C12

Algebraic indices

CHAPTER ASSIGNMENT · 31 MARKS

Name _____ Class _____ No. _____ Date _____

Answer every question in the space given. Work without a calculator. A fraction bar in the book is written here with brackets and /, so $(m^4n^9)/(mn^3)$ means m^4n^9 over mn^3. $\sqrt[5]{a}$ means the fifth root of a.

Practice questions from *Cambridge IGCSE Mathematics Core and Extended* (4th edition), Chapter 12 (Algebraic indices), for classroom use. The Check yourself and Chapter quiz questions are Guru Jazzy's own.

Exercise 12.1 · Positive indices

12.1.1 Simplify the following:

(a) $c^5 \times c^3$	(b) $m^4 \div m^2$	(c) $(b^3)^5 \div b^6$	(d) $(m^4n^9)/(mn^3)$
(e) $(6a^6b^4)/(3a^2b^3)$	(f) $(12x^5y^7)/(4x^2y^5)$	(g) $(4u^3v^6)/(8u^2y^3)$	(h) $(3x^6y^5z^3)/(9x^4y^2z)$

12.1.2 Simplify the following:

(a) $4a^2 \times 3a^3$	(b) $2a^2b \times 4a^3b^2$	(c) $(2p^2)^3$	(d) $(4m^2n^3)^2$
(e) $(5p^2)^2 \times (2p^3)^3$	(f) $(4m^2n^2) \times (2mn^3)^3$	(g) $((6x^2y^4)^2 \times (2xy)^3)/(12xy^6y^8)$	(h) $(ab)^d \times (ab)^e$

Exercise 12.2 · Zero and negative indices

12.2.1 Simplify the following:

(a) $c^3 \times c^0$	(b) $g^{-2} \times g^3 \div g^0$	(c) $(p^0)^3(q^2)^{-1}$	(d) $(m^3)^3(m^{-2})^5$

12.2.2 Simplify the following:

(a) $(a^{-3} \times a^5)/(a^2)^0$	(b) $(r^3)^{-2}/(p^{-2})^3$	(c) $(t^3 \div t^{-5})^2$	(d) $(m^0 \div m^{-6})/(m^{-1})^3$

Exercise 12.3 · Fractional indices (Extended)

12.3.1 Rewrite the following in the form $a^{m/n}$:

(a) $(\sqrt[5]{a})^3$	(b) $(\sqrt[6]{a})^2$	(c) $(\sqrt[4]{a})^4$	(d) $(\sqrt[7]{a})^3$

12.3.2 Rewrite the following in the form $(\sqrt[n]{b})^m$:

(a) $b^{2/7}$	(b) $b^{8/3}$	(c) $b^{-2/5}$	(d) $b^{-4/3}$

12.3.3 Simplify the following algebraic expressions, giving your answer in the form $a^{m/n}$:

(a) $a^{1/2} \times a^{1/4}$	(b) $a^{2/5} \times a^{-1/4}$	(c) $\sqrt{a} / a^{-2}$	(d) $\sqrt[3]{a} / a$

12.3.4 Simplify the following algebraic expressions, giving your answer in the form $(\sqrt[n]{b})^m$:

(a) $(\sqrt{b} \times b^{1/4})/b^{-1/5}$	(b) $(b^{-1/3} \times \sqrt[3]{b})/(b^{2/5} \times b)$	(c) $(b^3 \times b^{-1/3})/b^{-2}$	(d) $(b^{-2} \times \sqrt[3]{b})/(\sqrt{b} \times (\sqrt[3]{b})^{-1})$

12.3.5 Simplify the following:

(a) $(1/3)x^{1/2} \div 4x^{-2}$	(b) $(2/5)y^{1/3} \times 5y^{-2/3}$	(c) $(2p^{-1/4})^2 \div (1/2)p^2$	(d) $3x^{-2/3} \div (2/3)x^{-1/3}$

Student assessment 1

SA1.1 Simplify the following using indices: (a) $a \times a \times a \times b \times b$ · (b) $d \times d \times e \times e \times e \times e \times e$ [2]

