

LETTER FROM THE AUTHOR

It is with great excitement and enthusiasm that I present to you *Advantage Plus Mathematics Grade 7*—a book designed with the learner at heart. This book has been carefully developed to make learning mathematics engaging, interactive, and effective for every student.

Understanding that mathematics can sometimes be challenging, we have included **YouTube links for the examples** to provide step-by-step video explanations. These videos ensure that learners can grasp concepts at their own pace and revisit explanations whenever needed.

To strengthen understanding, the book contains **well-structured exercises at the end of each sub-strand**. These exercises provide ample practice, reinforcing what has been learned and preparing students for assessments. Additionally, we have included **examination-format questions** to familiarize learners with how concepts are tested, helping them build confidence and improve their performance.

One of the key features of *Advantage Plus Mathematics Grade 7* is the inclusion of **answers to all questions in the book**. This allows students to check their work and understand mistakes, fostering self-learning and progress tracking.

I believe that with dedication, practice, and the right resources, every learner can excel in mathematics. I encourage pupils to actively engage with the content, parents to support their children's learning journey, and teachers to use this book as a valuable classroom tool.

Together, let us make mathematics an enjoyable and rewarding experience for all!

Best regards,

Michael M. Mutinda

Author, *Advantage Plus Mathematics Grade 7*

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ISBN 978-9914-744-71-2

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- (b) to the nearest 1000, the number 673 098 123 becomes 673 098 000
(c) to the nearest 10 000, the number 563 789 256 becomes 563 790 000
(d) to the nearest 100, the number 730 862 156 becomes 730 862 200
NOTE: The digits in bold, are the digits rounding off.

Why is Rounding off important?

- i. It enables us understand figures faster. its easier to understand when someone talks of one million, than 975 674
- ii. It enables us to memorize figures faster. we can memorize $22/7$ as 3.142
- iii. It helps us approximate mathematical operations faster off head. we can approximate 19×32 as 600 (20×30)

Exercise 1.2

1. round off each of the following numbers to the nearest number indicated in brackets.

- | | |
|---------------------------|-------------------------|
| a) 783 164 563 (10 000) | b) 78 903 567 (100 000) |
| c) 605 425 940 (1000 000) | d) 9 628 144 (1000 000) |
| e) 12 893 152 (1000) | |

2. by rounding off to the nearest 100, estimate the value of:

- (a) 568×726 (b) $2\,256 - 178$ (c) $7\,854 + 162$

1.1.3 EVEN AND ODD NUMBERS.

An even number is a number that can be divided into two equal groups. Even numbers end in 2, 4, 6, 8 and 0 regardless of how many digits they have

An odd number is a number that cannot be divided into two equal groups. Odd numbers end in 1, 3, 5, 7, 9.

1.1.4 PRIME NUMBERS.

A prime number is a whole number greater than 1 whose only factors are 1 and itself. A factor is a whole number that can be divided evenly into another number. The first few prime numbers are 2, 3, 5, 7, 11, 13, 17 and 19.

Numbers that have more than two factors are called composite numbers. The number 1 is neither prime nor composite.

Why is 1 not prime?

- ◆ 1 can only be divided by one number, 1 itself, so with this definition 1 is not a prime number

Table 1: odd numbers, even numbers and prime numbers.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

KEY: 3 - ODD

6 - EVEN

13

PRIME

1.1.5 OPERATIONS ON WHOLE NUMBERS. ADDITION AND SUBTRACTION

Example 1.3

Solve:

(a) $25 + 7\,890 + 56\,843$

(a) Arranging vertically

$$\begin{array}{r} 25 \\ + 7\,890 \\ \hline 56\,843 \\ \hline 64\,758 \end{array}$$

(b) $906\,874\,304 - 67\,345\,907$

solution.

(b) The numbers are arranged in vertical format as shown

$$\begin{array}{r} 906\,874\,304 \\ - 67\,345\,907 \\ \hline 839\,528\,397 \end{array}$$

NOTE

1. Addition is commutative ($a+b=b+a$) order of numbers does not matter
2. In subtraction, the order matters ($a-b \neq b-a$)

MULTIPLICATION

When two numbers are multiplied, the result is known as product. Like addition, multiplication is commutative (that is, $a \times b = b \times a$); (order does not matter)

Example 1.4

Solve 54678×785

Solution

We re arrange the numbers vertically,

$$\begin{array}{r} 54678 \\ \times 785 \\ \hline 273390 \quad \leftarrow (54678 \times 5) \\ + 4374240 \quad \leftarrow (54678 \times 80) \\ \hline 38274600 \quad \leftarrow (54678 \times 700) \\ \hline 42922230 \end{array}$$

Alternatively,

We can also re write the problem as

$$54678 \times 785 = (54678 \times 700) + (54678 \times 80) + (54678 \times 5) = 42\,922\,230$$

DIVISION

Division is a mathematical operation, written using the symbol $\div$, that can be thought of in two ways: $a \div b$ is the size of each group when a objects are divided into b groups of equal size, OR $a \div b$ is the number of groups when a objects are divided into groups of b objects each.

