

NORTH CAROLINA MATHEMATICS

Grade 6 | Ratio reasoning

Two views of every unit ratio



NC.6.RP.2 | Ratios and proportional relationships

Teacher guide, original student tasks, model organizers, worked answers and performance evidence records.

Reusable bank: 30 multiple-choice + 30 open/performance tasks. Seven instructional sections; select a small core across several lessons.

Aligned to current NC standards used in 2026-27 and 2027-28. The standards adopted in 2026 for 2028-29 are not substituted here.

Free sample | Contents

NC.6.RP.2 | Sixth Grade mathematics

This sample contains 10 complete selected pages from the 62-page resource, plus this sample contents page. Original printed page numbers are retained. Gaps are intentional.

Included original pages: 1-9, 45

Representative activities

M01: sample PDF page(s) 9; original page(s) 8

M02: sample PDF page(s) 10; original page(s) 9

O01: sample PDF page(s) 9; original page(s) 8

O02: sample PDF page(s) 10; original page(s) 9

Selected teacher prompts and keys: original page(s) 45

Using this sample

Read the preparation and access guidance before using a selected activity.
Keep teacher keys and private preparation pages separate from student copies.
Use the original resource contents to see the scope of the complete packet.

Complete paid download

The complete resource includes the full PDF task bank and teaching materials.

TEACHER GUIDE

Contents and exact standard

Understand that ratios can be expressed as equivalent unit ratios by finding and interpreting both unit ratios in context.

Navigation

Pages 3-6: targets, planning, worked models and reusable organizer. Seven teacher-section pages each precede their paired student task pages. After the bank: complete worked keys, scoring record, differentiation and sources. Each student page has a recognition task and a different performance task.

Suggested core: use the first M and O in each section, plus targeted items needed for uncovered targets. Use remaining tasks across later practice and conferences. A 60-item bank is not a single test.

Print only selected student task pages. Keep teaching examples and worked keys separate from independent assessment. All contexts and data are invented for instruction.

TEACHER GUIDE

Targets and implementation

A | I can find both reciprocal unit ratios.

B | I can interpret both unit ratios with correct context and units.

Prerequisites and materials

Whole-number multiplication/division, fraction meaning, equivalent fractions and reading labelled tables. Paper, pencil, ruler and optional large paper counters. This packet supplies blank model boxes and a reusable table/double-line organizer. Coordinate grids are included for graph tasks. Calculators may check arithmetic after reasoning is shown; record their use.

Plan three or more sessions

Session 1 (25-35 min): warm-up, teacher model and selected We Do tasks. Session 2 (25-35 min): collaborative and independent tasks. Session 3 (20-30 min): misconception-based reteach and exit tasks. Expand time for explanation and models; no fixed speed cutoff.

Collect evidence

Record the actual representation, calculation, units and explanation for each target. Recognition alone does not demonstrate modeling. Ask: Which quantities are compared? What is one unit? What stays constant? Why does the result make sense?

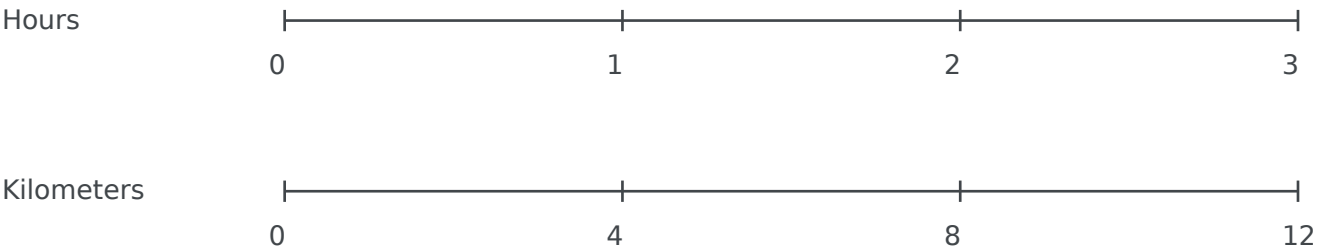
TEACHER MODEL

Think aloud and connect

Twelve kilometers in three hours

Say: “To find kilometers for one hour, divide both quantities by 3: 4 km per hour. To find hours for one kilometer, divide both by 12: 1/4 hour per kilometer. One compares distance with time; the other compares time with distance. $4 \times 1/4 = 1$, but the units tell us which ratio answers a question.”

Kilometers	Hours
12	3
4	1
1	1/4



TEACHER MODEL

From a model to an explanation

Use two strips: a 12-kilometer strip aligned to a 3-hour strip. Divide each strip into 3 matching parts to see 4 kilometers per hour. Then partition the originals into 12 matching parts to see 1 kilometer per $\frac{1}{4}$ hour. Interpret fractions as exact amounts, not as rounding errors.

Teacher questions and anticipated responses

Ask: “What is being held constant?” Expect the multiplicative relationship or the part-to-whole relationship, rather than the numerical difference. Ask: “Where is one unit in your model?” Have the student point and label it. Ask: “Can a second representation show the same relationship?” Require the same quantities and units in both.

Respond to an additive error

Say: “Show one complete batch or one percent unit. Now make two copies without changing what is inside a copy.” Compare that model with adding the same number to both quantities. Record the support and use a fresh item afterward.

Do not supply the performance answer

During independent work, read wording neutrally and clarify vocabulary without choosing a ratio direction, a multiplier, a benchmark, a table entry or a graph scale. Demonstrating any of these is answer-supplying support; record it and reassess later.

