Comparative Relational Thinking in a Division Equation

Students are asked to use comparative relational thinking to determine the value of an unknown number.

Formative Assessment Task

Instructions for Implementing the Task

Note: This task should be implemented individually.

1. The teacher provides the student with the Comparative Relational Thinking in a Division Equation worksheet and says, “Let’s look at this equation. It says $48 \div n = 24 \div 7$.”

2. The teacher then says, “How could you compare the expressions on either side of the equal sign to determine the value of $n$? Find the value of $n$ by comparing and then explain your reasoning.”

3. The student is given ample time to determine the value of $n$. The teacher should observe if the student must use computation to determine the value of $n$. If necessary, the teacher may ask, “How does 48 compare to 24? Can you use that information to help you determine the value of $n$?”

 TASK RUBRIC

 Getting Started

Misconception/Error

The student has an operational view of the equal sign.

Examples of Student Work at this Level
The student does not understand that the equal sign expresses a relationship between the expressions to its left and right. The student says the value of \( n \) is two because \( 48 \div 24 \) equals two.

**Questions Eliciting Thinking**

What does the equal sign mean?

I see that you did not consider the number seven to the right of the equal sign. Should we perform any operations with the seven?

Show the student the equation \( 7 = 7 \). Ask the student if the equation is true or false.

**Instructional Implications**

Consider using the MFAS task True or Not True (1.OA.4.7) which provides insight into the student's understanding of the equal sign.

Provide explicit instruction on the meaning of the equal sign. Use base ten blocks to show that the quantities on the left and right sides of the equal sign must have the same value. Guide the student to determine the value of \( n \) using the blocks. Then provide the student with additional division equations that contain a missing number. Model for the student how to determine the value of one side of the equation and then use that value to determine the unknown quantity on the other side of the equation. Eventually, model comparative relational thinking to solve equations using base ten blocks.

**Moving Forward**

**Misconception/ Error**

The student has a relational view of the equal sign and attempts to determine the quotient of the numbers on the right side of the equation in order to determine the value of \( n \).

**Examples of Student Work at this Level**

The student attempts to divide 24 by 7. The student explains that the quantities on the left and right sides of the equal sign must have the same value.

**Questions Eliciting Thinking**

You have a good understanding of the meaning of the equal sign. Could you look at the numbers on both sides of the equation and make some comparisons?

How would you compare the 48 and the 24? If 48 is two times more than 24, then how will the value of \( n \) compare to 7?

**Instructional Implications**

Model for the student how to use comparative relational thinking to determine the value of an unknown number in an equation that relates four whole numbers. Provide opportunities for the student to hear the explanations of Got It level students using comparative relational thinking to determine the value of unknowns in equations.

Consider using the MFAS task Are the Equations True? (4.OA.1.a).

**Almost There**

**Misconception/ Error**

The student attempts to use comparative relational thinking but makes errors.

**Examples of Student Work at this Level**

The student attempts to compare the expressions additively instead of multiplicatively.

**Questions Eliciting Thinking**

What operation is used on both sides of the equal sign? What operation do you think you should use to compare the two expressions?

**Instructional Implications**

Model for the student how to use comparative relational thinking with multiplicative reasoning to determine the unknown number in an equation that relates four whole numbers and both expressions involve division.

**Got It**

**Misconception/ Error**

The student provides complete and correct responses to all components of the task.

**Examples of Student Work at this Level**

The student determines that the value of \( n \) is 14 by using comparative relational thinking. For example, the student says, "48 is two times more than 24, so \( n \) must be two times more than 7."

**Questions Eliciting Thinking**

Why is it sometimes helpful to think about equations comparatively? Can you think of an example of an equation that is easier to solve using comparative relational thinking rather than by performing operations?

**Instructional Implications**

Consider using the MFAS task Comparative Relational Thinking in a Multiplication Equation (4.OA.1.b).

Provide a false equation such as \( 35 \div 10 = 70 \div 15 \). Have the student determine the error and then use comparative relational thinking to rewrite the equation so that it is true.

**Accommodations & Recommendations**
Special Materials Needed:
- Comparative Relational Thinking in a Division Equation worksheet.

Source and Access Information
Contributed by: MFAS FCRSTEM
Name of Author/Source: MFAS FCRSTEM
District/Organization of Contributor(s): Okaloosa
Access Privileges: Public
License: CPALMS License - no distribution - non commercial

Aligned Standards

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAFS.4.OA.1.b</td>
<td>Determine the unknown whole number in an equation relating four whole numbers using comparative relational thinking. For example, solve 76 + 9 = n + 5 for n by arguing that nine is four more than five, so the unknown number must be four greater than 76.</td>
</tr>
</tbody>
</table>