

Whole packs teacher guide and answers

Interpret the entry before teaching

Read Start Here for preparation. The target joins correct unit price to a feasible least purchase under explicit whole-pack, single-supplier rules. Starting task is optional when existing work already reveals that need. Do not infer a stable misconception from one answer.

Starting task key

A: $\$16 \div 8 = \$2$ per pencil; 1 pack gives 8, too few. Least: 2 packs, 16 pencils, \$32, 7 extra. B: $\$15 \div 5 = \$3$ per pencil; 1 pack gives 5, too few. Least: 2 packs, 10 pencils, \$30, 1 extra. B costs \$2 less now. The \$18 A proposal buys $9/8$ packs, which the supplier does not sell. The \$2 unit price is correct; the proposed transaction and unconditional decision are not.

Choose a response from the reasoning

- Correct unit price but \$18 purchase or an automatic A choice: ask what the shop can sell. If whole-pack restrictions remain overlooked, model complete packs, then use Guided work and changed-need Practice.
- Correct packs and costs with weak explanation: ask why one fewer pack is short and another costs more. Have the learner justify one purchase, then use different Follow-up check.
- A sound complete-pack setup with an arithmetic error: support the calculation and retain the valid reasoning. Do not reteach unit-rate meaning solely because a product is wrong.
- Reversed dollars and pencils or unclear per-one meaning: use the existing per-one lesson before this companion.
- Blank or uninterpretable response: clarify directions, access and response mode with neutral questions. If you supply a pack count, record that help.
- Secure entry reasoning: ask for an explanation, then use an unused follow-up or later transfer. Do not require unnecessary repetition.

Keep answers and the later tasks back. All quoted learners are fictional examples, not observations from a class.

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Model the missing purchase step

Use the seven-brush model

Say: “A is \$2 per brush and B is \$2.50. That answers the unit-price question. Our purchase question asks for enough whole packs at the least total. I will draw one complete A pack of six. Is six enough for seven? No. I add a second complete pack. Now I have twelve and pay two lots of twelve dollars. One fewer pack would fail. Every further pack would add cost.”

Repeat for B: one pack has four, two have eight and cost twenty dollars. Compare \$24 with \$20. Say: “B needs less cash for this seven-brush purchase even though each brush is dearer. That conclusion depends on this need and these rules.”

Student model explanation: unit price compares equal single-item amounts; pack restrictions determine feasible totals. A has 2 packs/12 brushes/\$24/5 extra; B has 2 packs/8 brushes/\$20/1 extra. A lower unit price can be useful information without being a sufficient purchase argument.

Do not replace one shortcut with another

A learner who says “always choose smaller packs” needs the changed-need Practice, where the supplier with five counters per pack wins for eight counters but loses for six. The target is checking the purchase against the need, not reversing the unit-price shortcut.

A representation without a formula

Draw or list complete groups: pack 1, pack 2, pack 3. Attach the item count and cost to each group. A labeled table, repeated addition, multiplication or a correctly explained division followed by the next sufficient whole number is acceptable. Ceiling notation is not required.

If a learner proposes 1.2 packs, say: “That would describe twelve buttons if parts of packs could be bought. Here the shop sells whole packs. Which permitted whole number first supplies enough?” Let the learner build the count. Work done with that prompt is supported practice.

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Guided work and practice keys

Twelve buttons

A: \$2 per button; 1 pack has 10, short. 2 packs have 20, cost \$40, leave 8 extra. B: \$3 per button; 2 packs have 8, short. 3 packs have 12, cost \$36, leave 0 extra. B costs \$4 less. $12 \div 10 = 1.2$ describes packs only if a fraction of a pack is available; 1.2 is not a permitted purchase. Two whole A packs are the least sufficient.

Six counters

C: \$3 per counter; 2 packs give 6 and cost \$18, with 0 extra. D: \$2 per counter; 2 packs give 10 and cost \$20, with 4 extra. C has the lower total by \$2 although D has the lower unit price. For C one fewer pack has 3; for D one fewer has 5. Both are short of 6.

