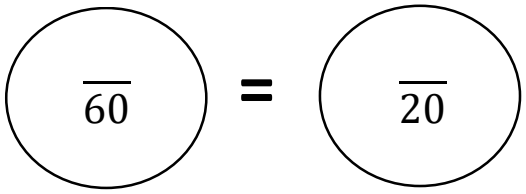
Name of School

Mathematics

Gr 8 Project
Term 3
Set by: J de Villiers

Part A **Converted to:**



INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. Section A consists of 11 pages and 7 questions.

2. Answer ALL the questions on the question paper.
   - Write legibly and present your work neatly.
   - Clearly show ALL calculations, diagrams, graphs, etc. that you have used in determining your answers.
   - Answers only will not necessarily be awarded full marks.

3. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise
   - If necessary, round off answers to TWO decimal places, unless stated otherwise.
4. Diagrams are NOT necessarily drawn to scale.

This Section consists of 11 pages.

Part A: Complete at home
Work through these examples and complete the questions in preparation for Part B.
Remember to bring along the completed Part A to class to complete Part B.

Algebra as a language:

An empty A4 poster has been attached to the back of this project.
Use this to indicate the following for the expression provided:

- Variable
- Constant
- Coefficient
- Exponents



Also:

- Underline the like terms.
- Circle any two unlike terms
- Write the total number of terms in the expression in the space provided.

You will be assessed on your poster using the following rubric:

	Achieved:	**Not Achieved:**
Correctly identifying from the expression: • **Variable** • **Constant** • **Coefficient** • **Exponents**	 **1** **1** **1** **1**	 **0** **0** **0** **0**
Underlining like terms	**2**	**0**
Cicrcling any two unlike terms	**2**	**0**
Determining the number of terms	**2**	**0**
Total mark obtained for Poster :		**/10**

Expressions:

Types of expressions:		
Numeric expressions	**Algebraic expressions:**	**Expressions in word:**
consists of numbers only	contains one or more letters.	Algebraic expressions can also be written in words, and from here you can be asked to write an algebraic expression
For example: *6+9*	*For example:* *a+9* This algebraic expression can be simplified if the value of *a* is known	*For example: The product of a certain number and 4* *b x 4 (correct algebraic notation: 4b)*

Simplifying algebraic expressions:
Addition & Subtraction:

Let's look at an example:

Ms. Ntanjana is taking stock of the chips in her shop before she orders more for the next month. The diagram below represents her stock:



In terms of ordering her new stock, it wouldn't make sense for her to just add all the packets together, as she wouldn't know how much of each product she should order.

So she does this:

- 5 packets of niknaks(n)
- 3 packets of lays (y)
- 6 packets of Simba (s)

Her son tells her that she can write the following algebraic expression:

5n + 3y + 6s

Because it is three different types of chips, there are no like terms so she cannot simplify the expression any further.

Remember: when we add or subtract algebraic expressions, we need to work with like terms.

The variables & exponents will need to be the same.



1.1 If she sells 2 packets of niknaks and one packet of Simba chips, write down a new algebraic expression, with your calculations, representing her stock.

_____

_____(2)

Ms Ntanjana also needs to take stock of her cool-drinks. She stocks Coke (c) and Fanta (f). Her current stock is shown below:





1.2 Write down an algebraic expression representing her cool-drink stock.

_____(1)

1.3 If she buys 24 more cokes and 19 more fanta's write a new algebraic expression for her cool-drink stock.

_____(2)

1.4 She also asks her son to count the sweets. He says:

- there are "n" packets of Jelly tots.
- The chocolates are three more than 4 times the Jelly Tots

Write down an algebraic expression for the number of chocolates.

_____ (1)

1.5 Calculate the actual number of chocolates in her shop if there are 12 packets of Jelly Tots.

_____

_____(3)

Multiplication & Division:

Exponent Law 1	Exponent Law 2	Exponent Law 3	Exponent Law 4
$a^m \times a^n$ $= a^{m+n}$	$(a^m)^n$ $= a^{mn}$	$(ab)^n$ $= a^n b^n$	$\frac{a^m}{a^n} = a^{m-n}$
$-3a^4b^5c \times -6a^2b^2c^2$ $= 18a^6b^7c^3$	$(-2b^3)^4$ $= 16b^{12}$	$(4a)^3$ $= 64a^3$	$\frac{12x^3 - 8x^2 + 14x^6}{2x^2}$ $= \frac{12x^3}{2x^2} - \frac{8x^2}{2x^2} + \frac{14x^6}{2x^2}$ $= 6x - 4 + 7x^4$