In this case, a is known as the divisor, b is the dividend and the answer obtained is the quotient.

In division, the order of numbers matter ($a \div b \neq b \div a$)

Example 1.5

Solve

$$24466 \div 26$$

Solution

We prefer to use the long division method

$$\begin{array}{r} 941 \\ 26 \overline{) 24466} \\ \underline{234} \\ 106 \\ \underline{104} \\ 26 \\ \underline{26} \\ 0 \end{array}$$

Multiples of 26

$$26 \times 1 = 26$$

$$26 \times 3 = 78$$

$$26 \times 5 = 130$$

$$26 \times 7 = 182$$

$$26 \times 9 = 234$$

$$26 \times 2 = 52$$

$$26 \times 4 = 104$$

$$26 \times 6 = 156$$

$$26 \times 8 = 208$$

$$26 \times 10 = 260$$

MIXED OPERATIONS.

When several operations have to be done, they have to follow a particular order. The order is as shown.

4. A square blanket has each side measuring 1.5 metres. Calculate the area of the blanket.

5. John has a square piece of land of area 5184 m^2 . Find the perimeter of the land.

Example	Youtube Link
1.1	https://youtu.be/GhSz5Yp0DG0
1.2	https://youtu.be/wYXtJxrKomA
1.3	https://youtu.be/WXbwBsMi4OU
1.4	https://youtu.be/WXbwBsMi4OU
1.5	https://youtu.be/rh482q7MumA
1.6	https://youtu.be/QeXaZv60IjA
1.7	https://youtu.be/XZhCQOorff4
1.8	https://youtu.be/Nx4F6OWutmc?si=bUUeEdbn3-TMlI5i
1.9	https://youtu.be/hUNJVnF8Utk
1.10	https://youtu.be/q1ad-INkoAA
1.12	https://youtu.be/URFySVc1KRc
1.13	https://youtu.be/LQiqtRaxMjg?si=0L3iguJH5ofLLX7N
1.14	https://youtu.be/nBgW9gx1peo
1.15	https://youtu.be/FwnvmBj39hU
1.16	https://youtu.be/ExCT2EEDyTo
1.17	https://youtu.be/5nye2Ah00I0?si=Hav9FXkHpdqttBKb
1.19	https://youtu.be/KzC0VApHADY
1.20	https://youtu.be/ZYUBL3wgQBg?si=Ax-g7TyoHSwmilDK
1.21	https://youtu.be/teUkBvVFING
1.22	https://youtu.be/S_pMGzX7SzE

1.23	https://youtu.be/ZiE4emWvOoE?si=xi4hAZ6wlOuUKXfO
1.24	https://youtu.be/uFyiVZYFyPQ
1.25	https://youtu.be/ze-Zk0-Ly1I?si=J3xfDKvyLY9PkFI
1.26	https://youtu.be/dw6TlRvgoqA?si=IrVdwL7calM9MAOy
1.27	https://youtu.be/gx0xfsqE6ak?si=RYE2bM9A_YA5b7z1
1.28	https://youtu.be/k12zuBYLWD0?si=GQjpeUkbYqU1a8rU
1.29	https://youtu.be/dQbV5SSSGAE
1.30 (a)	https://youtu.be/VRbj-qJdh18?si=k1CGNby0_YNVv9AV
1.30 (b)	https://youtu.be/z1zbpN9cjbY
1.31 (a)	https://youtu.be/15e9gaoyBeU?si=pZDsDIRWN3UBOS5K
1.31 (b)	https://youtu.be/2aYZGSbdwNg
1.32	https://youtu.be/kYN_mLvT5nY?si=y9h6VP2fUI6htD6D
1:33	https://youtu.be/sGt7QwyBOFc
1.34	https://youtu.be/nh7pD13RuQo

2.0. ALGEBRA.

Algebra is a part of mathematics in which letters and other general symbols are used to represent numbers and quantities in formulae and equations.

