# Teacher quick start



## Target

Generate or reject a candidate equivalent ratio by explaining how both labeled quantities change together.

## Prerequisites and materials

Count and name the two quantities in a ratio, preserve their order, and use equal groups or multiplication/division with whole numbers. The student lesson includes a short introduction to 'for every' and colon notation. Ordinary paper and pencil. Counters are optional; every group can be sketched.

## What to print

Full lesson: first give the separate Readiness page alone; then give Teach the Lesson pages 1–6. Do not distribute the lesson or glossary before S1. Short check: Check-only pages 1–3, with no model or answers. Follow-up: choose page 1 (Route A) or page 2 (Route B) of Follow-up. Later revisit: pages 1–2 of Later Revisit. The repeated independent tasks in the lesson and Check-only file are the same tasks; use one copy.

## Teaching sequence

1. Give S1 before showing the introduction or model; clarify task words without giving the quantities. Use its response to decide whether to teach the ratio-language introduction. 2. Model M1 with complete groups and the table. 3. Work G1–G3 while gradually removing prompts. 4. Collect C1–C3 independently. 5. Choose one response-linked follow-up, R1 or R2, or clarify an uninterpretable response. 6. Use L1–L2 after another learning opportunity. X1 is an optional boundary extension.

## What to notice and next decision

Record quantity order, shared factor or groups, arithmetic, units, and explanation separately. Same-addend reasoning suggests Route A after clarifying labels. Correct quantities without a reason suggest Route B. An arithmetic slip needs arithmetic support; a blank needs clarification first.

## Planning times

Preparation 4–6 minutes; full lesson 35–45 minutes; focused follow-up 8–12 minutes; independent check 4–6 minutes. Later revisit: After another learning opportunity. Planning estimates only; no classroom timing has been measured.

## Limits

The three short independent responses are narrow evidence, not a diagnosis or general mastery score. Later tasks are fresh but not validated equivalent forms; L2 adds scaling down. An immediate correct answer does not establish retention or a causal effect. Re-form temporary groups when evidence changes.

# Solutions · introduce and begin



**RR02-S1 · Readiness**

Task: A sticker sheet has 6 stars and 10 circles. Write stars:circles and explain what each number counts. Can you describe the same relationship with two equal groups?

Defensible answer: 6:10. Six counts stars and ten counts circles. The sheet can be seen as two groups of 3 stars and 5 circles, so 3:5 describes the same relationship.

Accept: A correctly labeled 6:10 description is sufficient readiness evidence even without reducing it to 3:5.

Notice: If the order reverses or 'for every' is unclear, teach the prerequisite introduction before treating scaling as the difficulty.

**RR02-M1 · Model**

Task: Watch the complete-group model for 3 stars for every 5 circles. Explain why 6:10 keeps the relationship and 6:8 does not.

Defensible answer: 6:10 is two complete 3:5 groups. 6:8 cannot be made from two such groups; 6 stars would need 10 circles.

Accept: A correctly labeled ratio table, drawing, or multiplication explanation is valid.

Notice: The student-facing model may show its solution; it is never used as an independent check.

**RR02-G1 · Guided**

Task: A pattern has 3 stars for every 5 circles. If it has 9 stars, how many circles keep the relationship? Show groups or a table.

Defensible answer: 15 circles. Three groups of 3 stars require three groups of 5 circles.

Accept: 9:15 or a labeled drawing is valid when the quantities are clear.

Notice: Ask which factor changed the stars and whether it also changed the circles.

# Solutions · guided work and first check



**RR02-G2 · Guided**

Task: The same pattern has 20 circles. How many stars keep the relationship? Explain starting with the circles.

Defensible answer: 12 stars. Twenty circles is four groups of five, so four groups of three stars give twelve.

Accept: A table or 20 ÷ 5 = 4, then 3 × 4 = 12 is valid.

Notice: The known quantity is second; do not let a memorized first-column procedure hide its meaning.

