

GRADE 8 – WORKSHEET 5

TOPIC: ALGEBRAIC EXPRESSIONS – PART 1

OUTCOMES:

- Recognise and interpret the rules for writing algebraic expressions
- Identify variables and constants in expressions.
- Recognise and identify conventions for writing algebraic expressions
- Recognise and identify coefficients and exponents in an algebraic expression
- Use the laws of exponents
- Identify like and unlike terms and be able to add and subtract like terms in an algebraic expression

ALGEBRAIC LANGUAGE

RULE 1: The multiplication sign is NOT always used in algebra. For example:

- $5 \times x = 5x$
- $x \times y = xy$
- $6 \times b \times c \times a = 6abc$ (*always in alphabetical order*)

RULE 2: You always write the number in front of the letter and the letters in alphabetical order.

For example:

- $x \times 6 = 6x$
- $4 \times b \times 2 \times a = 8ab$

RULE 3: $1 \times n = n$. You do not write the 1.

RULE 4: Exponents:

EXAMPLES:

$b \times b = b^2$. You read this as b to the power of 2.

$b \times b \times b \times b = b^4$. You read this as b to the power 4.

RULE 5: It is important that you realise the following difference:

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- $n \times n \times n \times n = n^4$
- $n + n + n + n = 4n$. You only use the exponent rules when you work with multiplication.

1.	Write the following algebraic expressions in their simplest form:
a)	$a \times 3 =$
b)	$x \times 2 =$
c)	$a \times 2 \times 3 =$
d)	$1 \times y \times x \times z =$
e)	$c \times 2 \times b \times 3 =$
f)	$2x \times 3y \times 4 =$
g)	$a \times 2 \times b \times b =$
h)	$y \times 2x \times 3x =$
i)	$m + m + m =$
j)	$m \times m \times m =$
k)	$5 \times a \times a \times 2 =$
l)	$a \times a \times a \times a =$
m)	$b + b + b + b =$
n)	$3x \times 2x \times x =$
o)	$x \times y \times x \times y \times x =$
p)	$3p \times 2p \times p^3 =$
q)	$4 \times b \times a =$

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r)	$2ab \times ba =$
s)	$3 \times x \times 4 \times x \times x =$
t)	$3a \times a \times 2a \times 4a^2 =$

LIKE TERMS are terms that have the same variable and the same exponents,

EXAMPLES OF LIKE TERMS:

- $2a$; $10a$ and $-8a$
- $4x^2$; $-2x^2$ and $10x^2$
- $3x^2y$; $-7x^2y$ and $12x^2y$
- $5ab$ and $2ba$

EXAMPLES OF UNLIKE TERMS:

- $5a$; $2b$ and $8c$
- $2ab$, $4ac$ and $3bc$
- $2x^2y$ and $4xy^2$ – must have the same variables (letters) and exponent.

EXAMPLES:

1. $5a + 2a = 7a$
2. $6x - x = 5x$
3. $4x + 2x^2 + 5x^2 = 4x + 7x^2$
4. $4ab + 2ba = 6ab$
5. $2x^2y + 3x^2y = 5x^2y$
6. $10a + 7 + 4a + 2 = 14a + 9$
7. $4m^4n + 6m^3n^2 + 8m^4n + 2n^2m^3 = 12m^4n + 8m^3n^2$
8. $7z^3 - 9z^3 = -2z^3$
9. $12n^2 + 7n - 10n^2 - 5n = 2n^2 + 2n$

2.	Identify the like terms in the following expressions and simplify.
a)	$4b + 2b =$

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b)	$10c - 2c =$
c)	$3x + 2x + 6 =$
d)	$4a + 2b + 4b =$
e)	$3x + 3x^2 + 3x^2 =$
f)	$3x + 3x^2 + 2x^2 + 4 =$
g)	$4bc - 2cb =$
h)	$2ab + 3ba + 6 =$
i)	$3xy + 5xy - xy =$
j)	$3x + 2y + 4x + 2y =$
k)	$10a - 2b - 12a - 3b =$
l)	$5a^2b - 10a^2b + a^2b =$
m)	$4e + 2e^2 + 4e^3 + e^2 =$
n)	$3x^2 + 2y + 4x + 5y + 3y^2 =$

3.	Identify the like terms in the following expressions and simplify. CHALLENGE YOURSELF – LEVEL 4 – COMPLEX QUESTIONS
a)	$3x + 5y - 2 - 4y + 8 - 6x =$
b)	$3a + 2b + 5a - 7b - 8ab - 3ab =$
c)	$2a^2 + 6b^2 - 9 - 3b^2 + 7a^2 - 12 =$
d)	$3a^3b + 4a^2b^2 - 7a^3b + 2ab - 5a^2b^2 + 10a^3b =$
e)	$3ab + a - 6ab + 6a + b - 4a - 2b =$