4.OA Comparing Money Raised

Alignments to Content Standards: 4.OA.A.2

Task

a. Helen raised $12 for the food bank last year and she raised 6 times as much money this year. How much money did she raise this year?

b. Sandra raised $15 for the PTA and Nita raised $45. How many times as much money did Nita raise as compared to Sandra?

c. Luis raised $45 for the animal shelter, which was 3 times as much money as Anthony raised. How much money did Anthony raise?

IM Commentary

The purpose of this task is for students to solve three comparisons problems that are related by their context but are structurally different. Multiplicative comparison is purposefully excluded from third grade (see 3.OA.3 and 3.MD.2), making this task appropriate for fourth but not third grade. In these multiplicative comparison problems, one factor and the product are amounts of money and the other factor represents the number of times bigger one amount is than the other. Sometimes this second factor is called a "scale factor." In part (a), the larger amount (which is the product) is unknown, while in part (b) the scale factor is unknown and in part (c) the smaller amount of money is unknown. Students will study multiplicative comparison problems involving scale factors that are fractions in 5th grade; see 5.NF.B.5. Note that in fourth grade, scale factors must always be bigger than 1, so students often think that "multiplying makes bigger"; however in 5th grade they will see that when the scale factor is less than 1, the product will actually be smaller than the initial quantity. Note that the numbers in parts (b) and (c) are related by the fact family $3 \times 15 = 45$. This allows for a classroom discussion about the different interpretations of the factors in a

multiplicative comparison context. To see an annotated version of this and other Illustrative Mathematics tasks as well as other Common Core aligned resources, visit Achieve the Core.

The Standards for Mathematical Practice focus on the nature of the learning experiences by attending to the thinking processes and habits of mind that students need to develop in order to attain a deep and flexible understanding of mathematics. Certain tasks lend themselves to the demonstration of specific practices by students. The practices that are observable during exploration of a task depend on how instruction unfolds in the classroom. While it is possible that tasks may be connected to several practices, only one practice connection will be discussed in depth. Possible secondary practice connections may be discussed but not in the same degree of detail.

This particular task helps illustrate Mathematical Practice Standard 1, Make sense of problems and persevere in solving them. Problem solving is based upon students engaging in a task in which a solution pathway is not known in advance. As fourth graders approach these three problems, they will analyze the problems to make sense of what each is asking, working to understand the structures and the unknowns. Through this analysis, students will understand that the numbers in parts (b) and (c) are both factors related by the same fact family but each serves a different role in their respective problems. Students need experience with unknowns that play different roles in multiplicative comparison problems in order to support a deeper understanding of this type of problem situation.

Solutions

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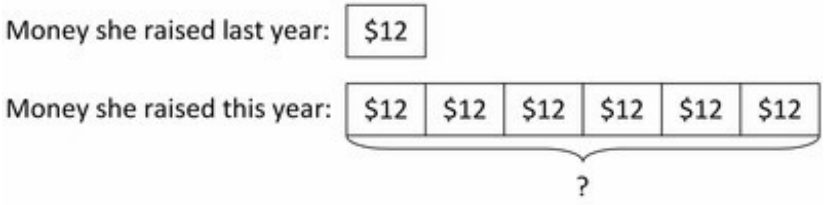
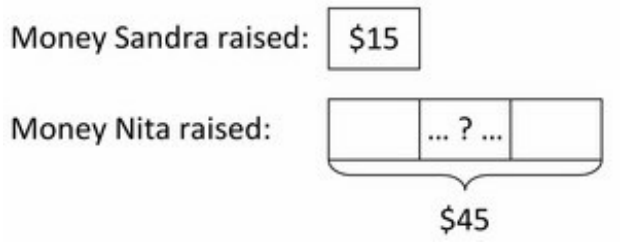
Solution: Tape diagram

a. She raised six times as much money (as shown in the diagram) so she raised $6 \times 12 = 72$.



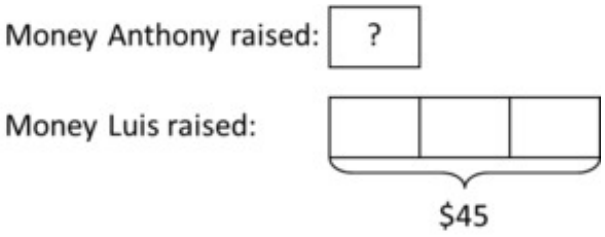
Helen raised \$72 this year.

b. $? \times 15 = 45$ is equivalent to $45 \div 15 = ?$



Nita raised 3 times as much as Sandra.

c. $3 \times ? = 45$ is equivalent to $45 \div 3 = ?$



Anthony raised \$15.

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Solution: Writing multiplication equations for division problems

a. Helen raised $6 \times \$12$ this year, so she raised \$72 this year.

b. This is a "Number of Groups Unknown" problem. We can represent the question as

$$? \times 15 = 45$$

or

$$45 \div 15 = ?$$

So Nita raised 3 times as much money as Sandra.

c. This is a "Group Size Unknown" problem. We can represent the question as

$$3 \times ? = 45$$

or

$$45 \div 3 = ?$$

So Anthony raised $15.