I. Lesson Overview

Lesson Title:	Classifying Whole Numbers: Prime and Composite
Strand:	Numbers and Algebra
Sub-Strand:	Real Numbers
Grade Level:	10
Estimated Duration:	40 minutes

Key Inquiry Question

How do we use real numbers in day-to-day activities?

II. Learning Objectives & Standards

Learning Objectives

Upon completion of this lesson, learners will be able to:

1. **Know (Conceptual Understanding):** Understand the definitions and properties of prime and composite numbers, including the role of factors.
2. **Do (Procedural Skill):** Classify whole numbers as prime or composite in different situations using factor analysis.
3. **Apply (Application/Problem-Solving):** Use the properties of prime and composite numbers to explain and solve real-world scenarios.

Curriculum Alignment

Strand:	Numbers and Algebra
Sub-Strand:	Real Numbers
Specific Learning Outcome:	Classifying whole numbers as prime and composite in different situations.

III. Materials & Resources

Textbooks:	CBC Grade 10 Mathematics Learner's Book CBC Grade 10 Mathematics Teacher's Book

IV. Lesson Procedure

Phase 1: Problem-Solving and Discovery / Engage & Explore (15 minutes)

Objective: To activate prior knowledge about number properties through a collaborative, open-ended task.

Anchor Activity:

Anchor Activity:

Group Work:

- In small groups, Learners work with a list of numbers from 1 to 30 in a grid with ten numbers on each row, like:
    - 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
- Learners draw a circle around all the numbers that are multiples of 2, draw squares around multiples of 3, and diamonds around multiples of 5.
- [NOTE: as the square root of 30 is ~5.5, we only need to check multiples of 2,3, and 5 to get all primes below 30]

Pattern Recognition:

- They identify and discuss patterns they notice between even and odd numbers.

Prime & Composite:

- From their sorted lists, they identify prime numbers (numbers **with no** squares, circles, or diamonds) and composite numbers (numbers **with** squares, circles, or diamonds).

Discussion:

- Groups discuss how a number is classified as prime or composite.

Special Case:

- Identify prime numbers that are also even.

Real-World Connection:

- Learners brainstorm real-life examples where these number classifications are found (e.g. sharing seven pens with three people fairly.)

Sharing:

- Groups share their work with fellow learners.

Teacher's Role: The teacher circulates among the groups, listening to their discussions and observing their classification methods. The teacher asks probing questions to guide discovery without giving direct answers (e.g., "How many factors does this number have?", "What makes a number prime?", "Why is 2 unique among prime numbers?"). The teacher will then select a few groups to share their findings, using their solutions and reasoning as a bridge to the next phase of structured instruction.

Phase 2: Structured Instruction / Explain (10 minutes)

Objective: To formalize the concepts and properties learners discovered in the anchor task.

Activity: The teacher leads a whole-class discussion, explicitly connecting the learners' discoveries from the anchor task to formal mathematical definitions and properties.

Key Takeaways & Teacher Connection:

Prime Numbers: A prime number is a number that has only two factors: 1 and itself. Examples: 2, 3, 5, 7, 11, 13, 17, 19, 23...

Connecting to Student Work: The teacher will say, "Many of you found that some numbers could only be divided by 1 and themselves. These are our prime numbers—they are like the building blocks of all other numbers."

Composite Numbers: Composite numbers are natural numbers greater than 1 that have more than two factors.

- 4 is composite because $4 = 1 \times 4$ and 2×2 (factors: 1, 2, 4)
- 6 is composite because $6 = 1 \times 6$ and 2×3 (factors: 1, 2, 3, 6)
- 9 is composite because $9 = 1 \times 9$ and 3×3 (factors: 1, 3, 9)

How to Identify:

- To identify if a number is prime: Check if the number has only two factors (1 and itself).
- To identify if a number is composite: Check if the number has more than two factors, or if it can be divided exactly by numbers other than 1 and itself.

Important Properties:

- Every composite number has prime factors (it can be broken down into a product of prime numbers).
- The only even prime number is 2.
- All other even numbers greater than 2 are composite.
- The smallest composite number is 4.
- Odd composite numbers are odd natural numbers greater than 1 that are not prime (e.g., 9, 15, 21, 25...).

Addressing Misconceptions: "Remember: 0 and 1 are neither prime nor composite. The number 1 has only one factor (itself), so it doesn't meet the definition of prime which requires exactly two distinct factors."

