



4.OA Comparing Growth, Variation 1

Alignment 1: 4.OA.1-3

Grade	4
Domain	OA: Operations and Algebraic Thinking
Cluster	Use the four operations with whole numbers to solve problems.

Standards:

4.OA.1. Interpret a multiplication equation as a comparison, e.g., interpret $35 = 5 \times 7$ as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.

4.OA.2. Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.¹

4.OA.3. Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding and explain why a rounded solution is appropriate.

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Leo has two snakes, Jewel and Clyde. Jewel was six feet and Clyde was eight feet. A year later Jewel was eight feet and Clyde was 10 feet. Which one grew more?

Commentary:

The purpose of this task is to foster a classroom discussion that will highlight the difference between multiplicative and additive reasoning. Some students will argue that they grew the same amount (an example of "additive thinking"). Students who are studying multiplicative comparison problems might argue that Jewel grew more since it grew more with respect to its original length (an example of "multiplicative thinking"). This would set the stage for a comparison of the two perspectives. In the case where the students don't bring up both arguments, the teacher can introduce the missing perspective.

In later grades, students will learn that "which grows more" means "which has the greater absolute increase?" and "which has the greater growth rate?" means "which has the greater increase relative to the starting amount?" but students won't see this type of language for two or three years. Teachers need to be aware of this and work to ask questions as unambiguously as possible; for example, when asking for multiplicative comparisons, use language such as, "How many times greater is X than Y." They should also be prepared to address this potential for confusion along the way.

Solution: 1

Viewing this additively, both snakes grew 2 feet and therefore grew the same amount. Viewing it multiplicatively, Jewel grew 26 its length, while Clyde grew 28 its length. From this perspective, Jewel grew more. Given the purposeful phrasing of the problem, both interpretations are reasonable, but the goal is to understand the two perspectives, thus the difference between additive and multiplicative reasoning.