**RR02-G3 · Guided**

Task: Which pairs keep 3 stars for every 5 circles: 6:10, 6:8, 9:15, 12:20? Explain one pair that works and why 6:8 does not.

Defensible answer: 6:10, 9:15, and 12:20 work; the complete-group factors are 2, 3, and 4. For 6 stars, 6:8 is two circles short of 6:10.

Accept: Equivalent fraction or ratio-table reasoning is valid if labels and both quantities are handled consistently.

Notice: Distinguish adding a complete 3:5 group from adding the same number to both original counts.

**RR02-C1 · Independent check**

Task: A flag display repeats a group of 2 triangle flags and 7 rectangular flags. If it has 8 triangle flags, how many rectangular flags should it have? Show why.

Defensible answer: 28 rectangular flags. Eight triangles make four groups of two; four groups of seven rectangles make twenty-eight.

Accept: A labeled table or four sketched complete groups is valid.

Notice: Look for matching scale in both quantities and an explanation, not only 28.

# Solutions · independent check



### RR02-C2 · Independent check

Task: A different banner uses 3 square flags for every 8 round flags. Two proposals are 6 squares with 16 rounds and 6 squares with 11 rounds. Which keeps the relationship? Explain why the other does not.

Defensible answer: 6:16 keeps the relationship because both original counts double. 6:11 adds three to each original count; six squares need sixteen rounds, so eleven is five short.

Accept: Any clear complete-group or shared-factor comparison that rejects 6:11 and explains the quantity mismatch is valid.

Notice: This is a new ratio; it does not supply a useful intermediate pair for C1. A correct choice without a reason gives limited evidence of the target.

### RR02-C3 · Independent check

Task: A strip uses 5 centimetres of striped ribbon for every 8 centimetres of plain ribbon. A version has 15 centimetres of striped ribbon. How much plain ribbon does it need? Explain and keep the units.

Defensible answer: 24 centimetres of plain ribbon. Fifteen is three groups of five centimetres striped, so three groups of eight centimetres plain are needed.

Accept: A ratio table or scaling both lengths by three is valid.

Notice: This transfers to lengths; a correct number with reversed labels does not fully interpret the relationship.

# Solutions · follow-up and first revisit



**RR02-R1 · Targeted follow-up A**

Task: A model uses 2 triangle counters for every 3 circle counters. Sketch three complete groups. Count both totals. Does 6 triangles with 7 circles meet the rule? Explain.

Defensible answer: Three groups have 6 triangles and 9 circles. The 6-and-7 proposal is short of two circles.

Accept: A labeled sketch, table, or repeated addition of complete 2:3 groups is valid. Physical counters are optional.

Notice: Use when a learner applies a same-addend rule; verify the quantities were understood first.

**RR02-R2 · Targeted follow-up B**

Task: A pattern uses 4 square tiles for every 7 round tiles. A larger pattern has 21 round tiles. Find the square tiles. Show the factor in both quantities and explain it in words.

Defensible answer: 12 square tiles. Twenty-one round tiles are three groups of seven, so three groups of four square tiles give twelve.

Accept: A correctly labeled table, sketch, or division-then-multiplication argument is valid.

Notice: Use when quantities are correct but the explanation is unclear; do not replace the explanation with a filled sentence alone.

**RR02-L1 · Later revisit**

Task: A print display uses 4 small prints for every 7 large prints. With 28 large prints, how many small prints keep the relationship? Explain starting with the large prints.

Defensible answer: 16 small prints. Twenty-eight large prints are four groups of seven; four groups of four small prints give sixteen.

Accept: A labeled table or factor-of-four explanation is valid.

Notice: This later task starts with the second quantity; it is fresh but not a calibrated equivalent form.

# Solutions · later revisit and extension



### RR02-L2 · Later revisit

Task: A craft plan uses 6 metres of cord for every 9 metres of ribbon. A smaller version uses 2 metres of cord. How much ribbon keeps the relationship? Explain whether quantities must become larger to remain equivalent.