Eight counters

C: 3 packs, 9 counters, \$27, 1 extra. D: 2 packs, 10 counters, \$20, 2 extra. D now has the lower total by \$7 and still has the lower unit price. Two C packs have only 6; one D pack only 5. The need changed which whole purchases were enough. Smaller packs do not always give a smaller total, and fewer extras do not always mean cheaper.

What to notice during practice

Check unit labels, whole sufficient pack counts, minimality, total paid and the comparison reason separately. A correct supplier letter alone can come from an unsupported shortcut. Ask the learner to explain the other supplier's least feasible purchase. If the complete-group calculation is still insecure, return to equal-group teaching; if the quantities per one are unclear, return to the unit-rate lesson.

Accept labeled sketches, repeated-addition tables, multiplication and correctly interpreted decimals or fractions. Do not require a particular formula or writing style. The explanation must still connect permitted purchases to the stated need.

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Fresh follow up keys and interpretation

Eleven clips

E: \$2 per clip; 2 packs provide 20 clips, cost \$40, leave 9 extra. F: \$2.50 per clip; 2 packs provide 12 clips, cost \$30, leave 1 extra. F is cheaper by \$10. One E pack has 10 and one F pack has 6, both short. Lower E unit price alone is insufficient.

Fourteen clips

E: 2 packs/20 clips/\$40/6 extra. F: 3 packs/18 clips/\$45/4 extra. E is cheaper by \$5. One E pack has only 10; two F packs have only 12. Unit prices did not change, but F needs another pack. Smaller packs or fewer extras would pick F wrongly for fourteen.

After an independent response

- Secure across both orders: retain the explanation and move to Later transfer at another learning opportunity. This supports this purchase reasoning; it does not establish whole-domain mastery.
- Correct unit prices but fractional purchases or ignored restriction: reteach complete permitted groups on the familiar brush/button problem. The clips task is now familiar practice; use an unused later task only after another learning opportunity.
- Feasible totals but an automatic supplier choice: compare the two orders and ask what changed. Use familiar counter practice to challenge the shortcut.
- Correct reasoning with computation slip: support computation while preserving the setup.
- Unclear or blank: probe access and meaning before choosing instruction; record the help and any change to the target.

Give both follow-up pages together. Changing the demand within the same supplier setting is part of the task. It is not two independent confirmations. If either page or its answer has been seen, use the set as practice. Keep unused later tasks in the original comparison kit for their intended occasions. Do not repeat familiar checks merely to increase the number of scores.

No equal-difficulty, efficacy or retention claim follows from these constructed tasks. Record exposure and support with the decision record.

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Transfer keys and defensible limits

Eight metres of ribbon

G: \$2 per metre; 2 whole rolls supply 14 metres for \$28, with 6 metres extra. H: \$3 per metre; 2 rolls supply 8 metres for \$24, with 0 metres extra. H is cheaper by \$4. One G roll supplies 7 and one H roll supplies 4, both short. A fractional roll is not a permitted purchase, even though the purchased ribbon may be cut.

Fourteen metres of ribbon

G: 2 rolls/14 metres/\$28/0 extra. H: 4 rolls/16 metres/\$48/2 extra. G is cheaper by \$20. One G roll supplies 7; three H rolls supply 12, both short. The longer roll is cheaper for this separate order. The unit prices remain unchanged.

Judge the claim

“Always choose the shorter roll” is refuted by the fourteen-metre order. For eight metres H needs less cash and leaves less extra; for fourteen G costs less and leaves less extra. The information supports current cash, sufficiency and extra length only. It does not tell whether extra ribbon will be used later, future demand, storage value or environmental impact. A qualified conclusion states the need and rules. The counter practice also shows that fewer extras do not always mean cheaper.

Accept alternatives without losing the target

Accept drawings with repeated complete rolls, a table or correctly labeled multiplication. Fractional length itself is meaningful, but the shop cannot sell a fraction of a roll here. For any least purchase, one fewer permitted group must be short and adding groups increases cost because pack prices are positive. Mixed-supplier purchases answer a different problem and are excluded by the supplied rule.

This transfer changes discrete items to measured length. A difficulty with “metres” may require measured-unit teaching rather than a conclusion that the earlier purchase reasoning disappeared. Note support and compare features, not just supplier letters. No physical purchase is requested.