SA1.2 Write the following out in full: (a) m^3 · (b) r^4 [2]

SA1.3 Simplify the following using indices:

(a) $a^4 \times a^3$	(b) $p^3 \times p^2 \times q^4 \times q^5$	(c) b^7/b^4	(d) $(e^4)^5/e^{14}$

SA1.4 Simplify the following:

(a) $r^4 \times t^0$	(b) $(a^3)^0/b^2$	(c) $(m^0)^5/n^{-3}$

SA1.5 Simplify the following: (a) $(p^2 \times p^{-5})^2/p^3 \cdot$ (b) $(h^{-2} \times h^{-5})^{-1}/h^0$ [4]

Student assessment 2 (Extended)

SA2.1 Rewrite the following in the form $a^{m/n}$: (a) $(\sqrt[8]{a}) \cdot$ (b) $(\sqrt[5]{a})^{-2}$ [2]

SA2.2 Rewrite the following in the form $(\sqrt[n]{(b^m)})$: (a) $b^{4/9} \cdot$ (b) $b^{-2/3}$ [2]

SA2.3 Simplify the following algebraic expressions, giving your answer in the form $a^{m/n}$: (a) $a^{1/3} \times a^{3/2} \cdot$ (b) $(\sqrt[3]{a} / a^{-5/6}) \times a^2$ [4]

SA2.4 Simplify the following algebraic expressions, giving your answer in the form $(\sqrt[n]{t})^m$: (a) $(\sqrt{t} \times t^{2/3})/t^{-1/3} \cdot$ (b) $\sqrt[3]{t}/(t^2 \times t^{-2/5})$ [4]

Check yourself

1 Simplify $5x^3y \times 2x^2y^4$. [2]

2 Simplify $(3a^2b^3)^2 \div 9a^4b$. [3]

3 Write $4m^{-2}$ without a negative index. Explain why the 4 stays on top. [2]

4 Use $k^5 \div k^5$ to explain why $k^0 = 1$. [2]

5 (Extended) Simplify $x^{3/4} \times x^{-1/4}$ and write your answer as a root. [2]

Chapter quiz

Q1 Simplify $x^3 \times x^5$.

A	B	C	D
x^8	x^{15}	$2x^8$	x^2

Q2 Simplify $m^9 \div m^3$.

A	B	C	D
m^3	m^6	m^{12}	m^{27}

Q3 Simplify $(p^4)^3$.

A	B	C	D
p^7	p^{12}	p^{64}	$3p^4$

Q4 Simplify $3a^2 \times 4a^5$.

A	B	C	D
$7a^7$	$12a^7$	$12a^{10}$	$7a^{10}$

Q5 Simplify $(2y^3)^2$.

A	B	C	D
$2y^6$	$4y^5$	$4y^6$	$2y^9$

Q6 Simplify $10x^6y^4 \div 5x^2y$.

A	B	C	D
$2x^4y^3$	$5x^4y^3$	$2x^3y^4$	$2x^4y^4$

Q7 Simplify $7b^0$.

A	B	C	D
0	1	7	7b

Q8 Write n^{-3} without a negative index.

A	B	C	D
$-n^3$	$1/n^3$	$-3n$	$3/n$

Q9 Simplify $a^{-2} \times a^{5}$.

A	B	C	D
a^{3}	a^{-10}	a^{7}	a^{-3}

Q10 Which is the cube root of x, $\sqrt[3]{x}$, written as a power of x?

A	B	C	D
x^{3}	x^{-3}	x^(1/3)	3x

Q11 Write $(\sqrt[4]{y})^{3}$ in the form y^(m/n).

A	B	C	D
y^(4/3)	y^(3/4)	y^{12}	y^(−3/4)

Q12 Simplify a^(1/2) × a^(1/3).

A	B	C	D
a^(1/6)	a^(1/5)	a^(5/6)	a^(2/5)

End of assignment · Check your answers against the chapter at gurujazzy.com/subjects/o-level-mathematics/chapter-12-algebraic-indices/