

TOPIC: EXPONENTS**OUTCOMES:**

The laws of exponents:

- The first law - $a^m \times a^n = a^{m+n}$
- The second law - $a^m \div a^n = a^{m-n}$
- A number to the power of zero - $a^0 = 1$
- The third law of exponents - $(a^m)^n = a^{mn}$

1.	Expand the following (write as a product)
a)	$5^2 = 5 \times 5$
b)	$11^4 =$
c)	$12^3 =$
d)	$a^5 =$
e)	$b^4 =$
f)	$a^4 \times b^2 = a \times a \times a \times a \times b \times b$
g)	$m^2 \times n^3 =$
2.	Write in exponential form • The first law - $a^m \times a^n = a^{m+n}$
a)	$5^1 \times 5^1 \times 5^1 \times 5^1 = 5^{1+1+1+1} = 5^4$
b)	$6 \times 6 \times 6 \times 6 \times 6 =$
c)	$8 \times 8 \times 8 \times 8 =$
d)	$11 \times 11 \times 11 \times 11 \times 11 \times 11 =$
e)	$a \times a \times a \times a \times a \times a =$
f)	$p \times p \times p =$

g)	$m \times m \times m \times m \times m = m^5$
h)	$a^3 \times a^2 =$
i)	$5^3 \times 5^2 =$
j)	$7^2 \times 7^2 \times 7^3 =$
k)	$2^3 \times 2^6 =$
l)	$3^2 \times 3^6 =$
m)	$5^4 \times 5^6 =$
n)	$12 \times 12^8 =$
o)	$2^5 \times 2^3 \times 2^2 =$
p)	$3^5 \times 3^2 =$
q)	$x^5 \times x^2 \times x^2 =$
r)	$a^2 \times b^2 \times a^3 \times b = a^5 b^{2+1} = a^5 b^3$
s)	$m \times n \times n^2 \times m^3 =$
t)	$x^2 \times y^4 \times x^3 \times y =$

3.	Simplify the following: The second law - $a^m \div a^n = a^{m-n}$
a)	$6^8 \div 6^4 = 6^{8-4} = 6^4$
b)	$5^6 \div 5^2 =$
c)	$20^{10} \div 20^4 =$
d)	$b^4 \div b^2 =$

e)	$x^5 \div x^3 =$
f)	$\frac{y^4}{y} = y^4 \div y = y^{4-1} = y^3$
g)	$\frac{y^{13}}{y^3} =$
h)	$p^{10} \div p^5 \div p^2 =$
i)	$x^{16} \div x^5 \div x =$
j)	$6^0 = 1$ (A number to the power of zero - $a^0 = 1$)
k)	$b^0 =$
l)	$100^0 =$
m)	$b^0 + 100^0 =$
n)	$6^0 + x^0 + p^0 =$
o)	$16^5 \div 5^0 =$
p)	$4^3 \times 4^6 \div 4 =$
q)	$x^{10} \times x^2 \div x^6 =$
r)	$2^3 \times 2^8 \div 2^4 =$
s)	$4^3 \times 4^2 \div 4^4 =$

4	Simplify the following without a calculator:
---	--

	The third law of exponents - $(a^m)^n = a^{mn}$ EXAMPLE: • $x^2 = x \times x$ • $(x^2)^2 = x^2 \times x^2 = x^{2+2} = x^4$
a)	$(5^2)^2 = 5^2 \times 5^2 = 5^4$
b)	$(4^3)^2 =$
c)	$(4^2)^3 =$
d)	$(3^2)^3 =$
e)	$(x^2)^4 =$
f)	$(x^3)^2 =$
g)	$(-4)^3 = -4 \times -4 \times -4 = -4^3$
h)	$(-2^3)^2 =$

5	Simplify the following without a calculator: CHALLENGE YOURSELF – LEVEL 4 – COMPLEX QUESTIONS
i)	$(-3)^2 + (-2)^3 =$
j)	$(3^2)^3 \times 6^0 =$
k)	$(6^2)^0 =$
l)	$(3^2 \times 2^3)^2 =$
m)	$\frac{16x^2y^8}{4xy} =$