Comparing Money Raised

Sample task from achievethecore.org
Task by Illustrative Mathematics, annotation by Student Achievement Partners

GRADE LEVEL Fourth

IN THE STANDARDS 4.OA.A.2

WHAT WE LIKE ABOUT THIS TASK

Mathematically:
- Highlights multiplicative comparison, an important development in multiplicative thinking beginning in grade 4 (4.OA.A.1, 4.OA.A.2)
- Builds meaning for multiplication equations through word problems (4.OA.A); shows how a multiplication equation models a situation (MP.4)
- Uses the same fact family in parts (b) and (c) to highlight different roles of the unknown factors

In the classroom:
- Provides a context that can be acted out in an engaging way
- Allows opportunity for presentation/demonstration of student work (e.g. poster presentation with number strips)

MAKING THE SHIFTS[1]

	Focus	Belongs to the major work[2] of fourth grade
	Coherence	Builds on previous understanding of multiplication as equal groups to multiplication as times-as-much.
	Rigor[3]	Conceptual Understanding: primary in this task
		Procedural Skill and Fluency: not targeted in this task
		Application: primary in this task

[1]For more information read Shifts for Mathematics.
[2]For more information, see Focus in Grade Four.
[3]Tasks will often target only one aspect of rigor.

ADDITIONAL THOUGHTS

Multiplicative comparison situations come in several different types. See Table 2 on page 89 of the Standards and page 23 of the progression document, *K–5 Operations and Algebraic Thinking*, available at www.achievethecore.org/progressions.

4.OA Comparing Money Raised

Alignments to Content Standards

- Alignment: 4.OA.A.2

Tags

- *This task is not yet tagged.*

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?

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.
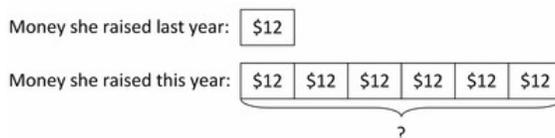
Note that the numbers in parts (b) and (c) are related by the fact family $3 \times 15 = 45$. This allows for a classroom discussion about the different interpretations of the factors in a multiplicative comparison context.

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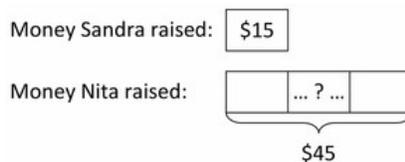
Solutions

Solution: Tape diagram

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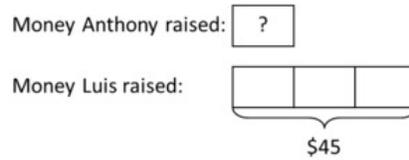

Helen raised $72 this year.

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

Nita raised 3 times as much as Sandra

Nita raised 3 times as much as Sandra.

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

Money Anthony raised: | ? |

Money Luis raised:

$45

Anthony raised $15.

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.