I. Lesson Overview

Lesson Title:	Antilogarithms
Strand:	Numbers and Algebra
Sub-Strand:	Indices and Logarithms
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, students will be able to:

1. **Know (Conceptual Understanding):** Understand that antilogarithm is the inverse operation of logarithm, and recognize the relationship between logarithms and exponentials.
2. **Do (Procedural Skill):** Find antilogarithms using logarithm tables and scientific calculators by separating characteristic and mantissa.
3. **Apply (Application/Problem-Solving):** Apply antilogarithm skills to solve equations and verify logarithmic calculations.

Curriculum Alignment

Strand:	Numbers and Algebra
Sub-Strand:	Indices and Logarithms
Specific Learning Outcome:	Finding the antilogarithm for numbers using a calculator and Logarithm table.

III. Materials & Resources

Textbooks:	CBC Grade 10 Mathematics Learner's Book CBC Grade 10 Mathematics Teacher's Book
Equipment:	Scientific calculators, Antilogarithm tables (one per student or pair)
Visual Aids:	Sample antilogarithm table displayed on board or projector

IV. Lesson Procedure

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

Objective: To explore the inverse relationship between logarithms and antilogarithms.

Anchor Activity: Discovering the Inverse Operation

Work in groups to explore the following:

Part A: Understanding Inverse Operations

1. You know that addition and subtraction are inverse operations.

   Example: 5 + 3 = 8, so 8 - 3 = 5

2. You know that multiplication and division are inverse operations.

   Example: 4 x 6 = 24, so 24 / 6 = 4

3. What is the inverse operation of taking a logarithm?

Part B: Exploring the Pattern

Complete the following table:

Logarithm	Value	Reverse Operation
log(100) =	2	If log(x) = 2, then x = ?
log(1000) =	3	If log(x) = 3, then x = ?
log(47.3) =	1.6749	If log(x) = 1.6749, then x = ?
log(473) =	2.6749	If log(x) = 2.6749, then x = ?

Discussion Questions:

- What pattern do you notice between the logarithm value and the original number?
- How can you "undo" a logarithm to get back the original number?
- What is the relationship between log(x) = y and x = 10^y?
- How might you use the logarithm table "backwards" to find antilogarithms?

Teacher's Role: The teacher circulates among groups, asking probing questions (e.g., "If log(100) = 2, what operation gives you back 100?", "How is 10^2 related to log(100) = 2?"). The teacher uses student discoveries to bridge to formal instruction.

Phase 2: Structured Instruction / Explain (10 minutes)

Objective: To formalize the concept and procedure for finding antilogarithms.

Key Takeaways:

What is an Antilogarithm?

The antilogarithm (or antilog) is the INVERSE operation of the logarithm.

If log(x) = y, then antilog(y) = x

In other words: antilog(y) = 10^y

The Fundamental Relationship:

Logarithm	Antilogarithm
log(x) = y	antilog(y) = x = 10^y

Finding Antilogarithms Using Tables (3-Step Process):

Step 1: Separate the characteristic (integer part) and mantissa (decimal part)

Step 2: Find the antilog of the mantissa from the antilog table

Step 3: Multiply by 10^(characteristic)

Finding Antilogarithms Using a Calculator:

Method 1: Use the 10^x button (or INV + LOG)

Method 2: Enter 10^(value) directly

Important Inverse Properties:

log_a(a^x) = x - Taking log "undoes" the exponent

a^(log_a(x)) = x - Raising to power "undoes" the log

Examples:

log_5(625) = log_5(5^4) = 4

5^(log_5(22)) = 22

Addressing Misconceptions: "Remember: The antilog table is read differently from the log table. Also, antilog is NOT the same as negative log - it's the inverse operation!"

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

Objective: To apply antilogarithm skills using tables and calculators.

