FIRST TERM
WEEKLY LESSON NOTES
WEEK 6

Week Ending: 10-11-2023	**DAY:**	**Subject:** Mathematics
Duration: 100MINS		**Strand:** Number
Class: B9	**Class Size:**	**Sub Strand:** SURDS
Content Standard: B9.1.2.4 Demonstrate understanding of surds as real numbers, the process of adding and subtracting of surds	**Indicator:** B9.1.2.4.1 Identify simple and compound surds.	**Lesson:** 1 of 2
Performance Indicator: Learners can identify and simplify simple and compound surds.		**Core Competencies:** Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)
References: Mathematics Curriculum Pg. 169		
New words: Surds, Simple Surd, Compound, Radicand		

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Display the following numbers on the board: √3, √18, √2, √50. Ask learners, "What do these numbers have in common, and how might they be different from each other?" Share performance indicators and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Briefly discuss what surds are (numbers that can't be simplified to remove a square root). Explain the terminology: the number under the square root sign is called the 'radicand'. Define a simple surd as a square root whose radicand cannot be further simplified. Provide examples, such as √2 or √3, and explain why these are simple surds (because they don't have factors which are perfect squares, apart from 1). Define a compound surd as a square root whose radicand can be simplified further by factoring out perfect squares. Use examples to illustrate. For instance, √18 can be written as √(9x2) or 3√2. Guide learners through the process of simplifying a few compound surds. Example: Simplify the compound surd: √72. <u>Solution</u> *To simplify the compound surd √72, you can simplify it as follows:*	Number cards

	*√72 = √(36 * 2)* *Now, simplify the square root of 36, which is 6:* *√(6 * 2) = 6√2* *So, the simplified form of √72 is 6√2.* Distribute a set of cards to each student or small groups, where each card has a surd written on it. Example: √50, √18, √98, √54, √75, etc. Ask learners to sort these cards into two piles: simple surds and compound surds. After sorting, encourage learners to pick a compound surd and simplify it. Example: Simplify √162 <u>solution</u> √162 = √(9 * 18) We can start by factoring 162 as = √9=3 and √18=(9*2) = 3*3√2 *So, the simplified form of √162 is 9√2* <u>Assessment</u> 1. Simplify the compound surd: √72. 2. Is √5 a simple or compound surd? Explain your answer. 3. Simplify √45. 4. Simplify √80. 5. Simplify √28. 6. Simplify √63. 7. Simplify √112. 8. Simplify √200.	
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	

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Class: B9	**Class Size:**	**Sub Strand:** SURDS

Content Standard: B9.1.2.4 Demonstrate understanding of surds as real numbers, the process of adding and subtracting of surds	**Indicator:** B9.1.2.4.2 Explain the identities/rules of surds	**Lesson:** 1 of 2

Performance Indicator: Learners can understand the fundamental identities and rules of surds and apply them in mathematical expressions.	**Core Competencies:** Communication and Collaboration (CC) Critical Thinking and Problem solving (CP)
References: Mathematics Curriculum Pg. 169	
New words: Surds, Simple Surd, Rationalizing, Radicand	

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Begin with a math puzzle. Display the following expressions on the board: √4, √9, √16, and √25. Ask learners, "What do you notice about these numbers, and how can you describe this pattern?" Share performance indicators and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Revise with learners on the definition of surds as square roots that cannot be simplified to whole numbers. Explain that the number under the square root sign is called the 'radicand.' <u>Identity: Rule 1</u>- √a * √b = √(a * b): Introduce the product rule, explaining that when you multiply two surds with the same index (e.g., both √a), you can simplify them by multiplying the radicands. Provide examples and guide learners through the process: √3 * √5 = √(3 * 5) = √15. <u>Identity: Rule 2</u>- √a / √b = √(a / b): Introduce the quotient rule, explaining that when you divide two surds with the same index, you can simplify them by dividing the radicands. Provide examples and guide learners: √12 / √3 = √(12 / 3) = √4 = 2. <u>Identity: Rule 3</u> - $\frac{b}{\sqrt{a}} = \frac{b}{\sqrt{a}} * \frac{\sqrt{a}}{\sqrt{a}} = \frac{b\sqrt{a}}{a}$	Number cards

Introduce Rule 3, explaining that it's used when you have a surd in the denominator of a fraction.

Walk through the steps: $b/(\sqrt{a}) = b/(\sqrt{a}) * (\sqrt{a})/(\sqrt{a}) = (b\sqrt{a})/a$. Provide examples and let students practice.

