

Knowledgeplus Training Centre

Mathematics

Grade 8 & 9

Examples

Indices

Indices Form 2

Law of Indices:

- (1) Multiplication Law: $a^m \times a^n = a^{(m+n)}$
- (2) Division Law: $a^m \div a^n = a^{(m-n)}$
- (3) Power Law: $(a^m)^n = a^{mn}$
- (4) Zero Index: $a^0 = 1$
- (5) Negative index: $a^{-n} = \frac{1}{a^n}$
- (6) Rule 1: $(ab)^n = a^n b^n$
- (7) Rule 2: $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$
- (8) Fractional indices - Square roots: $\sqrt{a} = a^{\frac{1}{2}}$
Cube roots: $\sqrt[3]{a} = a^{\frac{1}{3}}$
- (9) Equation involving indices: if $a^x = a^y$
then $x = y$
or: if $x^m = y^m$
then $x = y$.

Multiplication Law

Indices form

Multiplication Law: $a^m \times a^n = a^{(m+n)}$

Example 1
Simplify the following leaving your answer in index form.

(a) $2^4 \times 2^2$ (b) $x^4 \times y^2 \times x^3$ (c) $5x^4 \times 3$

(a) $2^4 \times 2^2 = 2^{4+2}$
 $= 2^6$

(b) $x^4 \times y^2 \times x^3 = x^{4+3} y^2$
 $= x^7 y^2$

(c) $5x^4 \times 3x^2 = (5 \times 3) x^{4+2}$
 $= 15x^6$

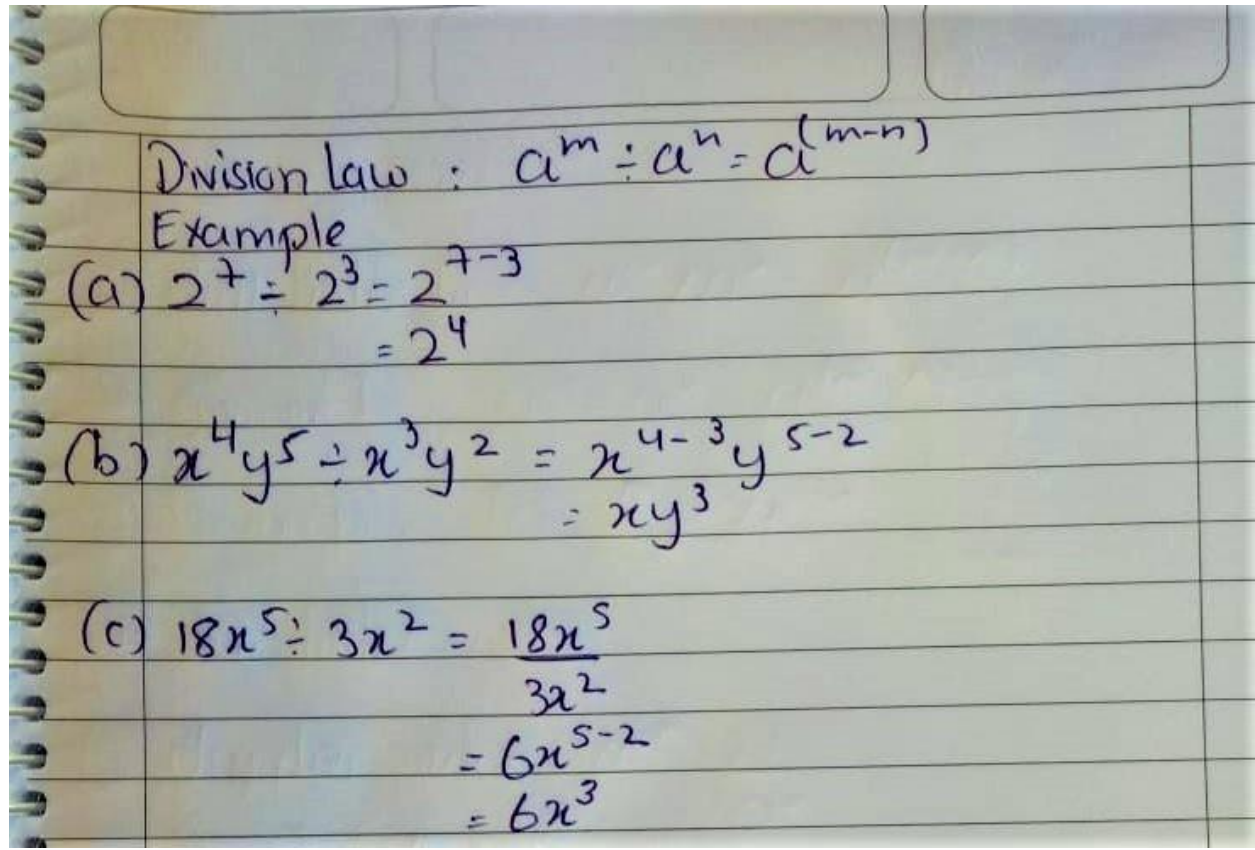
Exercise 1

Simplify the following, leaving your answer in index form.

