

## Lesson 4

## GCSE (Year 9) Mathematics Index Form

### 4.1 Converting answers out of index form

The work on indices has become fairly abstract.

Writing numbers in index form has become routine as has doing arithmetic with such numbers as, for example,

$$5^{-2}, \quad 9^{\frac{1}{2}}, \quad 7^0 \times 8^{\frac{1}{3}} = 8^{\frac{1}{3}} \quad \text{and} \quad \frac{1}{\sqrt{4}} = 4^{-\frac{1}{2}}$$

However, it's easy to stop understanding what numbers these actually represent ! This lesson addresses that issue.

### 4.2 “Together” Examples

Write each of the follow numbers, which are in index form, as ordinary numbers without any index.

( i )  $5^{-2}$

( ii )  $9^{\frac{1}{2}}$

( iii )  $7^0$

( iv )  $8^{\frac{1}{3}}$

( v )  $4^{-\frac{1}{2}}$

( vi )  $2^{-3}$

( vii )  $11^{-1}$

( viii )  $16^{\frac{1}{4}}$

### 4.3 “You Try” Examples

Write each of the follow numbers, which are in index form, as ordinary numbers without any index.

(i)  $8^2$

(ii)  $7^{-1}$

(iii)  $3^{-2}$

(iv)  $36^{\frac{1}{2}}$

(v)  $13^0$

(vi)  $125^{\frac{1}{3}}$

(vii)  $9^{-\frac{1}{2}}$

(viii)  $2^{-5}$

(ix)  $4^{-1}$

(x)  $16^{-\frac{1}{4}}$

Mega-Brain Challenge :  $8^{\frac{2}{3}}$

Mega-Mega-Brain Challenge :  $\left( \frac{\pi}{\sqrt{2} - (\sqrt{3})^7} \right)^0$

#### 4.4 Exercise

*Non - Calculator*

For each question;

(a) Write the answer in index form

(b) Write your part (a) answer as an ordinary number without any index.

(i)  $2^3 \times 2^{-7}$

(ii)  $3^{-3} \times 3^2$

(a) \_\_\_\_\_

(a) \_\_\_\_\_

(b) \_\_\_\_\_

(b) \_\_\_\_\_

(iii)  $5^{-1} \times 5^{-1}$

(iv)  $\frac{7^4}{7^6}$

(a) \_\_\_\_\_

(a) \_\_\_\_\_

(b) \_\_\_\_\_

(b) \_\_\_\_\_

(v)  $16^{\frac{1}{4}} \times 16^{\frac{1}{4}}$

(vi)  $6^{-3} \times 6^2 \times 6^{-1}$

(a) \_\_\_\_\_

(a) \_\_\_\_\_

(b) \_\_\_\_\_

(b) \_\_\_\_\_

(vii)  $\frac{10^7}{10^{11}}$

(a) \_\_\_\_\_

(b) \_\_\_\_\_

(viii)  $(2^{-3})^{-2}$

(a) \_\_\_\_\_

(b) \_\_\_\_\_

(ix)  $\frac{4 \times 4 \times 4}{4 \times 4 \times 4 \times 4 \times 4}$

(a) \_\_\_\_\_

(b) \_\_\_\_\_

(x)  $(2^2)^{-5}$

(a) \_\_\_\_\_

(b) \_\_\_\_\_

(xi)  $\sqrt{10^{-6}}$

(a) \_\_\_\_\_

(b) \_\_\_\_\_

(xii)  $\frac{8^8}{8^9}$

(a) \_\_\_\_\_

(b) \_\_\_\_\_

This document is a part of a **Mathematics Community Outreach Project** initiated by Shrewsbury School

It may be freely duplicated and distributed, unaltered, for non-profit educational use

In October 2020, Shrewsbury School was voted "**Independent School of the Year 2020**"

© 2021 Number Wonder

Teachers may obtain detailed worked solutions to the exercises by email from [mhh@shrewsbury.org.uk](mailto:mhh@shrewsbury.org.uk)