

# Step by step guide

## Finding Reciprocals Using Mathematical Tables and Calculators

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### Grade 10 Mathematics | 40-Minute Lesson

#### Before Class Begins

##### Preparation Checklist:

- Test internet connectivity and access to <https://innodemsgithub.io/CBC-Grade-10-Maths/>
- Ensure all Learner devices can access the digital textbook
- Pre-load the checkpoint page on the teacher's display device
- Have backup printed worksheets in case of technical issues
- Arrange seating for pair work, in groups, or station rotations
- Prepare number charts (1-100) for each group
- Set timer for phase transitions
- Prepare a large reciprocal table chart for demonstration (or projector)

#### PHASE 1: Problem-Solving and Discovery (15 Minutes)

##### Opening (2 minutes)

###### [SAY]:

*"Good morning/afternoon, class! In our previous lesson, we learned to find reciprocals using division. Today, we're going to learn a faster method—using mathematical tables and calculators."*

###### [SAY]:

*"Here's our key question: How do we use real numbers in day-to-day activities? Mathematical tables have been used for centuries to make calculations faster."*

##### Anchor Activity Introduction (2 minutes)

###### [SAY]:

*"Each group has a mathematical table. Today you're going to explore how to use the reciprocal section of these tables."*

**[HOLD UP a mathematical table]:**

*"This is a reciprocal table. It contains pre-calculated reciprocals for numbers. Your task is to figure out how to use it."*

**Group Work Instructions (1 minute)**

**[SAY - Read slowly and clearly]:**

*"In your groups, I want you to:*

*Step 1: Look at these numbers:  $\frac{3}{4}$ ,  $\frac{1}{3}$ , 6, and 0.4167*

*Step 2: Try to find the reciprocal of each number using the table*

*Step 3: Discuss how you navigated the table*

*Step 4: Write down what you realized about using the tables*

*You have 10 minutes. Begin!"*

**Circulation and Probing (8 minutes)**

**[DO]:** Walk around the room, observing how Learners navigate the tables.

**[ASK probing questions as you circulate]:**

- "How did you locate the number in the table?"
- "Which row and column did you use?"
- "What do you do if your exact number isn't in the table?"
- "Did you notice the SUBTRACT columns? What are they for?"
- "How would you handle a number like 6 that's larger than what's in the table?"

**[OBSERVE]:** Note which groups understand the row/column system. Watch for confusion about the subtract columns.

**[TIME CHECK]:** At 8 minutes, announce: "Two more minutes to finalize your observations!"

**Group Sharing (2 minutes)**

**[SAY]:**

*"Time's up! Let's hear from some groups. [Group name], how did you find the reciprocal of 0.4167?"*

**[LISTEN, then ask]:**

*"[Group name], what challenges did you face with the number 6?"*

**[TRANSITION]:**

"Great observations! Now let me show you the formal procedure for using these tables."

## PHASE 2: Structured Instruction (10 Minutes)

### Demonstrating the Procedure (6 minutes)

[SAY]:

"Let me show you step-by-step how to find the reciprocal of a large number like 1252."

[WRITE on board while explaining]:

"Step 1: Express in standard form.

$$1252 = 1.252 \times 10^3$$

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

- Find 1.2 in the x column
- Move right to column headed 5
- Read: 0.8000
- Move to SUBTRACT column 2
- Read: 13
- Subtract:  $0.8000 - 0.013 = 0.787$

Step 3: Find reciprocal of  $10^3$

$$\text{Reciprocal of } 1000 = 1/1000 = 0.001$$

Step 4: Multiply

$$0.787 \times 0.001 = 0.000787$$

The reciprocal of 1252 is 0.000787"

### Key Points (2 minutes)

[SAY]:

"Remember these key points:

- Always convert to standard form first
- The table gives reciprocals for numbers between 1 and 10
- Use the SUBTRACT columns for the third digit
- Don't forget to multiply by the reciprocal of the power of 10"

### Using Calculators (2 minutes)

[SAY]:

*"You can also use calculators. Most scientific calculators have a reciprocal button, often labeled  $1/x$  or  $x^{-1}$ . Simply enter the number and press this button."*

**[DEMONSTRATE on calculator]:**

*"Enter 1252, press  $1/x$ , and you get 0.0007987... Very close to our table answer!"*