Why is Algebra Important?

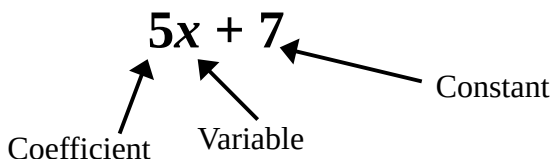
- i. All formulas in mathematics and science are a basic application of Algebra.
- ii. Businesses use algebra to calculate profit, loss, stock among solving other business problems.
- iii. Programming used in computer operations and smart gadgets is an application of Algebra.

2.1 ALGEBRAIC EXPRESSIONS

An algebraic expression is a combination of terms by the operations such as addition, subtraction, multiplication, division, etc. For example, let us have a look at the expression $5x + 7$. Thus, we can say that $5x + 7$ is an example of an algebraic expression.

An algebraic expression has the following parts.

- (a) Coefficient
- (b) Variable
- (c) Constant
- (d) Terms.



$5x$ and 7 are known as terms.

2.1.1 FORMATION OF ALGEBRAIC EXPRESSIONS.

Example 2.1

A jar has n sweets. Two sweets are picked from the jar. How many sweets remain.

Solution.

The jar initially had n sweets. If two sweets are picked, the sweets that remain are $n-2$.

Example 2.2

Albert, Wilson and Charles shared some apples. Albert got 5 more apples than Charles who got twice as much as Wilson. If Wilson got x apples, how many apples did they get all together?

Solution.

Wilson got x apples (from the question statement)

Charles got $2x$ apples (twice Wilson's apples)

Albert got $2x+5$ apples. (5 more than Charles)

Total Number of apples = $x + 2x + 2x + 5 = 5x + 5$

2.1.2 SIMPLIFYING ALGEBRAIC EXPRESSIONS.

These are the steps used in simplification of expressions.

(a) Remove any grouping symbol such as brackets by multiplying factors.

(b) Combine the like terms by addition or subtraction.

(c) Combine the constants.

Example 2.3:

Simplify $2x + 4y - x + y + 6$

Solution.

We group the like terms (those with x alone, those with y alone and constants alone).

$2x - x + 4y + y + 6$

Combining the like terms, we have $x + 5y + 6$

Example 2.4

Simplify $2(x-y)+3(2x-3)$

Solution.

We first open the brackets

$$2x - 2y + 6x - 9.$$

We then group like terms together

$$2x + 6x - 2y - 9$$

Then we combine like terms

$$8x - 2y - 9$$

Exercise 2.1

1. A mango costs ksh. x while an apple costs ksh. y each. Write an expression for the cost of 5 mangoes and 8 apples.

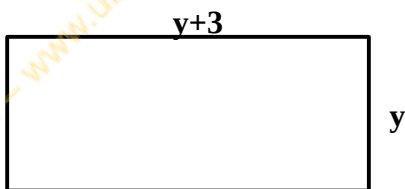
2. John is x years old. Jane is 3 years young than John while Janet is twice as old as Jane.

(a) Write an expression for the Jane's age.

(b) Write an expression for Janet's age.

(c) Write a simplified expression for the sum of the ages of John, Jane and Janet.

3. The diagram below shows the dimensions of a rectangle centimeters.



Write a simplified expression in terms of y for the perimeter of the rectangle.

4. Simplify

(a) $4x + 2(x-y)$

(b) $2(x+3) + 2(5x-6)$

(c) $4(2x-y) + 3(2x+1)$

2.2 LINEAR EQUATIONS.

Linear equations are equations in which the variables are raised to 1. We also call them first order equations.

In this sub strand, we will deal with linear equations of one variable. These equations will take the form $ax + b = 0$, where a and b are numbers, while x is a variable.

Examples of such linear equations are:

a) $2x + 3 = 0$

b) $4x = 8$

NOTE: *The difference between expressions and equations is that equations have an equal sign (=) while expression do not.*

2.2.1 FORMATION OF LINEAR EQUATIONS.

Example 2.5

A jar has n sweets. Two sweets are picked from the jar. The number of sweets that remain are 32. Form an equation in n for the number of sweets in the jar.

Solution.

$$n - 2 = 32$$

Example 2.6

The length of a rectangle is 4 cm more than its width. If the width is x cm and the perimeter is 24 cm, form an equation from this information.

Solution.

The rectangle dimensions are shown below.