Guide to:
Indices (index laws)

maths Links

Explanation:

Learn the four core **index laws** for powers with the same base: (1) **Multiply → add powers:** $a^m \times a^n = a^{m+n}$; (2) **Divide → subtract powers:** $a^m \div a^n = a^{m-n}$; (3) **Brackets → multiply powers:** $(a^m)^n = a^{mn}$; (4) **Power of zero:** $a^0 = \mathbf{1}$.

When an expression includes normal numbers (coefficients) in front of the letters, treat the numbers as normal numbers (multiply, divide, or raise them to the power) and apply the index laws to the powers!

Example 1: Simplify:

(a) $\frac{y^7 \times y^4}{y^3}$ (b) $(2x^3y^5)^4$

Solution:

(a) Top: $y^{7+4} = y^{11}$; then $y^{11-3} = \mathbf{y^8}$

(b) Raise 2 to power 4: $2^4 = \mathbf{16}$

Multiply powers: $x^{3\times4}y^{5\times4} = x^{12}y^{20}$

Answer: (a) $\mathbf{y^8}$ (b) $\mathbf{16x^{12}y^{20}}$

Example 2: Simplify $\frac{18a^6b^2}{3a^2b^5}$ and find the value of n in $\mathbf{5^n \times 5^3 = 5^{11}}$.

Solution:

Numbers: $18 \div 3 = \mathbf{6}$; Powers: $a^{6-2} = \mathbf{a^4}$, $b^{2-5} = \mathbf{b^{-3}}$

For $5^n \times 5^3 = 5^{11}$: $n + 3 = 11 \rightarrow \mathbf{n = 8}$

Answer: $\mathbf{6a^4b^{-3}}$ (or $\frac{6a^4}{b^3}$) and $\mathbf{n = 8}$

Worksheets and other links					
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Ken Stafford (Past Paper Qs)	Qs	Ans	**Dr Austin Maths**	Qs	Ans
Maths Genie	Qs	Ans	**Maths Made Easy**	Qs	Ans
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ken@mathslinks.co.uk