Western Cape Government
Education

GET DIRECTORATE

MATHEMATICS
GRADE 9

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 by inspection
  - solve equations by using additive and multiplicative inverses

3. RESOURCES:	DBE Workbook 1, Sasol-Inzalo book 1, Textbooks, BINGO GAME, Beans, Papers with solutions to the BINGO GAME

4. INTRODUCTION

Divide learners into two groups. Give each group the *BINGO GAME* and beans or any other token to play the game. There are two sets of *BINGO GAME,* distribute one set to one group. This means that each group will have its own set which will not be the same as the other group's. Work out the answers to both sets.

The game is played as follow:

- Read the solution of one of the problems in the *BINGO GAME* to learners.
- Learners determine the solution by inspection.
- If the solution corresponds to one of the problems in *BINGO GAME,* learners are expected to place a bean seed or any other token on top of the equation.
- Continue and read the next solution and so on. Make sure you read from both sets so that all the groups get a chance to shout *BINGO* after checking that the group is correct in their response.
- The first group to get a series of 4 correct answers either diagonally, horizontally or vertically must shout *BINGO!!!*

Note:

Do a number of them as time allows. This ensures active engagement in mental calculation since each group will be working hard to get an answer even if they do not get to shout *BINGO*. The game may be played visa versa, meaning, learners could be given the solutions and the teacher reads problems from the *BINGO GAME*. Laminate your *BINGO GAME* so that it lasts you longer

BINGO GAME 1

$-11x = 88$	$-7x = 49$	$9x = -81$	$-8x = 64$
$3x = 27$	$\frac{x}{2} = 30$	$x + 8 = 14$	$3x + 2 = 14$
$8 + y = 25$	$2x = 82$	$2(x - 15) = 4$	$\frac{x}{2} = 15$
$27 + p = 43$	$n^2 = 25$	$x + 8 = -4$	$-3x = 24$

BINGO GAME 2

$4x + 2 = 14$	$5x - 3 = -27$	$2(x + 1) = 10$	$\frac{6}{x} = 2$
$2^x = 32$	$4x + 1 = 25$	$3m = -48$	$3(x + 5) = 24$
$x + 18 = 52$	$x + 3 = -4$	$x - 10 = 5$	$x + 5 = 4$
$x - 11 = 7$	$x - 8 = 6$	$x - 6 = 2$	$2x - 4 = 10$

4. LESSON PRESENTATION/DEVELOPMENT

Teaching activities	**Learning activities** (Learners are expected to:)

Inspection
Note:

- When you are solving equations by inspection, you look for the value of the variable that will make the equation true. Once the value of unknown has been found, you can always check your answer by substituting the value into the original equation. You can solve these equations without actually having to write them down.
- Two 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. These two equations are ***equivalent***.

Example 1

Solve the equations below by inspection:

a) $x - 6 = 3$

$x = 9$

b) $\frac{3x}{2} = 6$

$= 4$

Note:

- Ask the learners to express the equation in their own words so that it makes sense to them. ("what" subtract 6 will give us 3)
- Take $3x$ as a placeholder, then it becomes "what" divided by 2 is equal to 6. Answer = 12, so, $3x = 12$ and 3 has to be multiplied by 4 to get 12. Let the learners say this in their own words.

Using additive and multiplicative inverses

Note: Some equations cannot easily be solved by inspection. To solve more complicated equations, we use additive and multiplicative inverses. This is sometimes called the balancing method i.e. what is on the RHS of the equation must be equal to what is on the LHS.

Do the following examples with the learners.

- use inspection to find values of the variables
- express the equations in their own words
- explain their thinking to their partners

Example 2

Solve for x in each of the following:

a) $8x + 3 = 27$ $8x + 3 - 3 = 27 - 3$ $8x = 24$ $\frac{8x}{8} = \frac{24}{8}$ $x = 3$	Subtract 3 from both sides Divide both sides by 8
b) $5a - 3 = 2a + 12$ $5a - 3 + 3 = 2a + 12 + 3$ $5a = 2a + 15$ $5a - 2a = 2a + 15 - 2a$ $3a = 15$ $\frac{3a}{3} = \frac{15}{3}$ $a = 5$	Add 3 to both sides Subtract $2a$ from both sides Divide both sides by 3.
c) $2(x + 4) = x + 10$ $2x + 8 = x + 10$ $2x + 8 - 8 = x + 10 - 8$ $2x = x + 2$ $2x - x = x + 2 - x$ $x = 2$	Simplify the LHS Subtract 8 from both sides Subtract x from both sides
d) $\frac{x}{2} + \frac{x+1}{3} = 17$ $3x + 2(x + 1) = 102$ $5x + 2 = 102$ $5x + 2 - 2 = 102 - 2$ $5x = 100$ $\frac{5x}{5} = \frac{100}{5}$ $x = 20$	Multiply both sides of the equation by 6 as it is the lowest common multiple of 2 and 3. Subtract 2 from both sides Divide both sides by 5.
e) $(x - 1)(x + 3) = 0$ $x - 1 = 0$ or $x + 3 = 0$ $x - 1 + 1 = 1$ or $x + 3 - 3 = -3$ $x = 1$ or $x = -3$	At least one factor must be equal to zero, thus $x = 1$ (add 1 to both sides) or $x = -3$ (add -3 to both sides)

Note: If the product of any two or more terms multiplied is equal to 0; any term in the expression may be equal to 0. Emphasise explanations on the RHS in the above examples.

- figure out which of the values of x will satisfy the equation
- share their strategies with their partners

5. CLASSWORK

Solve for x in each of the following:

a) $3x - 8 = 7$

b) $x + 3(x + 1) = 2x + 8$

c) $\frac{4x}{5} + 16 = 32$

d) $(x + 3)(x - 2) = 0$

6. CONSOLIDATION / CONCLUSION & HOMEWORK

Emphasise the following:

a) when we solve equations, numbers do not "jump" from one side of the equation to the other side but you add the additive inverses.

b) If you add a number and then subtract the same number, you are back where you started. This is why addition and subtraction are called **inverse operations**.

c) If you multiply by a number and then divide by the same number, you are back where you started. This is why multiplication and division are called **inverse operations.**