

# MATHEMATICS GRADE 8

DATE: .....

## 1. TOPIC: ALGEBRAIC EQUATIONS - 2

### 2. CONCEPTS & SKILLS TO BE ACHIEVED:

**By the end of the lesson learners should know and be able to:** solve equations using additive and multiplicative inverses

<b>3. RESOURCES:</b>	DBE Workbook 1, Sasol-Inzalo book 1, Textbooks
<b>ONLINE RESOURCES</b>	<a href="https://drive.google.com/open?id=1Qw6gZzmSxQ-ypsHmqx1LHnVbA2HsKX79">https://drive.google.com/open?id=1Qw6gZzmSxQ-ypsHmqx1LHnVbA2HsKX79</a>  <a href="https://www.thelearningtrust.org/asp-treasure-box">https://www.thelearningtrust.org/asp-treasure-box</a>

### 4. INTRODUCTION

#### Start class discussion on the following revision questions:

Two or more equations can have the same solution. For example,  $5x = 10$  and  $x + 2 = 4$  have the same solution;  $x = 2$  is the solution for both equations. Two equations are called equivalent if they have the same solution.

“Searching” for the solution of an equation by using tables or by narrowing down to the possible solution is called solution by inspection.

One of the things we do in algebra is to evaluate expressions. When we evaluate expressions we replace a variable in the expression with an **input number** to obtain the value of the expression called the **output number**. We think of this process as a **doing process**.



4. CLASSWORK



1. Copy and complete the following table:

x	-3	-2	0	5	17
2x					

2. Evaluate 4x if:

(a)  $x = -7$

(b)  $x = 10$

3. Copy and complete the table:

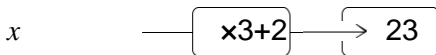
x					
5x	5	15	25	40	90

Learners respond to questions

**Solving equations using the additive and multiplicative inverses:**

Consider the equation  $3x + 2 = 23$ .

We can represent the equation  $3x + 2 = 23$  in a flow diagram, where x represents an unknown number:



When you reverse the process in the flow diagram, you start with the output number 23, then subtract 2 and then divide the answer by 3:



We can write all of the above reverse process as follows:

Subtract 2 from both sides of the equation:

$$3x + 2 - 2 = 23 - 2$$

$$3x = 21$$

Divide both sides by 3:

$$\frac{3x}{3} = \frac{21}{3}$$

$$x = 7$$



We say  $x = 7$  is the solution of  $3x + 2 = 23$ , because  $3 \times 7 + 2 = 23$ .

We say that  $x = 7$  makes the equation  $3x + 2 = 23$  true.

The numbers  $+2$  and  $-2$  are **additive inverses** of each other. When we add a number and its additive inverse we always get 0

The numbers 3 and  $\frac{1}{3}$  are **multiplicative inverses** of each other. When we multiply a number and its multiplicative inverse we always get 1, so  $3 \times \frac{1}{3} = 1$

Solve the equations below by using the additive and multiplicative inverses. Check your answers.

- |                 |                    |
|-----------------|--------------------|
| 1. $x + 10 = 0$ | 2. $49x + 2 = 100$ |
| 3. $2x = 1$     | 4. $20 = 11 - 9x$  |

**Example:** Solve for  $x$  :  $7x + 3x = 10$

$$\begin{aligned}
 10x &= 10 \\
 \frac{10x}{10} &= \frac{10}{10} \\
 x &= 1
 \end{aligned}$$

### Solving equations involving powers

Solving an exponential equation is the same as asking the question: **To what exponent must the base be raised in order to make the equation true?**

## 5. CONSOLIDATION / CONCLUSION & HOMEWORK

### a) Emphasise the following:

Two or more equations can have the same solution. For example,  $5x = 10$  and  $x + 2 = 4$  have the same solution;  $x = 2$  is the solution for both equations.

Two equations are called **equivalent** if they have the same solution.

“Searching” for the solution of an equation by using tables or by narrowing down to the possible solution is called **solution by inspection**.

**The multiplicative property of 1: the product of any number and 1 is that number.**

**The additive property of 0: the sum of any number and 0 is that number**

**Recommended Homework:**

Do the following:

1. Karina solved the equation  $3^x = 27$  as follows:

$$3^x = 27$$

$$\text{Hence } 3^x = 3^3$$

$$\text{Hence } x = 3$$



Now use Karina's method and solve for x in each of the following:

(a)  $2^x = 32$  (b)  $4^x = 16$  (c)  $6^x = 216$  (d)  $5^x + 1 = 126$

Do exercises from national Workbook Vol 1 . p. 72 – 82 for further consolidation

**ANSWERS**

a)	$2^x = 2^4$	$2^x = 32$ dus $x = 4$
b)	$4^x = 4^2$	$4^x = 16$ dus $x=2$
c)	$6^x = 6^3$	$6^x = 216$ dus $x=3$
d)	$5^x = 5^3$	$5^x + 1 = 126$ $5^x + 1 - 1 = 126 - 1$ $5^x = 125$ dus $x=3$