Example 1:
Simplify $5 / \sqrt{3}$.
Solution:
$5 / \sqrt{3} = 5 / \sqrt{3} * \sqrt{3} / \sqrt{3} = (5\sqrt{3}) / 3$

Example 2:
Simplify $2 / \sqrt{6}$.
Solution:
$2 / \sqrt{6} = 2 / \sqrt{6} * \sqrt{6} / \sqrt{6} = (2\sqrt{6}) / 6 = \sqrt{6} / 3$

<u>Identity: Rule 4</u> - $a\sqrt{c} + b\sqrt{c} = (a + b)\sqrt{c}$:

Introduce Rule 4, explaining that it's used when adding or subtracting surds with the same index and radicand.

Walk through the steps: $a\sqrt{c} + b\sqrt{c} = (a + b)\sqrt{c}$. Provide examples and let students practice.

Example 1:
Simplify $4\sqrt{5} + 3\sqrt{5}$ using Rule 4.
Solution:
$4\sqrt{5} + 3\sqrt{5} = (4 + 3)\sqrt{5} = 7\sqrt{5}$

Example 2:
Simplify $\sqrt{7} + 2\sqrt{7}$ using Rule 4.
Solution:
$\sqrt{7} + 2\sqrt{7} = (1 + 2)\sqrt{7} = 3\sqrt{7}$

<u>Identity: Rule 5</u> - : $\frac{c}{a+b\sqrt{n}} = \frac{c}{a+b\sqrt{n}} * \frac{a-b\sqrt{n}}{a-b\sqrt{n}}$

Introduce Rule 5, explaining that it's used for rationalizing the denominator when the denominator contains a sum.

Walk through the steps: $c/(a+b\sqrt{n}) = c/(a+b\sqrt{n}) * (a-b\sqrt{n})/(a-b\sqrt{n})$. Provide examples and let students practice.

Example 1:
Rationalize the denominator in the expression $5 / (3 + \sqrt{2})$.
Solution:
$5 / (3 + \sqrt{2}) = 5 / (3 + \sqrt{2}) * (3 - \sqrt{2}) / (3 - \sqrt{2}) = (5 * (3 - \sqrt{2})) / (3^2 - (\sqrt{2})^2) = (15 - 5\sqrt{2}) / (9 - 2) = (15 - 5\sqrt{2}) / 7$

	Example 2: *Rationalize the denominator in the expression 2 / (1 + √5).* *Solution:* *2 / (1 + √5) = 2 / (1 + √5) * (1 - √5) / (1 - √5) = (2 * (1 - √5)) / (1^2 - (√5)^2) = (2 - 2√5) / (1 - 5) = (2 - 2√5) / -4 = -(1/2) + (1/2)√5* <u>Identity: Rule 6</u> - $\frac{c}{a-b\sqrt{n}} = \frac{c}{a-b\sqrt{n}} * \frac{a+b\sqrt{n}}{a+b\sqrt{n}}$: Introduce Rule 6, explaining that it's used for rationalizing the denominator when the denominator contains a difference. Walk through the steps: c/(a-b√n) = c/(a-b√n) * (a+b√n)/(a+b√n). Provide examples and let students practice *Example 1:* *Rationalize the denominator in the expression 3 / (2 - √3)* *Solution:* *3 / (2 - √3) = 3 / (2 - √3) * (2 + √3) / (2 + √3) = (3 * (2 + √3)) / (2^2 - (√3)^2) = (6 + 3√3) / (4 - 3) = (6 + 3√3) / 1 = 6 + 3√3* *Example 2:* *Rationalize the denominator in the expression 4 / (1 - √2).* *Solution:* *4 / (1 - √2) = 4 / (1 - √2) * (1 + √2) / (1 + √2) = (4 * (1 + √2)) / (1^2 - (√2)^2) = (4 + 4√2) / (1 - 2) = (4 + 4√2) / -1 = -4 - 4√2* Provide learners with a set of surd expressions to simplify using the rules discussed. Encourage group work and peer learning. Allow learners to check their work collaboratively. <u>Assessment</u> 1. Apply the product rule to simplify √2 * √8. 2. Use the quotient rule to simplify √15 / √5. 3. Rationalize the denominator in the expression 1 / √2. 4. Simplify the expression 4√7 / √2 using the surd rules. 5. What is the result of applying Rule 4 to 5√3 + 2√3? 6. Use Rule 5 to rationalize the denominator in the expression 7 / (1 + √5). 7. Apply Rule 6 to rationalize the denominator in 3 / (2 - √6).	
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	