Worked Example 1: Finding antilog(2.6756) Using Tables

Solution:

Step 1: Separate characteristic and mantissa

2.6756 = 2 + 0.6756

Characteristic = 2, Mantissa = 0.6756

Step 2: Find antilog of mantissa from tables

Locate 0.67 in the first column

Move to column 5

Read: 4.732

Add mean difference for 6: +0.003

Antilog(0.6756) = 4.735

Step 3: Apply the characteristic

Multiply by 10^2

4.735 x 10^2 = 473.5

Therefore: antilog(2.6756) = 473.5

Verification: log(473.5) = 2.6753 (approximately correct)

Worked Example 2: Using Inverse Properties

a) Find log_5(625)

Solution:

625 = 5^4

log_5(625) = log_5(5^4) = 4

b) Find 5^(log_5(22))

Solution:

Since raising to power and taking logs are inverse operations:

5^(log_5(22)) = 22

Teacher's Role: The teacher monitors students, emphasizing the importance of correctly separating characteristic and mantissa, and verifying answers.

Phase 4: Assessment / Evaluate (Exit Ticket)

Objective: To formatively assess individual student understanding.

Exit Ticket Questions:

1. Find the antilogarithms of the following using logarithm tables:

   i) log P = 1.3562

   ii) log Q = 3.4821

   iii) log R = 0.7294

   iv) log S = 4.2187

2. Solve the following using a calculator:

   i) log a = 2.1457

   ii) log b = 0.8743

   iii) log c = 3.5961

   iv) log d = 1.9999

Answer Key:

1. Using Tables:

   i) P = antilog(1.3562) = 10^1 x antilog(0.3562) = 10 x 2.271 = 22.71

   ii) Q = antilog(3.4821) = 10^3 x antilog(0.4821) = 1000 x 3.035 = 3035

   iii) R = antilog(0.7294) = 10^0 x antilog(0.7294) = 1 x 5.363 = 5.363

   iv) S = antilog(4.2187) = 10^4 x antilog(0.2187) = 10000 x 1.654 = 16540

2. Using Calculator:

   i) a = 10^(2.1457) = 139.9 (approximately 140)

   ii) b = 10^(0.8743) = 7.484

   iii) c = 10^(3.5961) = 3947

   iv) d = 10^(1.9999) = 99.98 (approximately 100)

V. Differentiation

Student Group	Strategy & Activity
Struggling Learners (Support)	Scaffolding: Provide step-by-step guides. Use color coding for characteristic (blue) and mantissa (green). Allow calculator verification. Focus on whole number characteristics first.
On-Level Learners (Core)	The core lesson activities as described above.
Advanced Learners (Challenge)	Extension Activity: 1) Find antilog(bar 3.7275) - negative characteristic 2) If log(x) = 2.5 and log(y) = 1.5, find xy without finding x and y separately 3) Solve: 10^(2x-1) = 500 4) Prove: antilog(log a + log b) = ab

Extension Activity Solutions:

1. antilog(bar 3.7275):

   bar 3.7275 means -3 + 0.7275

   antilog(0.7275) = 5.34

   antilog(bar 3.7275) = 5.34 x 10^(-3) = 0.00534

2. Finding xy:

   log(xy) = log(x) + log(y) = 2.5 + 1.5 = 4

   xy = antilog(4) = 10^4 = 10,000

3. Solving 10^(2x-1) = 500:

   2x - 1 = log(500) = 2.699

   2x = 3.699

   x = 1.85

4. Proof:

   antilog(log a + log b) = antilog(log(ab)) = ab

VI. Assessment

Type	Method	Purpose
Formative (During Lesson)	- Observation during group work - Questioning during exploration - Exit Ticket	To monitor progress and adjust instruction.
Summative (After Lesson)	- Homework assignment - Future quiz/test questions	To evaluate mastery of learning objectives.

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 students to identify and correct errors in real-time.
5. Complete at least 5 questions before rotating
6. Pair students strategically so stronger learners can explain reasoning to peers.

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.

VII. Teacher Reflection

To be completed after the lesson.

1. What went well?

2. What would I change?

3. Student Understanding: Did students grasp the inverse relationship between log and antilog?

4. Next Steps: Which students need more practice with antilog tables?