

Worksheet: Laws of Indices

This worksheet has questions about **the laws of indices**: which are fundamental to algebra and also play a part in numerical calculations.

Model solutions to
this sheet



Laws of Indices
study guide



1. Without a calculator, use the laws of indices to help you evaluate the following:

(a) $2^6 2^{-4}$ (b) $9^{1/2} 3^2$ (c) $64^{1/3}$ (d) $4^{1/2} 8^{1/3}$

(e) $\frac{3^3}{3^5}$ (f) $\frac{4^{1/2}}{16^{1/4}}$ (g) $\frac{2^0}{2^{-2}}$ (h) $\frac{5^{-1}}{25^{-1/2}}$

2. Use the laws of indices to help you simplify the following expressions and decide if any are equal to each other:

(a) $x^2 x^8$ (b) $x^2 x^{-8}$ (c) $x^{-2} x^{-8}$ (d) $(x^2)^{-8}$

(e) $\frac{x^{-2}}{x^8}$ (f) $\frac{x^2}{x^{-8}}$ (g) $\frac{x^2}{x^8}$ (h) $\left(\frac{1}{x^8}\right)^{-2}$

3. Evaluate the following without a calculator:

(a) $\left(\frac{1}{2}\right)^{-2}$ (b) $\frac{1}{2^{-1}}$ (c) $27^{-1/3}$ (d) $\left(\frac{16}{49}\right)^{1/2}$

4. Use the laws of indices to simplify the following expressions:

(a) $\frac{y^{1/6}y^{-2/3}}{y^{1/4}}$ (b) $\frac{p^{1/2}p^{-3/4}}{p^{-1/4}}$ (c) $\frac{\sqrt{x}\sqrt{x^3}}{x^{-3}}$ (d) $\frac{(\sqrt{t})^3 t^2}{\sqrt{(t^5)}}$

5. Evaluate the following without a calculator:

(a) $\frac{9^{1/2}8^{1/2}}{2^{1/2}}$ (b) $\frac{5^{1/2}5^0 25^{1/2}}{125^{-1/3}}$ (c) $\frac{8^{1/3}16^{1/3}}{32^{-1/3}}$ (d) $\frac{9^{1/3}27^{-1/2}}{3^{-1/6}3^{-2/3}}$

6. Simplify the following expressions so that a , b and c appear only once and with a positive power:

(a) $\frac{a^2 b^{-4} c^5}{ab^{-7} c^2}$ (b) $\sqrt{\frac{ab^6 c^{-3}}{a^{-3} b^{-2} c}}$ (c) $\frac{ab^{1/6} c^{-2/3}}{a^2 b^{-1/4} c^{-4/5}}$

7. Simplify the following expressions. Give your answers in terms of positive powers only:

(a) $(p^2 q^{1/2} r^5)^3$ (b) $\left(\frac{p^{-2} r^3}{q^6}\right)^3$ (c) $(p^4 q^8 r^{-6})^{-1/2}$



This worksheet is one of a series on mathematics produced by the Learning Enhancement Team.

Scan the QR-code with a smartphone app for [more resources](#).



UEA

University of East Anglia

STUDENT SUPPORT SERVICE