

Teacher guide · Compare unit rates on the same basis

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Target

Choose a defensible comparison by finding rates with the same units and direction, then interpret the result for the stated goal.

Fit and entry

A bounded U.S. Grade 6 mathematics supplement, not a full ratios course. Local grade fit depends on the prerequisites below.

Name both quantities in a ratio in the intended order, make equivalent labeled pairs by scaling both quantities, divide whole numbers, and read a simple fraction as division. RR02 supplies ratio-language and equivalent-group work.

Materials

Paper and pencil. Optional counters for equal groups. No device, purchase, account or email is needed.

Teaching sequence

1. Start Here maps RR02 prerequisite → RR03 interpretation → RR04 comparison. A teacher may enter at RR04 only when per-one meaning and units are already secure.
2. Print readiness alone before any model, glossary or lesson. If prerequisite reasoning is insecure, teach RR02/RR03 as appropriate. Readiness is a routing conversation, not a diagnostic score.
3. Teach the model and guided page. Then give only the separate check file; provide no intended keys. Lesson and check use different stimuli.
4. Use the teacher criteria and response patterns; choose one supplied route and document why. Provide only that route page.
5. Reserve fresh recheck, later revisit and transfer selections. Their changed contexts/data are separate stimuli, not calibrated alternate forms. If shown before collection, label the later response practice.
6. Use fresh recheck after teaching, later revisit after another learning opportunity, then transfer. Record actual exposure, tools and response conditions locally.

Print and exposure · RR04

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Select files, not a full student packet

Every student file is separate. Give readiness page 1 alone before models, lesson or glossary. Teach-lesson page 1 supplies the model/M1; page 2 supplies G1/G2. Check-only pages 1 and 2 supply C1/C2 and contain no model or intended key.

Give only the chosen route file, page 1. Keep fresh-recheck pages 1–2, later-revisit pages 1–2 and transfer page 1 out of sight until their collection. Do not send the classroom ZIP or teacher guide to students. It contains teacher keys and all reserved tasks.

Exposure matters

The fresh/revisit/transfer tasks have new data or contexts; they are not calibrated equivalent forms. If a learner has seen a task, a model that answers it, or its key, record that exposure and use the response as practice. No repeated task is counted as fresh evidence.

Response criteria

Basis: uses the same units and direction for every compared rate, or explains a common-quantity comparison.

Calculation: finds each rate accurately with labeled quantities.

Decision: interprets higher output/speed or lower unit cost for the stated goal; accepts a tie.

Information: identifies the missing denominator and avoids ranking an incomplete rate.

Use criteria separately

Record calculation, quantity labels/direction, explanation and conditions separately. A correct bare number leaves meaning uncertain. A single arithmetic slip can coexist with sound rate reasoning. Use a tentative next step; do not make a summed mastery score or stable ability claim.

Choose a next move · continue

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Visible signal

C1 and C2 show a shared basis, a goal-matched comparison, tie and missing-information reasoning.

Use RR04-N1 · student/route-continue page 1

Ask for the labeled rate and why it can be used for the new quantity.

After the move

Use an unused fresh recheck after the move. Describe calculation, units and explanation separately; choose the next move from visible evidence. If uncertainty remains, clarify conditions rather than infer stable ability.

Reserved evidence

Fresh-recheck page 1 is RR04-F1; page 2 is RR04-F2. Use both to examine the target components after a route. Later-revisit pages 1–2 are RR04-L1/L2. Transfer page 1 is RR04-T1. If evidence is still unclear, clarify or reteach and document what remains uncertain.

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Choose a next move · clarify

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Visible signal

The response is blank/ambiguous or a choice appears without comparable labeled rates.

Use RR04-Q1 · student/route-clarify page 1

Read the task neutrally or allow an oral/labeled drawing response; ask what the 1 names. Supply no calculation or choice. Record the changed conditions.

After the move

Use an unused fresh recheck after the move. Describe calculation, units and explanation separately; choose the next move from visible evidence. If uncertainty remains, clarify conditions rather than infer stable ability.

Reserved evidence

Fresh-recheck page 1 is RR04-F1; page 2 is RR04-F2. Use both to examine the target components after a route. Later-revisit pages 1–2 are RR04-L1/L2. Transfer page 1 is RR04-T1. If evidence is still unclear, clarify or reteach and document what remains uncertain.

