Moving From Multiplicative Comparison Problems to Solving Ratio Problems

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Goals for the Session

- Understand how students reason about multiplicative comparison problems
- Understand the relationship between multiplicative comparison problems and ratio problems

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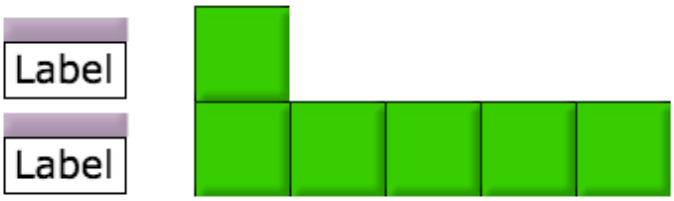
Some Opening Questions

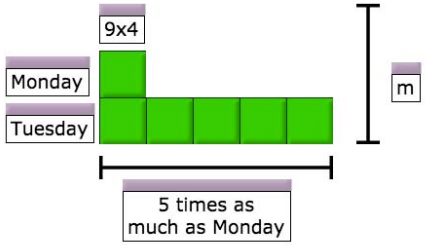
- What is the difference between additive comparison problems and multiplicative comparison problems?
- How does the language change?
- When does the study of multiplicative comparison problems begin?

A Sample Comparison Problem



With your partner, write several multiplicative comparison problems for this tape diagram.

A Sample Comparison Problem



The basketball team is selling T-shirts for $9 each. On Monday, they sold 4 T-shirts. On Tuesday, they sold 5 times as many T-shirts as on Monday. How much money did the team earn altogether on Monday and Tuesday? (G4 M3 L7 Application Problem)

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Multiplicative Comparisons

Compare	Larger Unknown	Smaller Unknown(A>!)	Multiplier Unknown
	A blue hat costs $B. A red hat costs A times as much as the blue hat. How much does the red hat cost?	A red hat costs $C and that is A times as much as a blue hat costs. How much does the blue hat cost?	A red hat costs $C and a blue hat costs $B. How many times as much does the red hat cost as the blue hat?
	Smaller Unknown	Larger Unknown (A<1)	Multiplier Unknown
	A blue hat costs $B. A red hat costs A times as much as the blue hat. How much does the blue hat cost?	A red hat costs $C and that is A of the cost of a blue hat. How much does the blue hat cost?	A red hat costs $C and a blue hat costs $B. What fraction of the cost of the blue hat is the cost of the red hat?

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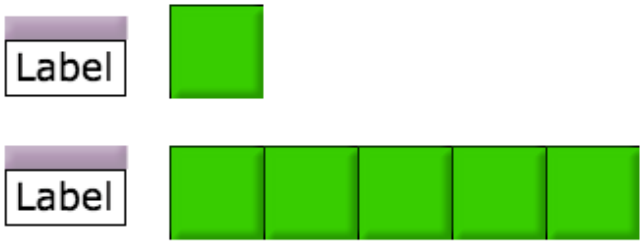
Ratio Problem

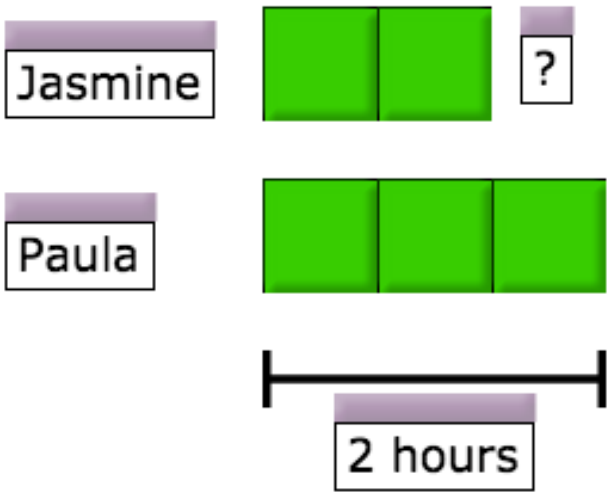


With your partner, write a sixth-grade ratio problem for this situation.

Group Work

- Solve the problem at your table in groups.
- Find a partner across the room, and compare your solutions.

Jasmine took $\frac{2}{3}$ as much time to take a math test as Paula. If Paula took 2 hours to take the test, how long did it take Jasmine to take the test? Draw a tape diagram and express your answer in minutes.	**Jasmine and Paula are taking a test. The ratio of the amount of time that Jasmine takes on the test to the amount of time that Paula takes on the test is 2:3. If Paula took 2 hours to take the test, how long did it take Jasmine to take the test? Draw a tape diagram, and express your answer in minutes.**



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Looking for Coherence

In pairs or triads,

1. Examine the problems and the tape diagrams in the envelope.
2. Match the problems to the tape diagrams.
3. Order the problems/tape diagrams from fourth grade to eighth grade.
4. Discuss the coherence of the representation used and the content of the problems.

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Conclusion

Middle-grade students and their teachers should be able to conceptualize ratios as an extension of multiplicative comparisons.

Language can help with making sense of both conceptualizations as well as relationships between multiplicative comparisons and ratios.

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