Defensible answer: 3 metres of ribbon. Dividing both quantities by three keeps the relationship; equivalent ratios may use smaller quantities.

Accept: A correctly labeled 2:3 comparison or one-third scaling argument is valid.

Notice: This later task adds scaling down; do not call it an equivalent test form.

### RR02-X1 · Extension

Task: A pattern is built only from complete groups of 3 stars and 5 circles. Can it contain exactly 30 stickers with none left over? What about 32? Explain the whole-group rule.

Defensible answer: Each complete group has eight stickers. Thirty cannot be made from a whole number of these groups. Thirty-two is four groups: twelve stars and twenty circles.

Accept: A count by eights or a whole-number division argument is valid; fractional stickers do not meet the complete-group rule.

Notice: This is a boundary question for discrete complete groups, not another repetitive scaling item.

# Choose one follow-up



## Build complete matched groups · RR02-R1

Use when: A response uses the same addend on both unequal quantities, after the learner has correctly named the quantities.

Say and do: One complete group needs both parts. Sketch the first 2-triangle-and-3-circle group, then a second and third. Count each type. Which part is missing from the proposed 6-and-7 model?

New evidence: Look for a matching number of complete groups and an explanation that both parts change together.

## Explain the shared factor · RR02-R2

Use when: The numerical quantities are correct, but the response does not reveal why they preserve the relationship.

Say and do: Start with the quantity we know. How many groups of seven are in twenty-one? What must those same groups mean for the square tiles? Show this in a table, then explain it in your own words.

New evidence: Look for the factor connected to both labeled quantities, not a memorized number pair.

### Response: 4:9 works because I added two

Clarify: Ask what each number counts. Next move: Use RR02-R1 to rebuild complete matched groups if the quantities are understood.

### Response: Correct quantities without a clear reason

Clarify: Ask the learner to show one group or a common factor. Next move: Use RR02-R2 to connect a table to the explanation.

### Response: Correct setup with an arithmetic slip

Clarify: Check the calculation or estimate. Next move: Support computation while preserving valid ratio reasoning.

### Response: Reversed order or unclear units

Clarify: Ask which quantity is first and what each number counts. Next move: Return to the ratio-language introduction before reteaching scaling.

### Response: Blank or uninterpretable

Clarify: Check access, directions, response mode, and time. Next move: Clarify first; do not infer a misconception from a blank.

# Supports, boundaries and provenance



## Scoring and interpretation

For each independent task, record separately: labeled quantity order, a valid shared group/factor, arithmetic, units when present, and a reason. Do not collapse three responses into a broad ratio-ability score or diagnosis. A solution different from the model is acceptable if its relationship is correct and explained.

## Support without hiding the target

### Barrier: Holding both quantities in working memory

Support: Keep labels visible and sketch one complete group before making a table. Constant: Both parts must scale together and be explained. Evidence limit: No change to the ratio target when the sketch is learner-created.

### Barrier: Transcribing a written explanation

Support: Permit an oral or dictated explanation with a labeled sketch; record response mode. Constant: The explanation must connect both quantities. Evidence limit: Does not show independent written mathematical communication.

### Barrier: Arithmetic load obscures reasoning

Support: Allow a calculator after the group/factor is identified and record its use. Constant: The learner still chooses the relationship and labels quantities. Evidence limit: The result cannot be used to infer unaided arithmetic accuracy.

## Standards boundary

6.RP.A.3a: Some tasks address equivalent-ratio tables and missing whole-number values; this pack does not assess coordinate plotting or the full standard.

## Provenance

Original fictional instructional contexts derived from the user-supplied 2026-09-28 Pack 02 brief; no copied competitor resource. No generated image required; any groups and tables are native editable document structures

## Review status

Original authoring prototype. Independent AI and human mathematics review, teacher-use trial, Word/Google Docs testing, and assistive-technology testing must be reported separately when performed.