

Exercicis de radicals per a 1r de batxillerat

Simplificar

1. $\sqrt{4a^4b^2}$

2. $\sqrt[3]{24a^3b^6c^5d}$

3. $\sqrt[3]{-a^9b^{12}c^{15}}$

4. $\sqrt[7]{5a^{28}b^{14}c^{49}}$

5. $\sqrt[3]{x^8}$

6. $\sqrt[5]{-25a^{10}b^{14}c^{26}}$

7. $\sqrt[4]{16x^8y^{12}z^4}$

8. $\sqrt[n]{a^{2n}b^{6n}c^n}$

9. $\sqrt[2n]{x^{8n}y^{3n}z^{6n}}$

10. $\sqrt{\frac{a^4}{b^8}}$

11. $\sqrt[3]{\frac{x^6}{y^7z^9}}$

12. $\sqrt[3]{\frac{-27x^9y^5}{8x^6}}$

Introduir dins de l'arrel els factors que estan fora

13. $2abc^2\sqrt{4a^2c}$

14. $3a^2c\sqrt{2ab^2}$

15. $-3xy^2\sqrt[3]{xyz}$

16. $\sqrt{b}\sqrt{5a}$

17. $\frac{ab}{2}\sqrt{\frac{2b}{a^3}}$

18. $\frac{y}{z}\sqrt{\frac{xz^3}{6y^4}}$

Treure de dins l'arrel la màxim quantitat de factors

19. $\sqrt{16a^6b^{12}}$

20. $\sqrt{9x^7yz^{15}}$

21. $\sqrt[3]{8m^4n^6}$

22. $\sqrt{\frac{6z^3}{16y^2x^7}}$

23. $\sqrt[3]{\frac{16r^6s^3}{24t^5}}$

24. $\sqrt[4]{\frac{x^6z^4}{y^5}}$

Suma i resta de radicals

25. $5\sqrt[3]{ab} - 2\sqrt[3]{ab} + \sqrt[3]{ab}$

26. $7a^2\sqrt{2b} + 8\sqrt{bc} - 3a^2\sqrt{2b} + \sqrt{bc}$

27. $\sqrt{48ab^2} + b\sqrt{75a}$

28. $\sqrt{50} - \sqrt{18} + \sqrt{32} - \sqrt{72} + \sqrt{2}$

28. $4\sqrt{\frac{2}{25}} - 3\sqrt{18} + 6\sqrt{\frac{2}{9}} - \frac{2}{3}\sqrt{\frac{18}{16}}$

29. $\sqrt[n]{a^3b} - \sqrt[n]{a^{n+3}b} + \sqrt[n]{a^3b^{2n+1}}$

30. $(2a^3\sqrt{a^2b} + 5b\sqrt{a}) + (3b\sqrt{a} - 4a^3\sqrt{a^2b} + 5ab\sqrt{ab}) - (2ab\sqrt{ab} - 3a^3\sqrt{a^2b})$

Reduir a índex comú

31. $\sqrt{a}, \sqrt[3]{a^2b}, \sqrt[5]{2a^2b^3}$

32. $\sqrt[3]{b}, \sqrt[9]{ab^7}$

33. $\sqrt[5]{a^2c}, \sqrt[3]{2b}, \sqrt{a}$

34. $\sqrt{ab^2}, \sqrt[4]{a^3b}, \sqrt[6]{a^2b^3}$

Producte de radicals

35. $\sqrt[3]{a^2b} \cdot \sqrt[3]{abc^2}$

36. $5\sqrt{a+b} \cdot a\sqrt{a-b}$

37. $\sqrt{3x^2y} \cdot (-5\sqrt{2xy})$

38. $\sqrt{2a} \cdot \sqrt{3b^2c} \cdot \sqrt{a^2b^2} \cdot \sqrt{2c^3d}$

39. $\sqrt[5]{x^3y^4z^2} \cdot \sqrt[5]{xy^3z}$

40. $(2+\sqrt{5}) \cdot (3-\sqrt{5})$

41. $(\sqrt{5}-\sqrt{3}) \cdot (\sqrt{5}-\sqrt{3})$

42. $\left(-3+\sqrt{\frac{2}{7}}\right) \cdot \left(-3-\sqrt{\frac{2}{7}}\right)$

