 y $q(x)$ es un polinomio de grado 7, entonces:

1. El grado de $p(x)+q(x)$ es _____
2. El grado de $p(x)-q(x)$ es _____
3. El grado de $p(x)q(x)$ es _____
4. El grado de $xp(x)+q(x)$ es _____
5. El grado de $x^2p(x)+q(x)$ es _____

Efectuar las operaciones indicadas, utilizando productos notables:

1. $\left(\frac{x}{3}+\frac{y}{5}\right)\left(\frac{x}{3}-\frac{y}{5}\right)$
2. $\left(3b^2+6c^3\right)\left(3b^2-6c^3\right)$
3. $(3x-4y)^2$
4. $\left(\sqrt{a}-\frac{1}{b}\right)\left(\sqrt{a}+\frac{1}{b}\right)$
5. $\left(4x^2y+\frac{1}{2}\right)^2$
6. $[(ax+by)(ax-by)]^2$
7. $(x-4y)^3$
8. $(x+2)\left(x^2-2x+4\right)$
9. $(3a+2b-c)(3a-2b+c)$
10. $(x+2y)(x-2y)\left(x^2+4y^2\right)$
11. $(x+5z-2y)(x+5z+2y)$
12. $(-bu-v)(bu-v)$
13. $(a+3b)^2\left(a^2-6ab+9b^2\right)$
14. $(3a-b)\left(9a^2+3ab+b^2\right)$
15. $(x+y+z)^2$
16. $[2(a+b)+3][2(a+b)-3]$
17. $(2x-5y)\left(4x^2+10xy+25y^2\right)$
18. $(x+2y+3z)^2$
19. $\left[\left(a^2+3\right)-a\right]\left[\left(a^2+3\right)+a\right]$
20. $\left(\frac{a}{2}-2b+\frac{c}{4}\right)^2$

5

1. $5x^3-17x^2-6x+50$
2. $-5x^3+26x^2-56x+15$
3. $8x^2+9x+5$
4. $2x^4+4x^3-6x^2-7x+15$
5. y^6+5y^3+3y
6. $2y^2-9y-12$
7. x^3-2x^2-5x+6
8. $15x^2y+13xy^2-6y^3-25x^3$
9. $18t^3-42t^2-14t-30$
10. $15n^3+\frac{29}{15}n^2-\frac{17}{3}n-\frac{11}{10}$
11. $-x^3-13x^2-6x+26$
12. $6w^3-\frac{3}{4}w^2+\frac{15}{7}w+1$
13. $2a^2b-\frac{10}{3}ab^2-\frac{19}{3}ab+\frac{11}{5}$
14. $-47a^2+b^4+24ab^2$
15. $2x^3-9x^2y+2x^2-2y^2-y^3$
16. $-8a^3-27b^3-3ab^2+12a^2b$

5

1. $\frac{x^2}{9}-\frac{y^2}{25}$
2. $9b^4-36c^6$
3. $9x^2-24xy+16y^2$
4. $a-\frac{1}{b^2}$
5. $16x^4y^2+4x^2y+\frac{1}{4}$
6. $a^4x^4-2a^2b^2x^2y^2+b^4y^4$
7. $x^3-12x^2y+48xy^2-64y^3$
8. x^3+8
9. $9a^2-4b^2+4bc-c^2$
10. x^4-16y^4
11. $x^2-4y^2+25z^2+10xz$
12. $v^2-(bu)^2$
13. $a^4-18a^2b^2+81b^4$
14. $27a^3-b^3$
15. $x^2+y^2+z^2+2xy+2xz+2yz$
16. $4a^2+8ab+4b^2-9$
17. $8x^3-125y^3$
18. $x^2+4y^2+9z^2+4xy+6xz+12yz$
19. a^4+5a^2+9
20. $\frac{a^2}{4}+4b^2+\frac{c^2}{16}-2ab+\frac{ac}{4}-bc$