Choose a next move · reteach

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Visible signal

After clarification the response still compares totals or mixes rate directions.

Use RR04-R1 · student/route-reteach page 1

Teach with the supplied equal-group/table task. Keep both quantities named. If the prerequisite remains insecure, use RR03 per-one lesson before RR04.

After the move

Use an unused fresh recheck after the move. Describe calculation, units and explanation separately; choose the next move from visible evidence. If uncertainty remains, clarify conditions rather than infer stable ability.

Reserved evidence

Fresh-recheck page 1 is RR04-F1; page 2 is RR04-F2. Use both to examine the target components after a route. Later-revisit pages 1–2 are RR04-L1/L2. Transfer page 1 is RR04-T1. If evidence is still unclear, clarify or reteach and document what remains uncertain.

Choose a next move · extend

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Visible signal

The learner handles whole-number comparisons and boundaries; try an exact fraction comparison.

Use RR04-X1 · student/route-extend page 1

Ask for exact fractions or an equivalent common-quantity argument; ask how reversing direction changes the interpretation.

After the move

Use an unused fresh recheck after the move. Describe calculation, units and explanation separately; choose the next move from visible evidence. If uncertainty remains, clarify conditions rather than infer stable ability.

Reserved evidence

Fresh-recheck page 1 is RR04-F1; page 2 is RR04-F2. Use both to examine the target components after a route. Later-revisit pages 1–2 are RR04-L1/L2. Transfer page 1 is RR04-T1. If evidence is still unclear, clarify or reteach and document what remains uncertain.

Answer guidance · RR04 · 1

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RR04-S1 · readiness

Task: A table lists 20 beads in 4 equal bags. Find beads per bag and explain what the 1 means. A second row says 6 beads per bag. Do these rows use the same units and direction?

Defensible answer: 5 beads per bag; 1 bag; both rows use beads per bag.

Accept: Labeled equal-sharing or table explanation.

Notice: This entry checks unit-rate prerequisite; use RR03 if it is unclear.

RR04-M1 · model

Task: Use the pencil-stall model. Which stall has the lower dollars per pencil? Explain why a common basis matters.

Defensible answer: Cedar at 2 dollars per pencil, compared with Maple at 3 dollars per pencil. Pack sizes differ, so total prices alone are not the needed comparison.

Accept: Compare cost for a common number of pencils or pencils per dollar with the decision interpreted correctly.

Notice: Modeled answer is teaching, not an independent check.

Answer guidance · RR04 · 2

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RR04-G1 · guided

Task: Two machines work at constant rates. Machine A sorts 30 cards in 5 minutes. Machine B sorts 28 cards in 4 minutes. Which sorts more cards per minute? Name a common basis, calculate both rates, and compare.

Defensible answer: A: 6 cards per minute; B: 7 cards per minute. B is faster despite its smaller total.

Accept: Compare both over 20 minutes or minutes per card and interpret smaller time as faster.

Notice: Look for the totals trap and consistent direction.

RR04-G2 · guided

Task: At constant speeds cart A travels 12 meters in 4 seconds and cart B travels 15 meters in 5 seconds. Compare meters per second. Is there a faster cart in this model?

Defensible answer: Both are 3 meters per second; tie.

Accept: Common-time distances or correctly labeled reciprocal times.

Notice: Do not force a winner when rates are equal.

Answer guidance · RR04 · 3

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RR04-C1 · independent check

Task: For identical notebooks with no fees, shop A charges 18 dollars for 6 notebooks; shop B charges 20 dollars for 5 notebooks. Which shop has the lower dollars per notebook? Show both rates and explain the comparison.

Defensible answer: A: 3 dollars per notebook; B: 4 dollars per notebook. A has lower unit cost.

Accept: Cost for a common number of notebooks or notebooks per dollar correctly interpreted.

Notice: Decision must match unit cost; no quality claim.

RR04-C2 · independent check

Task: At constant rates sorter A handles 36 envelopes in 6 minutes, sorter B handles 24 envelopes in 4 minutes, and sorter C handles 40 envelopes but its time is not given. Compare A and B in envelopes per minute. Can you rank C against them? Explain what you need.

Defensible answer: A and B each handle 6 envelopes per minute, so tie. C cannot be ranked without its elapsed time (or its unit rate). Its total 40 is insufficient.