Quocients de radicals

43. $4\sqrt{72} : \sqrt{8}$

44. $(5\sqrt{32}-3\sqrt{72}) : \sqrt{8}$

45. $36\sqrt{x^3y^5} : 9\sqrt{x^2y^2}$

46. $(4\sqrt{18}-6\sqrt{8}+8\sqrt{72}) : 4\sqrt{2}$

47. $\frac{\sqrt[5]{a^3b^4c^5}}{\sqrt[5]{a^2b^5c^2d^4}}$

48. $\frac{\sqrt[3]{a^2bc^2d}}{\sqrt{abc}}$

49. $\frac{\sqrt{2a}}{\sqrt[3]{a}}$

50. $\frac{-2\sqrt{-5a^3b^2}}{\sqrt{-ab^4}}$

Racionalització de denominadors

51. $\frac{4}{\sqrt{5}}$

52. $\frac{3}{4-\sqrt{7}}$

53. $\frac{\sqrt{3}}{4\sqrt{8}}$

54. $\frac{\sqrt{2}}{3-\sqrt{2}}$

55. $\frac{3}{\sqrt[3]{3}}$

56. $\frac{5a\sqrt{a^2-b^2}}{(1-a)\sqrt{a+b}}$

57. $\frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$

58. $\frac{(a^2-1)\sqrt[4]{8a^3}}{(a+1)\sqrt{2ab}}$

59. $\frac{7\sqrt{5}}{\sqrt{11}+\sqrt{3}}$

Potències de radicals

$$60. (\sqrt[3]{5a^2bc^3})^2$$

$$61. (\sqrt[3]{a^2b})^4$$

$$62. (2\sqrt[4]{a^3b^2})^2$$

$$63. (\sqrt{a+b} - \sqrt{a-b})^2$$

$$64. (\sqrt{x-1} + 1)^2$$

$$65. (2ab^2\sqrt[3]{a+b})^6$$

$$66. (\sqrt{2} + \sqrt{3} - \sqrt{5})^2$$

$$67. (a\sqrt{(a-b)^3})^4$$

$$68. \sqrt[3]{(a^3)^4}$$

Radicals de radicals

$$69. \sqrt[3]{\sqrt{x^{12}}}$$

$$70. \sqrt[3]{8a^3\sqrt[5]{b^6}}$$

$$71. \sqrt[4]{\sqrt[5]{a^{20}b^{10}}}$$

$$72. \sqrt{\sqrt{\sqrt{x^{12}}}}$$

$$73. \sqrt[m]{x^{2m}} \sqrt[n]{y^{3nm}}$$

$$74. \sqrt[3]{\sqrt[4]{a^6b^{18}c^{12}}}$$

Simplifica al màxim

$$75. (-\sqrt{2})(-\sqrt{8})(-\sqrt{32})$$

$$76. (\sqrt{a+b} + \sqrt{a})(\sqrt{a+b} - \sqrt{b})$$

$$77. \sqrt{4a^2 + 8ab + 4b^2}$$

$$78. (3\sqrt[3]{500ab^3}) : \sqrt[3]{4a}$$

$$79. (\sqrt{12} - \sqrt{3})^2 - (\sqrt{12} + \sqrt{3})^2$$

$$80. \frac{2}{\sqrt{3}-1} - \frac{1}{\sqrt{2}+1} - \frac{1}{\sqrt{2}+\sqrt{3}}$$

$$81. \frac{5}{\sqrt{5}-\sqrt{3}} - \frac{3}{\sqrt{5}+\sqrt{3}}$$

$$82. 0,0064^{1/2}$$

$$83. 8000^{2/3}$$

$$84. (\sqrt{2} + \sqrt{3}) : \sqrt{5+2\sqrt{6}}$$

$$85. (2\sqrt{8x} + \sqrt{128x} - \sqrt{72x}) : 2\sqrt{2x}$$

Redueix a la forma més senzilla possible:

$$\sqrt{128} \quad \sqrt[4]{1024} \quad \sqrt{50} \quad \sqrt[3]{abc} \sqrt{a^2 b^2 c^2} \quad \sqrt{12a-3a} \quad \sqrt{18a^2 b^4}$$

$$\sqrt{8^3 \sqrt{2}} \quad \sqrt[3]{4^3 \sqrt{2}} \quad \sqrt[3]{250047} \quad \sqrt[6]{5832} \sqrt{2500} \quad \sqrt{0,2} \quad \sqrt[3]{0,008}$$

Calcula el valor de les següents potències:

$$4^{1,5} \quad 32^{0,2} \quad 27^{0,\bar{6}} \quad 125^{2,\bar{3}} \quad 25^{-0,5} \quad \left(\frac{8}{27}\right)^{\frac{1}{3}} \quad (0,125)^{-\frac{1}{3}}$$

Quines d'aquestes igualtats són falses?, per què?

$$2^{5/2} = 2^{9/4} \quad 7^{5/8} = 7^{8/13} \quad 0,5^{6/9} = 0,5^{4/6} \quad 1,2^{10/4} = 1,2^{15/6} \quad ((2/3)^{2,3})^{1,7} = (0,\bar{6})^4$$

$$16^{2,5} \cdot 16^2 = 16^5 \quad 9^{1,4} \cdot 4^{1,4} = 36^{1,96} \quad 3^6 \cdot 3^{-0,5} = 3^{-3} \quad (2/5)^{2/3} \cdot (2/5)^{7/3} = (2/5)^3$$

Calcula i racionalitza els inversos de:

$$2+5\sqrt{3} \quad 4-\sqrt{3} \quad 7\sqrt{5} \quad \frac{3}{4} - \frac{\sqrt{7}}{5} \quad \sqrt{7}-\sqrt{3} \quad 2\sqrt[3]{3} \quad \frac{\sqrt{2}}{2} - \frac{\sqrt{3}}{3}$$

Efectua los següents operacions i racionalitza:

$$\left(3 + \frac{\sqrt{5}}{4}\right)\left(\frac{1}{2} - 4\sqrt{5}\right) \quad \left(\frac{1}{5} + 3\sqrt{6}\right) - \left(\frac{2}{3} + \frac{\sqrt{6}}{5}\right) \quad (2 - 4\sqrt{7})\left(10 + \frac{3\sqrt{7}}{2}\right) \quad \frac{4 - 3\sqrt{10}}{1 + 2\sqrt{10}}$$

$$\frac{7}{6\sqrt{128}} \quad \frac{\sqrt{125} + 2\sqrt{5} - 5 - \sqrt{50}}{5} \quad \left(\frac{1}{2} + \frac{\sqrt{3}}{3} - \frac{4\sqrt{3}}{4} + \frac{\sqrt{3}}{12}\right)\sqrt{3} \quad \frac{1}{2 + \sqrt{6}} \frac{1 - \sqrt{6}}{3}$$

Simplifica al màxim:

$$\frac{\sqrt[4]{a^3}}{(\sqrt[4]{a})^6} \quad \frac{\sqrt[3]{a^2 b}}{a^3 \sqrt[3]{b^2}} \quad \frac{\sqrt[3]{a}}{\sqrt[3]{a^3 b^2}} \quad \frac{(ab^2)^{2/3}}{a^{2/3} b - a^{4/3} b^2} \quad \frac{1}{a^{-1/3}} \sqrt[3]{a^2} \quad \frac{a^2 \sqrt{a^4 b^3}}{\sqrt[4]{a^6 b^6}}$$

$$\sqrt[3]{16} - \sqrt[3]{54} + \sqrt[3]{112} \quad \sqrt{75} - \sqrt{147} - \sqrt{48} \quad 2\sqrt[3]{3^2} - 2\sqrt[3]{24}(\sqrt[3]{275} - \sqrt[3]{192}) \quad \sqrt[3]{\frac{81}{648}}$$

Efectua els productes i simplifica:

$$(\sqrt{2} - \sqrt{32})(2\sqrt{2} + \sqrt{32}) \quad \left(\frac{1}{\sqrt{2}} - \frac{\sqrt{2}}{2}\right)^2 \quad \left(\frac{3}{4\sqrt{3}} + \frac{1}{\sqrt{3}}\right)^2 \quad (\sqrt{2} + \sqrt{3} + \sqrt{5})^2$$

$$\left(\frac{1}{\sqrt{2}} + \frac{1}{\sqrt{3}} + \frac{1}{\sqrt{5}}\right)^2 \quad (\sqrt{5} - 3\sqrt{2} + 6\sqrt{3})(2\sqrt{3} - 3\sqrt{2}) \quad \left(\sqrt{\frac{3}{4}} + \sqrt{\frac{4}{3}}\right)\left(\sqrt{\frac{3}{4}} + \sqrt{\frac{4}{3}}\right)$$

Examina si són, o no són, certes les igualtats?:

$$\frac{\sqrt{2} + \sqrt{6}}{2} = \sqrt{2 + \sqrt{3}} \quad \frac{\sqrt[3]{a}}{\sqrt{a}} = a^{-1/6} \quad \frac{\sqrt{a} + 1}{\sqrt{ab}} = \frac{1}{\sqrt{b}} \quad X^{1/3} + Y^{1/3} = (X + Y)^{1/3}$$

$$(\sqrt{a} + \sqrt{b})^2 = a + b \quad \sqrt[3]{a^4 b^3} = a^2 b \sqrt[3]{a} \quad (x^{3/4} y^{1/3})^{1/2} = x^{5/4} y^{5/6} \quad \frac{\alpha^{4/3} \beta^{1/3}}{\alpha^{3/5}} = \alpha^{4/3} \beta^{1/3}$$

Simplifica tot el que puguis:

$$\frac{x+8+4\sqrt{x}}{2+\sqrt{x}} \quad \sqrt{\frac{ab^2+a^2b}{a+b}} + \sqrt{\frac{a^2b-ab^2}{a-b}} \quad (\text{si } a, b \in \mathbb{R}^+) \quad \frac{\sqrt{3}-2}{5+2\sqrt{3}} - \frac{1}{\sqrt{3}+1} + \frac{1}{\sqrt{3}}$$

$$\sqrt{\frac{1+2\sqrt{5}}{1-2\sqrt{5}}} + \sqrt{\frac{1-2\sqrt{5}}{1+2\sqrt{5}}} \quad \sqrt{3+2\sqrt{2}} - \sqrt{3-2\sqrt{2}} \quad \sqrt[4]{16} \sqrt[3]{\frac{1}{4}} \frac{1}{\sqrt[6]{4}} \quad \sqrt{\sqrt{\sqrt{\sqrt{3^{18}}}} \sqrt{3^{36}}}$$

Uneix per fletxes l'operació amb el seu resultat:

<u>Operacions</u>	<u>Resultats</u>
$\sqrt{2} + \sqrt{2}$	0
$\sqrt{8}$	2
$\sqrt{2}\sqrt{2}$	$\sqrt{2}$
$\frac{2}{\sqrt{2}}$	$2\sqrt{2}$
$\frac{\sqrt{200}}{5}$	$4\sqrt{2}$
$(\sqrt{2}+1)^2 - (\sqrt{2}-1)^2$	

Efectua les operacions i simplifica:

$$\frac{1}{1 + \frac{1}{1 + \frac{1}{\sqrt{2}}}} \quad \frac{1}{\sqrt{7}-\sqrt{3}} - \frac{1}{\sqrt{3}-\sqrt{7}} - \frac{1}{\sqrt{7}+\sqrt{3}} \quad \frac{A^{-3}B^4C^{-1}}{A^{-4}B^{-3}C^2} \quad \frac{4a^2b^2 + b^4 + 4ab^3}{4a^2b^3 - b^5}$$

$$\left(\frac{1}{2} \frac{\sqrt{3}}{\sqrt{5}} \frac{7}{\sqrt{2}}\right)^2 \quad \left(\frac{1}{3} \frac{x}{\sqrt{x^3}}\right)^{-2} \quad \frac{\sqrt[3]{x^2} \sqrt[4]{y^3}}{\sqrt[3]{\sqrt{x}} (\sqrt{y})^6} \quad \frac{\sqrt{ax} - \sqrt{bx}}{\sqrt{a} - \sqrt{b}} \quad \frac{\sqrt{ax} + \sqrt{ay} + \sqrt{bx} + \sqrt{by}}{\sqrt{a} + \sqrt{b}}$$

$$\sqrt[3]{(x-1)\sqrt{(x+1)}} - 3 \sqrt[6]{(x-1)^2(x+1)^3} \quad \frac{(\sqrt{x} + \sqrt{y})^2 - 4\sqrt{xy}}{x-y} \quad \frac{\sqrt[n]{a^{2n} + 1}}{a^2 + 1}$$

Digues quines són certes i quines són falses:

$$\begin{array}{lll} \sqrt[n]{AB} = \sqrt[n]{A} + \sqrt[n]{B} & \sqrt[n]{A+B} = \sqrt[n]{A} + \sqrt[n]{B} & \sqrt[n]{A-B} = \sqrt[n]{A} - \sqrt[n]{B} \\ \sqrt[n]{A^p} = \sqrt[n]{p} \sqrt[n]{A} & \sqrt[n]{\sqrt[p]{A}} = \sqrt[n+p]{A} & \sqrt[n]{A^p} = (\sqrt[n]{A})^p \\ \sqrt[n]{\sqrt[p]{A}} = \sqrt[np]{A} & \sqrt[n]{\sqrt[p]{A}} = \sqrt[n]{A} \sqrt[p]{B} & \sqrt[n]{A^n + 1} = A + 1 \end{array}$$