**[TRANSITION]:**

*"Now let's practice using the tables!"*

## PHASE 3: Practice and Application (15 Minutes)

### Guided Practice (5 minutes)

**[SAY]:**

*"Let's find the reciprocal of 0.154 together using tables."*

**[ASK]:**

*"First, how do we express 0.154 in standard form?"*

**[Expected answer]:** " $1.54 \times 10^{-2}$ "

**[SAY]:**

*"Good! Now find the reciprocal of 1.54 in your tables. What do you get?"*

**[WAIT, then confirm]:**

*"You should get approximately 0.6494. Now multiply by  $10^1 = 10$ .*

*$0.6494 \times 10 = 6.494$*

*So the reciprocal of 0.154 is approximately 6.494."*

### Word Problem (7 minutes)

**[SAY]:**

*"Now let's solve a real-world problem. Work with your partner."*

**[READ the problem]:**

*"Murunga's car consumes  $1/8$  liters of fuel per kilometer. Use tables to find how far Murunga can drive with 1 liter."*

**[GIVE 4 minutes, then solve together]:**

"Let's solve this step by step:

- If  $1/8$  liters = 1 km, then 1 liter = ? km
- We need the reciprocal of  $1/8$
- Convert:  $1/8 = 0.125 = 1.25 \times 10^{-1}$
- Reciprocal of  $1.25$  from tables: 0.8000
- Multiply by 10:  $0.8000 \times 10 = 8$
- Murunga can drive 8 km with 1 liter!"

### Quick Practice (3 minutes)

[SAY]:

"Quick check: A farmer plants 0.85 acres per day. How many days to plant 1 acre?"

[WAIT, then reveal]:

"We need the reciprocal of 0.85.

$0.85 = 8.5 \times 10^{-1}$

Reciprocal of 8.5  $\approx 0.1176$

Multiply by 10: 1.176 days"

[TRANSITION]:

"Now I want to see what each of you has learned."

## PHASE 4: Assessment / Checkpoint (8 Minutes)

### Checkpoint exploration (5 minutes)

[DO] Project the digital textbook on the screen. Navigate to the "Checkpoint" section.

[SAY] "This is our digital mathematics textbook. It has something special called checkpoints. Watch what happens when I click this button..."

[DO] Click "Show new example question" on Checkpoint

[SAY] "See? A new number appeared! And if I click again..."

[DO] Click the button again to show randomization

[SAY] "A different number! This means you can practice with hundreds of different examples. The computer never runs out of problems to give you."

[SAY] "Now it's your turn. With your partner, open the digital textbook and find the checkpoint.

**[SAY]** Click “Show new example question” to load the problem

**[SAY]** Solve the displayed question

**[SAY]** Click “submit” to check your answer

**[SAY]** 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.

**[SAY]** Complete at least 5 questions

**[DO]** Circulate among pairs. Ask probing questions, for example, what patterns do you notice?

### Independent Work (5 minutes)

**[DISPLAY questions]:**

*"1. Find the reciprocal of 4286 using tables."*

*"2. Maria found that 0.6 of Learners preferred football. Find the reciprocal of 0.6."*

*"3. A shopkeeper packs 96 apples in groups of 8. What is the reciprocal of 8?"*

**[SAY]:**

*"You have 5 minutes. Begin."*

### Collection and Closure (2 minutes)

**[SAY]:**

*"Time's up. Please pass your exit tickets forward."*

**[COLLECT all tickets]**

**[SAY]:**

*"Today you learned to find reciprocals using mathematical tables and calculators. Remember: convert to standard form, use the table for numbers between 1 and 10, and adjust for the power of 10."*

**[ASK]:**

*"When might using tables be more practical than a calculator?"*

**[ACCEPT responses - examples: no calculator available, exam conditions, understanding the process]**

**[SAY]:**

*"Great work today! For homework, find the reciprocals of 5 numbers using both tables and calculators, and compare your answers."*

## Differentiation Notes

### For Struggling Learners:

- Provide a step-by-step guide for reading reciprocal tables
- Highlight rows and columns on the table with colored markers
- Use calculators to verify answers from tables
- Work directly with this group during anchor activity

### For Advanced Learners:

**[GIVE this extension]:**

*"Compare the accuracy of reciprocals found using tables versus calculators. For which types of numbers do tables give slightly different answers? Why might this happen?"*

## Answer Key

### Exit Ticket Answers:

- 1. Reciprocal of 4286:**  $4286 = 4.286 \times 10^3 \rightarrow \text{Reciprocal} \approx 0.000233$
- 2. Reciprocal of 0.6:**  $0.6 = 6 \times 10^{-1} \rightarrow \text{Reciprocal} \approx 1.667$
- 3. Reciprocal of 8:**  $8 = 8 \times 10^0 \rightarrow \text{Reciprocal} = 0.125$

## Post-Lesson Reflection Prompts

- 1. What went well?** Did Learners successfully navigate the tables?
- 2. What would I change?** Was enough time given for table exploration?
- 3. Learner Understanding:** What did the exit tickets reveal about table usage?

**4. Next Steps:** Which Learners need more practice with standard form?