Reasoning extension

Across two sessions, invent a realistic relationship, represent it two ways, and ask a partner to identify an incorrect row or claim. Revise the wording after feedback. Evaluate the explanation and consistency, not the decoration.

REUSABLE STUDENT ORGANIZER

Name quantities before calculating

Name: _____ Date: _____

Quantities and units: _____

Quantity 1: _____	Quantity 2: _____



Equation, matching units and explanation

TEACHER | Warm-up

Warm-up plan

Activate prior meaning

Bank allocation: M01-M04 and O01-O04. Selected core: M01 and O01; replace or add items for a target needing evidence.

0-2 min | Ask learners to name the two quantities before comparing. Give individual think time, then invite a description with “for every.”

2-6 min | Say: “Identify the quantities and units. Show the relationship with a model or table. Explain why your calculation matches that relationship.” Allow oral, signed or dictated explanations.

6-10 min | Confer: “What would stay the same if the batch or whole changed? Show where your answer appears in your model.” Ask for a different representation only after the first is complete.

Core performance focus: Interpret both unit ratios with correct context and units.

Look for: Divide both quantities by 9: $16/3$ pages for 1 minute. Divide both by 48: $3/16$ minutes for 1 page. The numerical unit ratios multiply to 1: $(48/9)(9/48) = 1$. Example questions: How many pages for 1 minute? $16/3$. How many minutes for 1 page? $3/16$.

If reasoning breaks down: return to one labelled unit or one complete batch. Distinguish a quantity from its unit. Do not tell the learner the missing multiplier during the independent check.

Early finisher: create a new example with different quantities and verify it with a second representation. Record date, item, actual evidence, access support and next teaching step. Shorten this section for an exit ticket; timing is flexible.

WARM-UP

M01 + O01 | Student tasks

Name: _____ Date: _____

M01 | Target B

A recipe uses 32 liters for 5 equal batches. Which pair explains the amount of liters for one batch AND the amount of batches for one liter?

- A. $64/5$ liters per batch; $5/64$ batches per liter
- B. $32/5$ liters per batch; $5/32$ batches per liter
- C. $16/5$ liters per batch; $5/16$ batches per liter
- D. $37/5$ liters per batch; $5/37$ batches per liter

O01 | Target B | Show your reasoning

A printer prints 48 pages in 9 minutes at a constant rate. Find both unit ratios. Pose one question answered by each ratio, and answer your questions with units.

Model / table / calculation**Answer with units and explanation**

WARM-UP

M02 + 002 | Student tasks

Name: _____ Date: _____

M02 | Target A

A printer prints 36 pages in 8 minutes at a constant rate. Which pair can complete the two rows (pages, minutes) with second coordinate 1 and first coordinate 1?

- A. $11/2$ pages per minute; $2/11$ minutes per page
- B. $9/2$ pages per minute; $2/9$ minutes per page
- C. $13/2$ pages per minute; $2/13$ minutes per page
- D. 9 pages per minute; $1/9$ minutes per page

002 | Target A | Show your reasoning

A recipe uses 20 liters for 6 equal batches. Find both unit ratios. Use them to recover the original pair in two ways. Explain why the two numbers are reciprocals.

Model / table / calculation**Answer with units and explanation**

TEACHER ONLY | WORKED KEYS

Items 01-02

M01 | B. 32/5 liters per batch; 5/32 batches per liter

Divide both quantities by 5: 32/5 liters for 1 batch. Divide both by 32: 5/32 batches for 1 liter. The numerical unit ratios multiply to 1: $(32/5)(5/32) = 1$. Example questions: How many liters for 1 batch? 32/5. How many batches for 1 liter? 5/32.

Check alternatives: A: 64/5 liters per batch; 5/64 batches per liter; C: 16/5 liters per batch; 5/16 batches per liter; D: 37/5 liters per batch; 5/37 batches per liter. Compare each with the worked relationship above; none satisfies it.

Diagnostic check: Each quotient must carry numerator units per denominator unit. Check both divisions; merely reversing unit labels is not taking a reciprocal.

O01 | Sample complete response

Divide both quantities by 9: 16/3 pages for 1 minute. Divide both by 48: 3/16 minutes for 1 page. The numerical unit ratios multiply to 1: $(48/9)(9/48) = 1$. Example questions: How many pages for 1 minute? 16/3. How many minutes for 1 page? 3/16.

M02 | B. 9/2 pages per minute; 2/9 minutes per page

Divide both quantities by 8: 9/2 pages for 1 minute. Divide both by 36: 2/9 minutes for 1 page. The numerical unit ratios multiply to 1: $(36/8)(8/36) = 1$. Table rows (pages,minutes): (36,8), (9/2,1), (1,2/9).

Check alternatives: A: 11/2 pages per minute; 2/11 minutes per page; C: 13/2 pages per minute; 2/13 minutes per page; D: 9 pages per minute; 1/9 minutes per page. Compare each with the worked relationship above; none satisfies it.

Diagnostic check: Each quotient must carry numerator units per denominator unit. Check both divisions; merely reversing unit labels is not taking a reciprocal.

O02 | Sample complete response

Divide both quantities by 6: 10/3 liters for 1 batch. Divide both by 20: 3/10 batches for 1 liter. The numerical unit ratios multiply to 1: $(20/6)(6/20) = 1$. Recovery: $10/3 \times 6 = 20$ liters; $3/10 \times 20 = 6$ batches.