- a) $5^4 \times 5^3$
- b) $3^5 \times 3^2$
- c) $x^3 \times x^6$
- d) $7^5 \times 7^8$
- e) $3^2 \times 3^2$
- f) $a^2 \times b \times a^5$
- g) $3a^3 \times a^2$

$$h) 5ab^5 \times 3a^3b$$

Division Law



Exercise 2

Simplify the following, leaving your answer in index form.

a) $5^4 \div 5^2$

b) $3^5 \div 3^2$

c) $b^8 \div b^6$

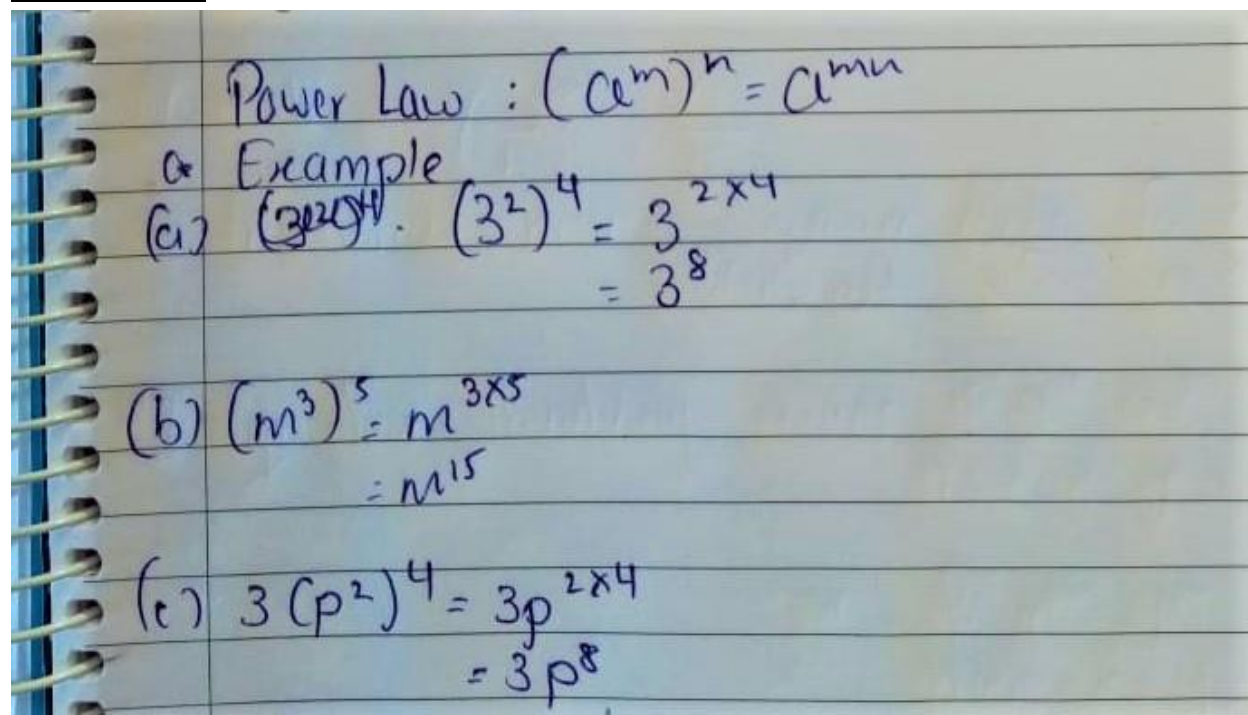
d) $5x^3 \div x^2$

e) $12x^5 \div 3x^2$

f) $a^7 \div 5a^2$

g) $12a^4 \div 6a^2$

Power Law



Exercise 3

Simplify the following, leaving your answer in index form.

a) $(3^2)^5$

b) $(a^4)^3$

c) $3(a^2)^5$

d) $(m^3)^5 \times (m^2)^3$

e) $2(p^2)^3 \times (p^2)^3$

f) $3(m^3)^7 \times 2(m^5)^3$