Remember: for coefficients we need to use the rules for integers.
So $-3 \times -6 = +18$

For variables we need to use the rules for exponents.
So $c^1 + c^2 = c^3$

Use the information, laws of exponents and the examples above to simplify the expressions below:



2.1 $(a^3)^4$

_____(1)

2.2 $4ab^3 \times -3a^3b$

_____

_____ (3)

2.3 $\frac{2x^3+8x^3}{(5x)(2x)^2}$

_____

_____

_____(4)

2.4 Sam tried to simplify the algebraic expressions below. He obtained the answers below. Look at the solutions he got and then:

- Indicate if you agree with the solution OR
- Redo the the calculations indicating the correct steps.

a) $\sqrt{16a^{16} + 9a^{16}}$
$= 4a^4 + 3a^4$
$= 7a^4$

_____

_____(3)

b) $-(-2x^3)^6$
$= -12x^9$

_____

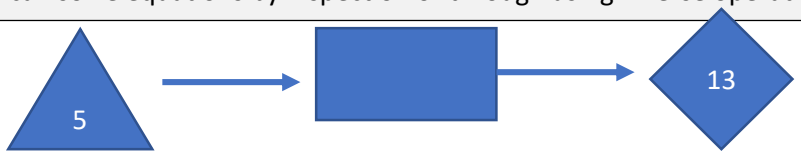
_____(2)

[22]

Algebraic Equations:

In primary school you learnt about number sentences. When a number sentence includes a variable we call it an algebraic equation.
Remember in an equation the left hand side must be equal to the right hand side.
We can solve equations by inspection or through using inverse operations.



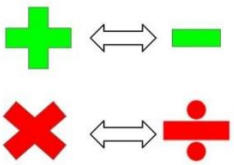


Input Output

We can figure out that $5 + 8 = 13$
So we need to $+8$.
However, if we make it into an algebraic equation it will be $5 + x = 13$
Which will then simplify to : $x = 8$

Solving equations:

To solve more complex algebraic equations we can use inverse operations.
This can be presented by :



Let's look at an example:



$$3 + 4a = 15$$

$$4a = 15 - 3$$

$$4a = 12$$

$$a = \frac{12}{4}$$

$$a = 3$$

You can check your solution by substituting your value for a into the Left Hand Side (LHS) and Right Hand Side (RHS) of the equation to see if these sides are equal.



3. Solve the following equations:

3.1 $k - 11 = 2$

_____

_____(1)

3.2 $-7 - x = -5$

_____

_____(2)

3.3 $5m + 4 = 3m - 12$

_____

_____(3)

3.4 $5(x - 1) = 4(x - 2)$

_____

_____

_____(4)

Writing equations:

We need to be able to convert situations in word to algebraic equations:
Make sure you look carefully at the terminology used and the order of the operations.



Let's look at a few examples:

- *The sum of m and 5 is 12.*

$$m + 5 = 12$$

- *The value of n is three times the value of b*

$$n = 3b$$



4. Write algebraic equations for the following sentences:

4.1 The product of b and 5 is 125.

_____(1)

4.2 The value of b is half the value of c

_____(1)

4.3 The difference between k and 9 is 4.

_____(1)

[13]

Algebra in real life:

We can use Algebra in our daily lives to help us calculate unknowns and determine missing values.

Make sure you read these types of questions carefully & apply your knowledge of algebraic expressions & equations to answer the questions that you might encounter.

Let's look at some examples:

Example 1:

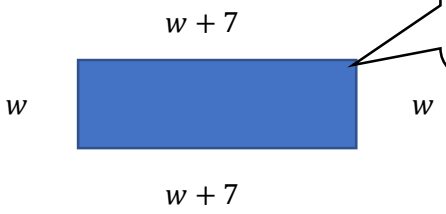
The perimeter of a rectangle is 30 cm. The length of the sides are 7cm more than the width. Determine the length and width of the rectangle. Let the width be =w



Remember that the perimeter of a rectangle can be calculated as follows:

$$perimeter = 2l + 2w$$

Solution:



Let the width be $= w$

$\therefore$ length will be equal to $w + 7$

$$perimeter = 2l + 2w$$
$$2(w + 7) + 2(w) = 30$$
$$2w + 14 + 2w = 30$$
$$2w + 2w = 30 - 14$$
$$4w = 16$$
$$w = 4$$
$$\therefore the\ width\ is\ 4\ cm$$
$$so\ the\ length\ will\ be:$$
$$w + 7$$
$$4 + 7$$
$$l = 11\ cm$$

5. Two rectangles have the exact same area. The measurements of the first rectangle is : $3k\ by\ 3$



And the measurements of the second rectangle is $k + 3\ by\ 6$.

