

# Formulário de Radicais e potências de expoente racional – 10º ano

## RADICAIS

<p><b>Radicais equivalentes</b></p> $\sqrt[n]{a^p} = \sqrt[nk]{a^{pk}}$ <p style="text-align: right;">p. 75</p>	<ul style="list-style-type: none"> <li>▪ Simplificar: <math>\sqrt[9]{7^6} = \sqrt[9:3]{7^{6:3}} = \sqrt[3]{7^2}</math></li> <li>▪ Reduzir ao mesmo índice <math>\sqrt[2]{3}</math> e <math>\sqrt[3]{2}</math>:  <math>\sqrt[2 \times 3]{3^3}</math> e <math>\sqrt[3 \times 2]{2^2}</math>, ou seja, <math>\sqrt[6]{27}</math> e <math>\sqrt[6]{4}</math></li> </ul>
<p><b>Multiplicação de radicais</b></p> $\sqrt[n]{a} \times \sqrt[n]{b} = \sqrt[n]{a \times b}, n > 1$ <p style="text-align: right;">p. 77</p>	<ul style="list-style-type: none"> <li>▪ Passar fatores para fora do radical:  <math>\sqrt[4]{2^5} = \sqrt[4]{2^4} \times 2 = \sqrt[4]{2^4} \times \sqrt[4]{2} = 2 \times \sqrt[4]{2} = 2\sqrt[4]{2}</math></li> <li>▪ Passar fatores para dentro do radical:  <math>2\sqrt{3} = \sqrt{3 \times 2^2} = \sqrt{12}</math></li> </ul>
<p><b>Potência de um radical</b></p> $(\sqrt[n]{a})^p = \sqrt[n]{a^p}; n, p \in \mathbb{N} \text{ e } n > 1$ <p style="text-align: right;">p. 78</p>	$(\sqrt[5]{2})^7 = \sqrt[5]{2^7}$
<p><b>Divisão de radicais</b></p> $\sqrt[n]{a} : \sqrt[n]{b} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}} = \sqrt[n]{\frac{a}{b}}, n \in \mathbb{N}, b \neq 0 \text{ e } n > 1$ <p style="text-align: right;">p. 79</p>	$\sqrt{2} : \sqrt{3} = \sqrt{\frac{2}{3}}$
<p><b>Radical de radical</b></p> $\sqrt[n]{\sqrt[p]{a}} = \sqrt[np]{a}; n, p \in \mathbb{N} \text{ e } n > 1$ <p style="text-align: right;">p. 81</p>	<ul style="list-style-type: none"> <li>▪ <math>\sqrt{\sqrt[3]{2}} = \sqrt[6]{2}</math></li> <li>▪ <math>\sqrt[5]{7\sqrt{3}} = \sqrt[5]{7 \times \sqrt{3}} = \sqrt[10]{3 \times 7^2}</math></li> </ul>

## Racionalização de denominadores

$\frac{a}{\sqrt[n]{b^p}} = \frac{a \sqrt[n]{b^{n-p}}}{\sqrt[n]{b^p} \times \sqrt[n]{b^{n-p}}}$ <p style="text-align: right;">p. 82</p>	$\frac{2}{\sqrt[5]{3}} = \frac{2 \times \sqrt[5]{3^4}}{\sqrt[5]{3} \times \sqrt[5]{3^4}} = \frac{2\sqrt[5]{3^4}}{3}$
$\frac{a}{\sqrt{b} + \sqrt{c}} = \frac{a(\sqrt{b} - \sqrt{c})}{(\sqrt{b} + \sqrt{c})(\sqrt{b} - \sqrt{c})} = \frac{a\sqrt{b} - a\sqrt{c}}{b - c}$ <p style="text-align: right;">p. 83</p>	$\frac{1}{\sqrt{3} - 2\sqrt{5}} = \frac{\sqrt{3} + 2\sqrt{5}}{(\sqrt{3} - 2\sqrt{5})(\sqrt{3} + 2\sqrt{5})} =$ $= \frac{\sqrt{3} + 2\sqrt{5}}{3 - 20} = \frac{\sqrt{3} + 2\sqrt{5}}{-17}$

## POTÊNCIAS DE EXPOENTE RACIONAL

$a^{\frac{1}{n}} = \sqrt[n]{a}$	<p>p. 98</p> $2^{\frac{1}{5}} = \sqrt[5]{2}$
$\sqrt[n]{a^m} = a^{\frac{m}{n}}$	<p>p. 100</p> $5^{\frac{3}{4}} = \sqrt[4]{5^3}$
$a^{-q} = \frac{1}{a^q}$	<p>p. 101</p> $5^{-\frac{2}{3}} = \frac{1}{5^{\frac{2}{3}}}$
$a^p \times a^q = a^{p+q}$	<p>p. 102</p> <ul style="list-style-type: none"> <li>▪ <math>2^{-\frac{1}{3}} \times 2^{\frac{1}{2}} = 2^{-\frac{1}{3} + \frac{1}{2}} = 2^{\frac{1}{6}}</math></li> <li>▪ <math>\sqrt{2} \times \sqrt[3]{2} = 2^{\frac{1}{2}} \times 2^{\frac{1}{3}} = 2^{\frac{1}{2} + \frac{1}{3}} = 2^{\frac{5}{6}} = \sqrt[6]{2^5}</math></li> </ul>
$a^p : a^q = a^{p-q}$	<p>p. 102</p> <ul style="list-style-type: none"> <li>▪ <math>4^{\frac{1}{10}} : 4^{\frac{2}{5}} = 4^{\frac{1}{10} - \frac{2}{5}} = 4^{-\frac{3}{10}} = 4^{-0,3}</math></li> <li>▪ <math>\sqrt{5} : \sqrt[3]{5} = 5^{\frac{1}{2}} : 5^{\frac{1}{3}} = 5^{\frac{1}{2} - \frac{1}{3}} = 5^{\frac{1}{6}} = \sqrt[6]{5}</math></li> </ul>
$a^p \times b^p = (a \times b)^p$	<p>p. 103</p> $\left(\frac{1}{2}\right)^{\frac{2}{3}} \times 6^{\frac{2}{3}} = \left(\frac{1}{2} \times 6\right)^{\frac{2}{3}} = 3^{\frac{2}{3}}$
$a^p : b^p = (a : b)^p$	<p>p. 103</p> $\left(\frac{2}{3}\right)^{\frac{2}{5}} : 2^{\frac{2}{5}} = \left(\frac{2}{3} : 2\right)^{\frac{2}{5}} = \left(\frac{1}{3}\right)^{\frac{2}{5}}$
$(a^p)^q = a^{pq}$	<p>p. 103</p> <ul style="list-style-type: none"> <li>▪ <math>\left[\left(\frac{1}{2}\right)^{\frac{1}{3}}\right]^{\frac{2}{5}} = \left(\frac{1}{2}\right)^{\frac{2}{15}}</math></li> <li>▪ <math>\sqrt{\sqrt[3]{2}} = \left(2^{\frac{1}{3}}\right)^{\frac{1}{2}} = 2^{\frac{1}{6}} = \sqrt[6]{2}</math></li> </ul>