Accept: Common-time comparison with explicit missing time for C; possible examples show C could be faster/slower/tied.

Notice: Tie and insufficient information are separate judgments.

Answer guidance · RR04 · 4

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RR04-N1 · continue

Task: Two constant-rate pumps fill water. Pump A fills 21 liters in 3 minutes; pump B fills 24 liters in 4 minutes. Which fills more liters in 2 minutes at its same rate? Explain using a common basis.

Defensible answer: A: 7 liters per minute, 14 liters in 2 minutes; B: 6 liters per minute, 12 liters in 2 minutes. A fills more.

Accept: Direct equivalent-pair comparison over 2 minutes.

Notice: Continue from secure basis and interpretation into a matched-time application.

RR04-Q1 · clarify

Task: Machine A prints 16 tickets in 4 minutes; machine B prints 18 tickets in 3 minutes, each at a constant rate. Find tickets per minute for both. Explain orally, in writing or in a labeled table which is faster and why.

Defensible answer: A: 4 tickets per minute; B: 6 tickets per minute; B is faster.

Accept: A labeled table or oral explanation with the same mathematics.

Notice: Clarify response mode/task language without giving a rate or choosing the winner.

Answer guidance · RR04 · 5

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RR04-R1 · reteach

Task: For identical erasers with no fees, box A costs 10 dollars for 5 erasers; box B costs 12 dollars for 3 erasers. Make two labeled rows with a column for dollars per 1 eraser. Divide both quantities in each row by its eraser count. Which unit cost is lower? Why is 10 dollars versus 12 dollars not enough reasoning?

Defensible answer: A: 2 dollars per eraser; B: 4 dollars per eraser. A has lower unit cost. Different eraser counts require a common basis, even though the totals happen to suggest the same winner here.

Accept: Compare cost for a common number of erasers; table shows the labeled denominator 1.

Notice: If per-one meaning fails, return to RR03 before comparison.

RR04-X1 · extend

Task: At constant rates valve A releases 9 liters in 4 minutes and valve B releases 7 liters in 3 minutes. Which releases more liters per minute? Compare exactly with fractions, without rounding. Would comparing minutes per liter lead to the same choice? Explain.

Defensible answer: A: $9/4$ liters per minute; B: $7/3$ liters per minute. Since $27/12 < 28/12$, B releases more. Minutes per liter: A $4/9$, B $3/7$; B needs less time ($28/63 > 27/63$), giving the same choice.

Accept: Compare volumes after 12 minutes (27 vs 28); for reciprocal comparison explain why smaller time means faster.

Notice: Extension compares simple fractions exactly and interprets reverse direction.

Answer guidance · RR04 · 6

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RR04-F1 · fresh recheck

Task: For identical folders with no fees, stall A charges 28 dollars for 7 folders; stall B charges 25 dollars for 5 folders. Which has the lower dollars per folder? Explain why comparing total prices could mislead.

Defensible answer: A: 4 dollars per folder; B: 5 dollars per folder. A has lower unit cost despite its larger total price.

Accept: Common-folder comparison or correctly interpreted folders per dollar.

Notice: Fresh totals-trap task; reserve after route.

RR04-F2 · fresh recheck

Task: At constant speeds robot A travels 18 meters in 3 seconds; robot B travels 30 meters in 5 seconds. Robot C travels 42 meters with no elapsed time supplied. Compare A and B in meters per second. Can C be ranked? Explain.

Defensible answer: A and B: 6 meters per second, tie. C needs elapsed time or its unit speed.

Accept: Common-time reasoning plus missing-denominator explanation.

Notice: Fresh combined tie/information boundary; no equivalent-form claim.

Answer guidance · RR04 · 7

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RR04-L1 · later revisit

Task: At constant rates press A makes 40 tiles in 8 minutes; press B makes 36 tiles in 6 minutes. Which makes more tiles per minute? Give both rates and justify the choice.

Defensible answer: A: 5 tiles per minute; B: 6 tiles per minute. B makes more per minute despite fewer total tiles.

Accept: Compare over 24 minutes or correctly interpreted minutes per tile.

Notice: Fresh context and totals trap after another learning opportunity.

RR04-L2 · later revisit

Task: Two stalls sell identical clips with no fees. Stall A charges 16 dollars for 8 clips; stall B charges 14 dollars for 7 clips. Stall C charges 12 dollars but gives no clip count. Compare A and B in dollars per clip. Can C be ranked on unit cost? Explain.