Calculate the value of k.

_____

_____

_____

_____ (4)

Example 2:

At a sports day a school is selling:

- toasted sandwiches(s) for R15 and
- pies (p) for R20.



In total they sell 75 items on one day.
They also note that their total income from these two items is R1 215.

Use this information to determine the number of sandwiches and pies sold.

Solution:

$s + p = 75$

$s = 75 - p \; or \; p = 75 - s$

	Sandwiches	pies
Number sold	$75 - p$	p
Income made per item:	$15(75 - p)$	$20p$

$$Now\ remember\ that\ in\ total\ the\ school\ made\ 1\ 215\ \ldots$$
$$15(75 - p) + 20p = 1\ 215$$
$$1125 - 15p + 20p = 1\ 215$$
$$-15p + 20p = 1\ 215 - 1\ 125$$
$$5p = 90$$
$$p = 18$$
$$\therefore 18\ pies\ were\ sold$$
$$number\ of\ sanwiches: 75 - 18$$
$$s = 57$$

6. Sal is selling two types of printed socks. He sells type a at R45 a pair.
He sells type b at R30.
If he sold 16 pairs in total, and had a total income of R585, how many pairs of sock b did Sal sell?



_____

_____

_____

_____

_____

_____

_____

_____ (6)

Example 3:
The sum of Nicole and Kristin's age is 32. In two years, Nicole will be three times as old as Kristin. How old are they now?



Solution:
$n + k = 32$
$n = 32 - k \; or \; k = 32 - n$

	Nicole	Kristin
Age now	n	$32 - n$
Age in two years	$n + 2$	$32 - n + 2$ $34 - n$

$$Now\ remember\ that\ in\ two\ years\ Nicole\ will\ be\ three\ times\ as\ old\ as\ Kristin\ so\ \ldots$$

$$n + 2 = 3(34 - n)$$
$$n + 2 = 102 - 3n$$
$$n + 3n = 102 - 2$$
$$4n = 100$$
$$n = 25$$
$$\therefore Nicole\ is\ 25\ years\ old$$
$$Kristin\ will\ be:$$
$$32 - 25$$
$$k = 7$$

7. A father is four times as old as his son. In 20 years time the father will be twice as old as his son.
Determine the age of the son & dad at the time of this question.



_____

_____

_____

_____

_____

_____

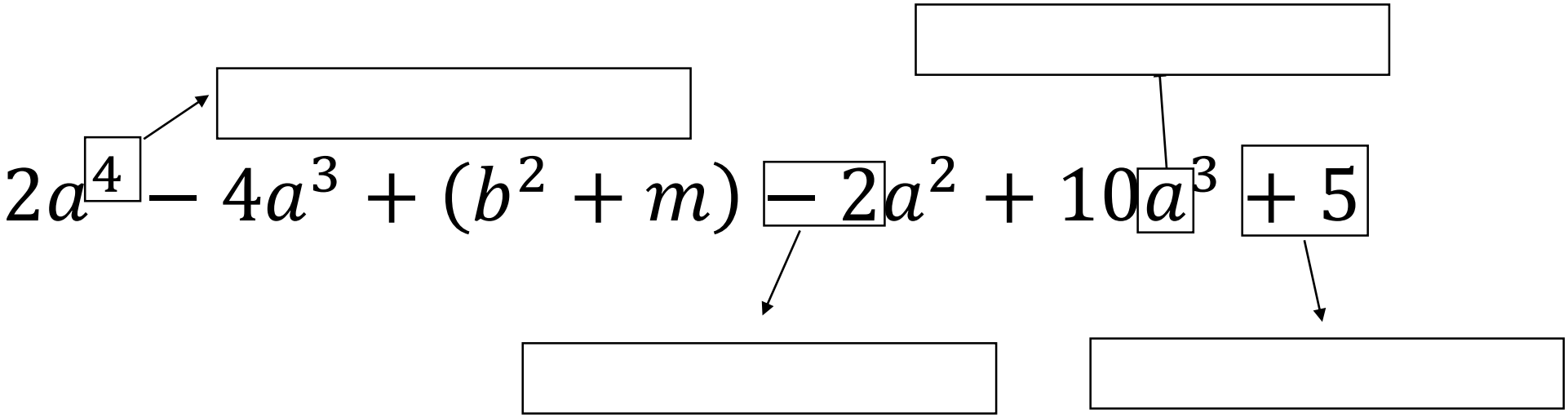
_____

_____ (5)

[15]

Total Part A [60]

Algebra as a language



Number of terms in the expression: