Step by step guide: Finding Reciprocals Using Calculators

Grade 10 Mathematics | 40-Minute Lesson

Before Class Begins

Preparation Checklist:

- Test internet connectivity and access to https://innodems.github.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
- Write the key sequence on the board (covered until Phase 2): 1 ÷ [number] =

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

Opening (2 minutes)

[SAY]:

"Good morning/afternoon, class! Today we're going to learn the fastest and most practical way to find reciprocals—using calculators. This is a skill you'll use throughout your mathematics studies and in real life."

[SAY]:

"Here's our key question: How do we use real numbers in day-to-day activities? Think about this as we work with calculators today."

Anchor Activity Introduction (2 minutes)

[SAY]:

"Everyone should have a calculator. Today you're going to discover how to find reciprocals using this tool."

[ASK]:

"Who remembers what a reciprocal is?"

[WAIT for responses, acknowledge]:

"Yes! The reciprocal of a number is 1 divided by that number. Now let's see how to do this on a calculator."

Group Work Instructions (1 minute)

[SAY - Read slowly and clearly]:

"In your groups, I want you to:
Step 1: Find the reciprocal of 151.6 by pressing: 1, ÷, 1, 5, 1, ., 6, then =
Step 2: Write down the result you see on the screen
Step 3: Find the reciprocals of: 0.0038, 0.5498, 1/8, and 564
Step 4: Discuss how you determined each reciprocal

You have 10 minutes. Begin!"

Circulation and Probing (8 minutes)

[DO]: Walk around the room, observing how Learners use the calculators.

[ASK probing questions as you circulate]:

- "What keys did you press to find that reciprocal?"
- "What result did you get for 151.6?"
- "How did you enter the fraction 1/8?"
- "Does your answer make sense? Is it bigger or smaller than 1?"
- "How can you verify your answer is correct?"

[OBSERVE]: Note which Learners struggle with decimal entry or the order of operations.

[TIME CHECK]: At 8 minutes, announce: "Two more minutes to complete your calculations!"

Group Sharing (2 minutes)

[SAY]:

"Time's up! Let's hear from some groups. [Group name], what did you get for the reciprocal of 151.6?"

[Expected answer]: "Approximately 0.00659..."

[ASK]:

"[Group name], what about 0.0038? What did you notice about this answer?"

[Expected observation]: "The reciprocal is much larger than 1 because the original number is small."

[TRANSITION]:

"Excellent work! Now let me formalize the procedure you've discovered."

PHASE 2: Structured Instruction (10 Minutes)

The Standard Procedure (5 minutes)

[SAY]:

"Here is the standard procedure for finding reciprocals using a calculator."

[WRITE on board while explaining]:

"To find the reciprocal of any number:

Step 1: Press 1
Step 2: Press ÷
Step 3: Enter the number
Step 4: Press =
Step 5: Read the result"

[SAY]:

"Let me demonstrate with the number 7."

[DEMONSTRATE on calculator or board]:

"Press: 1, ÷, 7, =
The display shows: 0.14285714286
Rounded to 4 decimal places: 0.1429"

Working Through Examples (3 minutes)

[SAY]:

"Let's work through a few more examples together."

[SAY]: "Reciprocal of 5.6:"

"Press: 1, ÷, 5, ., 6, =
Result: 0.1786"

[SAY]: "Reciprocal of 0.003:"

"Press: 1, ÷, 0, ., 0, 0, 3, =
Result: 333.3333"

[SAY]: "Reciprocal of 12.8:"

"Press: 1, ÷, 1, 2, ., 8, =
Result: 0.078125"

Key Points (2 minutes)

[SAY]:

"Remember these important points:
• The reciprocal of a number greater than 1 is less than 1
• The reciprocal of a number less than 1 is greater than 1
• Always check that your answer makes sense
• Some calculators have a 1/x button—you can use that too!"

[TRANSITION]:

"Now let's practice with more problems!"

PHASE 3: Practice and Application (15 Minutes)

Individual Practice (5 minutes)

[SAY]:

"Now I want each of you to practice. Find the reciprocals of these numbers:"

[WRITE on board]:

"a) 8
b) 125
c) 0.00067
d) 0.4875"

[GIVE 4 minutes, then check answers]:

"Let's check:
a) Reciprocal of 8 = 0.125
b) Reciprocal of 125 = 0.008
c) Reciprocal of 0.00067 ≈ 1492.54
d) Reciprocal of 0.4875 ≈ 2.0513"

Word Problems (7 minutes)

[SAY]:

"Now let's apply this to real-world problems. Work with your partner."

[READ Problem 1]:

"A school cafeteria has 8 large trays of food to serve equally. To find how much food each Learner gets per tray, find the reciprocal of 8."

[GIVE 2 minutes, then solve]:

"Reciprocal of 8 = 0.125. This means each Learner gets 0.125 or 1/8 of each tray."

[READ Problem 2]:

"If a machine completes a task in 6 hours, its work rate per hour is the reciprocal of the time. Find the reciprocal and explain what it represents."

[GIVE 2 minutes, then solve]:

"Reciprocal of 6 ≈ 0.1667. This means the machine completes about 0.1667 or 1/6 of the task each hour."

Quick Check (3 minutes)

[SAY]:

"Quick check: A car travels 12 km on 1 liter of fuel. How many liters per kilometer?"

[WAIT, then reveal]:

"Reciprocal of 12 ≈ 0.0833 liters per kilometer."

[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 598 using your calculator.

2. Find the reciprocal of 8.861.

3. Write down 3 numbers of your choice and find their reciprocals."

[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 calculators. Remember the simple sequence: 1 ÷ [number] =. This is a quick and accurate method you can use anytime."

[ASK]:

"When might you need to find reciprocals in real life?"

[ACCEPT responses - examples: calculating rates, unit conversions, dividing resources equally]

[SAY]:

"Great work today! For homework, find the reciprocals of 10 different numbers and verify each by multiplying the number by its reciprocal—you should always get 1."

Differentiation Notes

For Struggling Learners:

- Provide a step-by-step visual guide showing which keys to press
- Start with simple whole numbers (2, 4, 5, 10) before decimals
- Pair with a peer who can assist with calculator operation
- Allow extra time for decimal entry practice

For Advanced Learners:

[GIVE these extensions]:

- What happens when you find the reciprocal of a reciprocal?
- Explore patterns in reciprocals of consecutive numbers (1, 2, 3, 4...)
- Create your own word problems that require finding reciprocals

Answer Key

Exit Ticket Answers:

1. Reciprocal of 598: ≈ 0.001672

2. Reciprocal of 8.861: ≈ 0.1129

3. Learner-chosen numbers: Answers will vary

All Assessment Answers:

Reciprocal of 8 = 0.125

Reciprocal of 125 = 0.008

Reciprocal of 598 ≈ 0.001672

Reciprocal of 8638 ≈ 0.0001158

Reciprocal of 8.861 ≈ 0.1129

Reciprocal of 0.00067 ≈ 1492.54

Reciprocal of 0.01467 ≈ 68.17

Reciprocal of 0.4875 ≈ 2.0513

Post-Lesson Reflection Prompts

1. What went well? Did Learners successfully use the calculators?

2. What would I change? Was enough time given for practice?

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

4. Next Steps: Which Learners need more practice with decimal entry?