

INDICES

TRANSCRIPT

Rules of Indices

Examples

<p>1. $x^p \times x^q = x^{p+q}$</p>	<p>1. $y^2 \times y^3$</p> $= (y \times y) \times (y \times y \times y)$ $= y \times y \times y \times y \times y$ $= y^5$
<p>2. $x^p \div x^q = x^{p-q}$</p>	<p>2. $y^5 \div y^3$</p> $= \frac{y \times y \times y \times y \times y}{y \times y \times y}$ $= y^2$
<p>3. $(x^p)^q = x^{pq}$</p>	<p>3. $(y^2)^3$</p> $= y^2 \times y^2 \times y^2$ $= y^6$
<p>4. $x^1 = x$</p>	<p>4. $y^4 \div y^3$</p> $= \frac{y \times y \times y \times y}{y \times y \times y}$ $= y$ <p>But by 2nd rule $y^4 \div y^3 = y^{4-3} = y^1$</p> $\therefore y^1 = y$

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5. $x^0 = 1$

5. $y^3 \div y^3 = 1$

But by 2nd rule $y^3 \div y^3 = y^{3-3} = y^0$

$\therefore y^0 = 1$

6. $x^{-p} = \frac{1}{x^p}$

6. $y^3 \div y^5$
 $= \frac{y^1 \times y^1 \times y^1}{y \times y \times y \times y \times y}$

$= \frac{1}{y^2}$

But by 2nd rule $y^3 \div y^5 = y^{3-5} = y^{-2}$

$\therefore y^{-2} = \frac{1}{y^2}$

7. $x^{\frac{1}{p}} = \sqrt[p]{x}$

7. $y^{\frac{1}{2}} \times y^{\frac{1}{2}} = y^{\frac{1}{2} + \frac{1}{2}} = y^1 = y$

so $y^{\frac{1}{2}}$ multiplied by itself = y

$\therefore y^{\frac{1}{2}} = \sqrt{y}$

Also $y^{\frac{1}{3}} \times y^{\frac{1}{3}} \times y^{\frac{1}{3}} = y^1 = y$

so $y^{\frac{1}{3}} = \sqrt[3]{y}$

the cubic root of y

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8. $x^{p/q} = (\sqrt[q]{x})^p = \sqrt[q]{x^p}$

Examples

8. $y^{2/3} = (y^{1/3})^2$
 $= (\sqrt[3]{y})^2$
or $y^{2/3} = (y^2)^{1/3}$
 $= \sqrt[3]{y^2}$

Summary of Rules of Indices

- 1. $x^p \times x^q = x^{p+q}$
- 2. $x^p \div x^q = x^{p-q}$
- 3. $(x^p)^q = x^{pq}$
- 4. $x^1 = x$
- 5. $x^0 = 1$
- 6. $x^{-p} = \frac{1}{x^p}$
- 7. $x^{1/p} = \sqrt[p]{x}$
- 8. $x^{p/q} = (\sqrt[q]{x})^p = \sqrt[q]{x^p}$

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Examples

$$\begin{aligned} 1. \quad & 2x^2 \times 3x^3 \\ & = 2 \times x^2 \times 3 \times x^3 \\ & = 6x^5 \end{aligned}$$

$$\begin{aligned} 2. \quad & 10x^{10} \div 2x^2 \\ & = \frac{10x^{10}}{2x^2} = 5x^8 \end{aligned}$$

$$\begin{aligned} 3. \quad & (2x^2)^5 \\ & = 2x^2 \times 2x^2 \times 2x^2 \times 2x^2 \times 2x^2 \\ & = 32x^{10} \end{aligned}$$

$$4. \quad 7^1 = 7$$

$$5. \quad 8^0 = 1$$

$$6. \quad 5^{-3} = \frac{1}{5^3} = \frac{1}{125}$$

$$7. \quad 8^{\frac{1}{3}} = \sqrt[3]{8} = 2$$

$$\begin{aligned} 8. \quad & 9^{3/2} = (\sqrt[4]{9})^3 \\ & = 3^3 \\ & = 27 \end{aligned}$$

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$$\begin{aligned} 9. \quad & 16^{-3/4} = \frac{1}{16^{3/4}} \\ & = \frac{1}{(\sqrt[4]{16})^3} \\ & = \frac{1}{2^3} \\ & = \frac{1}{8} \end{aligned}$$

$$\begin{aligned} 10. \quad & \frac{10p^4q^2r^5}{2p^8q^8r^3} \\ & = \frac{5p^3r^2}{q^6} \end{aligned}$$