Analogy: "Think of prime numbers as building blocks, and composite numbers as being made by combining those blocks."

Phase 3: Practice and Application / Elaborate (15 minutes)

Objective: To apply the learned concepts and procedures to solve varied problems.

Activity: learners work on a set of problems individually or in pairs. The problems are designed to move from simple classification to application and reasoning.

Varied Problems:

1. Direct Classification: Which of the following numbers are prime and which are composite?

a) 29 (Prime)
b) 21 (Composite: 3 × 7)
c) 5 (Prime)
d) 30 (Composite: 3 × 10, etc.)

2. Word Problem Application:

During a mathematics lesson, Grade 10 learners were asked to classify the number 45038. Which of the following statements are true? Select all that apply.

(1) It is odd

(2) It is prime

(3) It is composite

(4) It is even

Solution Process:

1. Test if the number is even or odd: Check the last digit. The last digit is 8, which is even. Therefore, the number is even.

2. Test if the number is prime or composite: Since the number is even and greater than 2, it has a divisor other than 1 and itself. Therefore, it is composite.

Answer: (3) It is composite and (4) It is even.

Teacher's Role: The teacher monitors learners as they work, providing support where needed and encouraging learners to explain their reasoning using the formal definitions discussed in Phase 2.

Phase 4: Assessment / Evaluate (Exit Ticket)

Objective: To formatively assess individual student understanding of the lesson objectives.

Activity (Exit Ticket): learners independently complete a short assessment task.

Classify each of the following numbers as Prime, Composite, or Neither:

"Classify each number as Prime, Composite, or Neither:
1. 14
2. 11
3. 3
4. 25
5. 17
6. 18"

Answer Key:

(a) 14 is composite, as its factors are 1, 2, 7, 14 (14 = 1 × 14 = 2 × 7).

(b) 11 is prime; it has no factors other than 1 and itself.

(c) 3 is prime; it has no factors other than 1 and itself.

(d) 25 is composite, as its factors are 1, 5, 25 (25 = 1 × 25 = 5 × 5).

(e) 17 is prime; it has no factors other than 1 and itself.

(f) 18 is composite, as its factors are 1, 2, 9, 18 (18 = 1 × 18 = 2 × 9).

Teacher's Role: Collect and review the exit tickets to gauge student understanding and identify any common misconceptions that need to be addressed in the next lesson.

V. Differentiation

Student Group	Strategy & Activity
Struggling Learners (Support)	Scaffolding: Provide a 1-30 chart with multiples of 2 already circled. Offer a handout with the definitions and a list of prime numbers up to 30 for reference. Use factor trees as visual aids. Work with this group in a small setting during the anchor task.
On-Level Learners (Core)	The core lesson activities as described above.
Advanced Learners (Challenge)	Extension Activity: Explore prime factorization. Ask learners: "Can every composite number be written as a product of prime numbers? Try to express 60, 84, and

	100 as products of only prime numbers. What pattern do you notice?" This introduces the Fundamental Theorem of Arithmetic.

VI. Assessment

Type	Method	Purpose
Formative (During Lesson)	- Observation: Teacher circulates during the anchor task. - Questioning: Teacher asks probing questions. - Exit Ticket: A short, independent task.	To monitor student progress in real-time, provide immediate feedback, and adjust instruction as needed.
Summative (After Lesson)	- Homework assignment with more complex problems. - Future quiz/test questions on prime factorization.	To evaluate mastery of the learning objectives after instruction and practice.

Checkpoint Integration

Pre-class Preparation list:

1. Test internet connectivity and access to https://innodems.github.io/CBC-Grade-10-Maths/
2. Ensure all student devices can access the digital textbook
3. Pre-load the checkpoint page on the teacher's display device
4. Have backup printed worksheets in case of technical issues
5. Arrange seating for pair work and station rotations

Checkpoint protocol for Learners:

1. Click “Show new example question” to load the problem
2. Solve the displayed question
3. Click “submit” to check your answer
4. If incorrect, carefully read the feedback and analyse the error before trying a new question. The immediate feedback from checkpoint submissions allows learners to identify and correct errors in real-time.
5. Complete at least 5 questions before rotating
6. Pair learners strategically so stronger learners can explain reasoning to peers.

VII. Teacher Reflection

To be completed after the lesson.

1. What went well?

2. What would I change?

3. Student Understanding: What did the exit tickets reveal about student learning?

4. Next Steps: Based on the assessment data, what is the plan for the next lesson?