I. Lesson Overview

Lesson Title:	Finding Reciprocals of Real Numbers Using Mathematical Tables and Calculators
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 how to use reciprocal tables and calculators to find reciprocals of real numbers.
2. **Do (Procedural Skill):** Find reciprocals of real numbers using mathematical tables and calculators, including numbers in standard form.
3. **Apply (Application/Problem-Solving):** Apply reciprocal tables to solve real-world problems involving rates and proportions.

Curriculum Alignment

Strand:	Numbers and Algebra
Sub-Strand:	Real Numbers
Specific Learning Outcome:	Finding reciprocals of real numbers using mathematical tables and calculators.

III. Materials & Resources

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

Pre-class Preparation list:

1. Test internet connectivity and access to https://innodems.github.io/CBC-Grade-10-Maths/
2. Ensure all Learner 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

IV. Lesson Procedure

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

Objective: To activate prior knowledge about reciprocals and introduce the use of mathematical tables.

Materials Required: Each group should have a mathematical table (reciprocal tables).

Anchor Activity:

Group Formation:

- Working in groups of 5, consider the following numbers: a) 3/4 b) 1/3 c) 6 d) 0.4167

Exploration:

- Discuss how to use reciprocal tables to find reciprocals of each of the given numbers.

Calculation:

- Determine the reciprocals of the numbers using the tables.

Reflection:

- What did you realize about using the tables?

Sharing:

- Share your work with fellow learners.

Teacher's Role: The teacher circulates among the groups, observing how Learners navigate the reciprocal tables. The teacher asks probing questions (e.g., "How did you locate the number in the table?", "What columns did you use?", "How do you handle numbers not directly in the table?"). The teacher identifies common difficulties and uses Learner discoveries as a bridge to formal instruction.

Phase 2: Structured Instruction / Explain (10 minutes)

Objective: To formalize the procedure for using reciprocal tables, especially for large numbers.

Key Takeaways & Teacher Connection:

Step-by-Step Procedure for Large Numbers (e.g., 1252):

Step 1: Express the number in standard form: $1252 = 1.252 \times 10^3$

Step 2: Find the reciprocal of 1.252 from the reciprocal table:

a) Move down the column headed "x" to locate 1.2

b) Move right along the row to the column headed "5"

c) Read the number at the intersection: 0.8000

d) Move to the SUBTRACT column headed "2"

e) Read the number: 13

f) Subtract: 0.8000 − 0.013 = 0.787

Step 3: Calculate the reciprocal of 10^3 = 1/1000

Step 4: Multiply: 0.787 × 1/1000 = 0.000787

Step 5: Therefore, the reciprocal of 1252 is 0.000787

Key Points:

- Always express large numbers in standard form first ($a \times 10^n$ where $1 \leq a < 10$)
- Use the main table for the mantissa (the "a" part)
- Use the SUBTRACT columns for additional precision
- Multiply by the reciprocal of the power of 10

Addressing Misconceptions: "Remember to align digits correctly when subtracting. The subtract value affects the last digits of your answer."

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

Objective: To apply the procedure for finding reciprocals using tables to various problems.

Varied Problems:

1. Direct Calculation: Use tables to find the reciprocal of 0.154.

Solution: Express 0.154 in standard form: 1.54×10^{-1}. Find reciprocal of 1.54 from tables, then multiply by 10^1 = 10.

2. Word Problem: Murunga's car consumes 1/8 liters of fuel per kilometer. Use tables to identify how far Murunga can drive with 1 liter.

Solution:

• If 1/8 liters = 1 km, then 1 liter = ? km

• Convert 1/8 to decimal: 1 ÷ 8 = 0.125

• Express in standard form: 1.25×10^{-1}

• Find reciprocal of 1.25 from tables: 0.8000

• Multiply by 10^1: $0.8000 \times 10 = 8$

• Murunga can drive 8 km with 1 liter.

Teacher's Role: The teacher monitors Learners as they work, providing support with table navigation and standard form conversions.

Phase 4: Assessment / Evaluate (Exit Ticket)

Objective: To formatively assess individual Learner understanding.

Exit Ticket Questions:

1. Find the reciprocals of the following numbers using reciprocal tables:

a) 4286 b) 0.0458 c) 0.007582 d) 2.781 e) 3/8 f) 4/0.125

2. Maria discovered that 0.6 of Learners preferred football. Use mathematical tables to find the reciprocal of 0.6.

3. A farmer can plant 0.85 acres of land in one day. How many days will it take to plant one acre? (Use the reciprocal of the planting rate.)

4. A shopkeeper has 96 apples and packs them in groups of 8 apples per pack.

a) How many packs does the shopkeeper make?

b) What is the reciprocal of the number of apples per pack?

Answer Key:

1a) $4286 = 4.286 \times 10^3 \longrightarrow$ Reciprocal ≈ 0.000233

1b) $0.0458 = 4.58 \times 10^{-2} \longrightarrow$ Reciprocal ≈ 21.83

1c) $0.007582 = 7.582 \times 10^{-3} \longrightarrow$ Reciprocal ≈ 131.9

1d) $2.781 \longrightarrow$ Reciprocal ≈ 0.3596

1e) $3/8 = 0.375 = 3.75 \times 10^{-1} \longrightarrow$ Reciprocal ≈ 2.667

1f) $4/0.125 = 32 \longrightarrow$ Reciprocal $= 0.03125$

2. Reciprocal of 0.6 = 1.667

3. Reciprocal of 0.85 ≈ 1.176 days

4a) $96 \div 8 = 12$ packs

4b) Reciprocal of 8 = 0.125

V. Differentiation

Learner Group	Strategy & Activity
Struggling Learners (Support)	Scaffolding: Provide a step-by-step guide for reading reciprocal tables. Highlight the rows and columns on the table. Use calculators to verify answers. Work with this group during the anchor task.
On-Level Learners (Core)	The core lesson activities as described above.
Advanced Learners (Challenge)	Extension Activity: Compare the accuracy of reciprocals found using tables versus calculators. Investigate when tables might give slightly different answers than calculators and explain why.

Checkpoint Integration

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.

VI. Assessment

Type	Method	Purpose
Formative (During Lesson)	- Observation during anchor task - Questioning to check table navigation - Exit Ticket	To monitor progress and adjust instruction.
Summative (After Lesson)	- Homework assignment - Future quiz/test questions	To evaluate mastery of learning objectives.

VII. Teacher Reflection

To be completed after the lesson.

1. What went well?

2. What would I change?

3. Learner Understanding: What did the exit tickets reveal?

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