

# Indices and Algebra Expression

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The first rule:  $a^n \times a^m = a^{m+n}$

The second rule:  $(a^n)^m = a^{mn}$

The third rule:  $a^m \div a^n = a^{m-n}$

The fourth rule:  $a^0 = 1$

The fifth rule:  $a^{-1} = \frac{1}{a}$        $a^{-m} = \frac{1}{a^m}$

The sixth rule:  $a^{\frac{1}{2}} = \sqrt{a}$        $a^{\frac{1}{m}} = \sqrt[m]{a}$

$$a^{\frac{n}{m}} = (a^{\frac{1}{m}})^n = (\sqrt[m]{a})^n$$

This is a hard chapter. To make you guys understand I INTENTIONALLY make the wordings BIG

# Indices and Algebra Exercises

Leave the answers in indices algebra expression or exponentials. **Do not use calculator**

## Part 1 Indices

- $5^2 \times 5^1 \times 5^3$
- $3^2 \times 3^1 \times 3^2$
- $6^2 \times 6 \times 6^3$
- $4^2 \times 4^4 \times 5^3$
- $3^5 \times 3^1 \times 5^3$
- $6^4 \times 7^1 \times 7^3$

## Part 2 Algebra Expression

- $a^2 \times a^1 \times a^3$
- $b^2 \times b^1 \times b^2$
- $c^2 \times c \times c^3$
- $d^2 \times d^4 \times e^3$
- $f^5 \times f^1 \times d^3$
- $g^4 \times h^1 \times h^3$

## Part 3

- $(3^2 \times 2^3)^2$
- $(3^3 \times 2^3)^3$
- $(3^2 5^3)^4$
- $(3^2 4)^5$

## Part 4

- $(a^2 \times b^3)^2$
- $(a^2 \times b^3)^4$
- $(a^2 b^3)^5$
- $(a^2 b^3)^3$

## Part 5

- $\left(\frac{1}{2}\right)^3$
- $\left(\frac{2 \times 4}{3}\right)^3$
- $\left(\frac{3}{2^3 3^2}\right)^4$
- $\left(\frac{2 \times 4^2}{5 \times 3^3}\right)^5$

## Part 6

- $\left(\frac{a}{b}\right)^3$
- $\left(\frac{2}{3b}\right)^3$
- $\left(\frac{3}{a^2 b^3}\right)^4$
- $\left(\frac{2b}{5ac^2}\right)^5$

## Part 7

- $\left(\frac{1}{2}\right)^3 \times \left(\frac{2 \times 4}{3}\right)^3$
- $\left(\frac{2 \times 4}{3}\right)^3 \times \left(\frac{2 \times 4}{3}\right)^3$
- $\left(\frac{3}{2^3 3^2}\right)^4 \times \left(\frac{2 \times 4^2}{5 \times 3^3}\right)^5$
- $\left(\frac{1}{5}\right)^3 \times \left(\frac{2 \times 5}{3}\right)^3$
- $\left(\frac{2 \times 6}{3}\right)^3 \times \left(\frac{3 \times 4}{3}\right)^3$
- $\left(\frac{3}{2^3 4^2}\right)^4 \times \left(\frac{2 \times 4^2}{6 \times 3^3}\right)^5$

## Part 8

- $\left(\frac{1}{a}\right)^3 \times \left(\frac{a \times b}{3}\right)^3$
- $\left(\frac{ab^2}{c^3}\right)^2 \times \left(\frac{a^2 b^3}{a}\right)^2$
- $\left(\frac{ab^2}{b^3}\right)^2 \times \left(\frac{a^2 c^3}{b}\right)^2$
- $\left(\frac{b^2}{a^3}\right)^4 \times \left(\frac{a^2 c^3}{b}\right)^3$
- $\left(\frac{cb^2}{c^3}\right)^2 \times \left(\frac{b^2 b^3}{a}\right)^2$



## Higher Order Thinking Skills

Part 9

**Simplify**

1.  $\frac{1}{a} + \frac{a}{a+b}$

2.  $\frac{1}{xy} + \frac{x}{x}$

3.  $\frac{1}{a} + \frac{a}{a+b}$

4.  $\frac{1}{x^2} + \frac{x}{x+y}$

5.  $\frac{1}{yx^2} + \frac{x}{y}$

6.  $\frac{1}{x^2} + \frac{y}{2x}$

7.  $\frac{1}{yx^2} + \frac{y}{3x}$

8.  $\frac{1}{x^2} + \frac{y^2}{x}$

9.  $\frac{y}{x^2} + \frac{y^2}{x}$

10.  $\frac{1+x}{x^2} + \frac{y^2}{x}$

11.  $\frac{1}{x^2} + \frac{y^2}{x+1}$

12.  $3 + \frac{y^2}{x}$

13.  $\left(\frac{1}{a}\right)^3 + \left(\frac{a \times b}{3}\right)^3$

14.  $\left(\frac{ab^2}{c^3}\right)^2 + \left(\frac{a^2b^3}{a}\right)^2$

Part 10

**Simplify**

1.  $\frac{3a^2b^4c^5}{6a^5b^2}$

2.  $\frac{3a^2b^4c^5}{6a^5b^2} \times \frac{2a^4b^6c^5}{4a^8b^2}$

3.  $\frac{b^4c^5}{6a^5} \times \frac{3a^{12}b^4c^4}{4a^6b^2}$

4.  $\frac{c^5}{b^2} \times \frac{5a^2b^3c^6}{20a^5b^2}$

5.  $\frac{7a^2b^4c^5}{b^5} \times \frac{4a^7c^5}{6a^5} \times \frac{6b^4c^5}{a^5b^2c}$

6.  $\left(\frac{ab^2}{b^3}\right)^2 + \left(\frac{a^2c^3}{b}\right)^2$

7.  $\left(\frac{b^2}{a^3}\right)^4 + \left(\frac{a^2c^3}{b}\right)^3$

