

GRADE 8 – WORKSHEET 6

TOPIC: ALGEBRAIC EXPRESSIONS – PART 2

OUTCOMES:

- Classify each expression according to the number of terms.
- Use commutative, associative and distributive laws for rational numbers and laws of exponents to multiply integers and monomials by:
 - Monomials,
 - binomials and
 - trinomials

ALGEBRAIC LANGUAGE

Terms of an expression are separated by plus (+) or minus (–) signs.

- Example: $5 - x$, is two terms, 5 *and* x

Brackets group terms together to form one term.

- Example: $14 + (2 - x)$, is only two terms, 14 *and* $(2 - x)$

The division line works in the same way as brackets.

- Example: $\frac{4-x}{2} + 3$, is two terms, $\frac{4-x}{2}$ *and* 3

In the following expression $7x + 5$:

- 7 is the coefficient of x
- x is called a variable and 5 is the constant term
- The expression consist of 2 terms

KEY WORDS:

- Polynomial – is an expression with many terms
- Monomial – is an expression with one term
- Binomial – is an expression with two terms
- Trinomial – is an expression with three terms

MORE EXAMPLES:

Write down the number of terms in the following and classify each expression according to the number of term:

- $8w^3 + 5w^2 = 2$ terms, Binomial

GRADE 8 – WORKSHEET 6

	➤ $4f^2g^3 = 1$ term, Monomial ➤ $ax + (bx + c) = 2$ terms, Binomial ➤ $a^3 + \frac{a-b}{c} - d = 3$ terms, Trinomial ➤ $(4a + 5a) \div 3 + 2a + 6a \div 2 = 3$ terms, Trinomial ➤ $2p^2 - 3(p^2 + p^2) = 2$ terms, Binomial ➤ $\frac{4x^3}{-4x} + \frac{16x}{-4x} = 2$ terms, Binomial
1	Write down the number of terms in the following and classify each expression according to the number of term:
a)	$2a^2 + 6b^2 - 9$
b)	$4b^2 - 9$
c)	$(2a^2 + 6b^2) - 4x$
d)	$(2a^2 + 6b^2 - 4x)$
e)	$2a^2 + (6b^2 - 4x)$
f)	$4a \times 2 + 4y$
g)	$4a - 5b + 4x \times 2$
h)	$(4a - 5b) + 4x + 2$
i)	$4a + 3b \times 2 + 2b + 6q \div 2$
j)	$\frac{2x + 5}{3x - 40} + 3x - 4$
k)	$3x - \frac{y}{2} + (z + 3)$
l)	$\frac{a + b}{c - d}$
m)	$2x^4 + y - 3x + 5 + 2y$

GRADE 8 – WORKSHEET 6

n)	$a \times -3 + 8$
o)	$2p + 2p \times (3q - 5q) + 4q \times (-3p)$
p)	$(4a + 5a) \div 3 + (2a + 6a) \div 2$
	<u>ALGEBRAIC LANGUAGE</u> • The process of writing product expressions as sum expressions is called expansion. It is sometimes also referred to as multiplication of algebraic expressions. • The words distribute means “to spread out”. The distributive properties may be described as follows: ➤ $a(b + c) = ab + ac$ and ➤ $a(b - c) = ab - ac$, where a, b and c can be any rational number <u>EXAMPLES:</u> 1) $6(x + 2) \rightarrow$ 6 must be multiplied with every term in the bracket $= 6 \times x + 6 \times 2$ $= 6x + 12$ 2) $3(x - 4) \rightarrow$ 3 must be multiplied with every term in the bracket $= 3 \times x + (3 \times -4)$ $= 3x - 12$ 3) $4(a + b) \rightarrow$ 4 must be multiplied with every term in the bracket $= 4 \times a + 4 \times b$ $= 4a + 4b$ 4) $2a(a + b) \rightarrow$ 2a must be multiplied with every term in the bracket $= 2a \times a + 2a \times b \rightarrow$ use the first exponent rule $= 2a^2 + 2ab$ 5) $2m(2m^4 + 4n - 3p) \rightarrow$ 2m must be multiplied with every term in the bracket $= 2m \times 2m^4 + 2m \times 4n + (2m \times -3p)$ use a bracket when working

GRADE 8 – WORKSHEET 6

with negative numbers

$$= 4m^5 + 8mn + (-6mp)$$

$$= 4m^5 + 8mn - 6mp$$

$$6) - 2x(4x + 2)$$

$$= (-2x \times 4x) + (-2x \times 2)$$

$$= (-8x^2) + (-4x)$$

$$= -8x^2 - 4x$$

A bracket indicates multiplication

$+ \times - = -$

$$7) - 3x(2x^2 - 2x^3)$$

$$= (-3x \times 2x^2) + (-3x \times -2x^3)$$

$$= (-6x^3) + (+6x^4)$$

$$= -6x^3 + 6x^4$$

$$8) - 3(2a - 3b - 4c)$$

$$= (-3 \times 2a) + (-3 \times -3b) + (-3 \times -4c)$$

$$= (-6a) + (+9b) + (+12c)$$

$$= -6a + 9b + 12c$$

$$9) - 4y^2(2y^2 - 3y + 2)$$

$$= (-4y^2 \times 2y^2) + (-4y^2 \times -3y) + (-4y^2 \times 2)$$

$$= (-8y^4) + (12y^3) + (-8y^2)$$

$$= -8y^4 + 12y^3 - 8y^2$$

2. Expand and simplify the following expressions:

a) $3(x - y)$

b) $2(x + y)$

c) $4(m + 2)$

d) $2(2a - 3b)$

e) $5(c - 2)$

GRADE 8 – WORKSHEET 6

f)	$4(2x - 3y)$
g)	$5(x - y)$
h)	$3(2x - 3y)$
i)	$2a(a^2 - 3)$
j)	$-2x(2x - 3y)$
k)	$-2m(2m - 3)$
l)	$-2y(2y^3 - 3y)$
m)	$-3x(2x - 4x^3)$
n)	$-4b(2b^2 - 3)$
o)	$y^2(2y^2 - 3y)$
p)	$3a^3(2a^3 - 3a^2 + 5a)$
q)	$-3x(x^2 + 2x - 3)$
3.	CHALLENGE YOURSELF – LEVEL 3 and 4
a)	$5(4x + 3) + 5x$
b)	$2(x^2 + 1) - x - 2$
c)	$-3(x^2 + 2x - 3) + 3(x^2 + 4x)$
d)	$x(x - 1) + x + 2$
e)	$3(2a - 3b + 4c) + 4(-5a + b + 7c)$
f)	$x^3(2x^2 + 4x - 6) + 2x^2(-x^3 + 5x) - 3x(2x^4 - 4x^3 + 7x^2)$