Defensible answer: A and B: 2 dollars per clip, tie. C needs the clip count or dollars per clip; lower total price does not establish lower unit cost.

Accept: Cost for common clip count and explicit missing count for C.

Notice: Fresh tie/information boundary; reserve until later.

Answer guidance · RR04 · 8

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RR04-T1 · transfer

Task: A team needs exactly 12 identical brushes. Supplier A sells only whole packs of 4 brushes for 12 dollars per pack; supplier B sells only whole packs of 6 brushes for 15 dollars per pack. There are no fees. Compare dollars per brush, then choose the lower total cost for exactly 12 brushes and give that cost. State how the whole-pack condition affects your calculation.

Defensible answer: A: 3 dollars per brush, 3 packs cost 36 dollars; B: $5/2$ dollars per brush, 2 packs cost 30 dollars. B has both lower unit cost and lower total cost for exactly 12 because both whole pack sizes divide 12.

Accept: Equivalent pairs or pack-count calculation with labels; 2.5 dollars per brush accepted.

Notice: Unit price and feasible purchase are separate; do not assume arbitrary fractional packs.

Supports and boundaries

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Preserve the learning target

Reading or written-language load: Read task words without explaining the rate, allow oral explanations or labeled diagrams; offer sentence frame ____ units of ____ for each 1 _____. Keep constant: The rate, requested direction and comparison goal stay unchanged. Limit: Record the response mode and assistance; supported work is not evidence of unaided reading/writing.

Arithmetic blocks rate meaning: Separate reasoning from computation. First ask the learner to label the division and the quantity represented by 1. If using a calculator, record it. Keep constant: The learner must choose the correct division/direction and interpret units. Limit: Calculator-supported responses do not establish unaided arithmetic fluency.

Ratio prerequisite or per-one meaning: Use RR02 labeled complete groups for ratio order/scaling, then RR03 equal-time/equal-item groups before RR04 comparisons. Keep constant: Return to the original target only after prerequisite support. Limit: Do not interpret an unfinished higher-target task as stable inability.

Scope

Interpret per one, preserve direction and units, compare on the same basis, explain ties and missing information, and apply a stated constant rate. No percent, measurement conversion, coordinate graphing, complex fractions or complete proportionality course.

Standards fit

6.RP.A.2, selected 6.RP.A.3b. RR03 addresses unit-rate meaning and language; RR04 addresses selected comparison and unit-pricing/constant-rate problems. These materials do not assess the whole standard or establish course alignment.

<https://www.thecorestandards.org/Math/Content/6/RP/>

Provenance and use

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Original materials

All tasks, fictional responses and contexts are original instructional authoring for this commission. Numerical data are constructed, not measured observations.

Teachers may print, use and adapt these materials for their teaching. Retain Mentor Teaching attribution and identify local changes.

Native editable tables; no third-party images, copied worksheets or custom font assets. PDF exports use standard system-font subsets.

Source ledger

OWNER-COMMISSION-20260930: Bounded collection architecture and independent-AI review workflow.

CCSS-6-RP: Scope/grade-fit reference; tasks and examples are original, not copied from the standard. <https://www.thecorestandards.org/Math/Content/6/RP/>

RR02-0.1.7: Read-only prerequisite source. Original source and 18 PDF/DOCX files unchanged; bundle uses 9 HTML variants with decorative response-line ARIA and small-screen reflow corrected. Instructional text and print/binary files preserved; original public files retained.

RR02-0.1.7-html-response-lines-r1: Nine HTML variants of accepted RR02 v0.1.7. Decorative response-line ARIA and small-screen reflow corrected; instructional text and print/binary files preserved. All 9 files include screen-only CSS; 6 also change response-line ARIA. Original public files remain unchanged.

Factual limits

AI-authored. Review status and exact versions must be recorded separately. Classroom effectiveness, classroom timing, empirical assessment equivalence, Word/Google Docs behavior and assistive-technology use have not been established. Brief responses support a tentative teaching decision, not a diagnosis, stable ability rank or mastery score.

Keep the record local

Use shared/local-decision-record if helpful. Keep any student response information locally; do not submit names, work or records to the site. Public version and actual review status are recorded separately on the resource page.