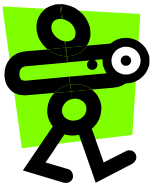


SCAFFOLDING TASK: Stuck on Division

STANDARDS FOR MATHEMATICAL CONTENT

MCC.3.OA.2 Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each.

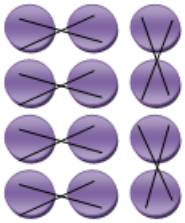
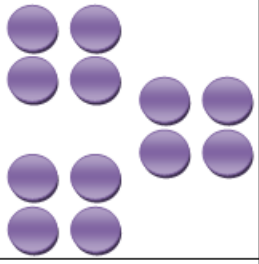
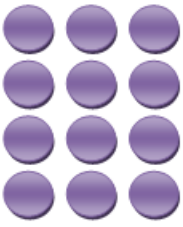
STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

Students should clearly understand how to write number sentences and how to follow written directions before working independently.

One possible solution is shown below:

Division is…	Diagram	Number Sentence
Repeated subtraction "I took two circles away each time. I subtracted 2, 6 times."		12 – 2 – 2 – 2 – 2 – 2 – 2 = 0
Separating a whole into equal groups "I separated the circles into groups of 4. I have 3 groups of four."		12 ÷ 4 = 3
The opposite of multiplication "I have an array with four rows of three. That can be written as 4 x 3 = 12 or 12 ÷ 3 = 4."		4 x 3 = 12 3 x 4 = 12 12 ÷ 4 = 3 12 ÷ 3 = 4

ESSENTIAL QUESTIONS

- How can we model division?
- How are multiplication and division related?
- How are subtraction and division related?
- How can we write a mathematical sentence to represent division models we have made?
- Is there more than one way to divide a number to get the same quotient?

MATERIALS

- 12 connecting cubes **per student**
- "Stuck on Division" task sheet
- "Stuck on Division" recording sheet
- *Divide and Ride* by Stuart J. Murphy or similar book

GROUPING

Individual/Partner Task

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

In this task, students will experiment with a set of 12 connecting cubes to determine the division patterns when the dividend is 12.

Comments

You may choose to open this task by reading, discussing, and modeling the events in *Divide and Ride* by Stuart J. Murphy. *Divide and Ride* is a story about dividing a group of children to ride amusement park rides. Another suitable book about division is *One Hundred Hungry Ants* by Elinor J. Pinczes. Focus on the different ways division can be described (separating into equal groups, repeated subtraction, and inverse of multiplication.)

The three ways of looking at division are closely related and may be difficult for students to verbalize initially as they make connections between concrete models and their corresponding number sentences. Therefore, students need multiple experiences using a given number of cubes to model repeated subtraction, form equal groups, and explain how these two activities are alike and different. They also need to understand the inverse relationship of multiplication and division. Help students make connections to the language of mathematics and between visual and symbolic representations.

Task Directions

Students will follow the directions below from the "Stuck on Division" task sheet.

Use 12 connecting cubes to complete this task.

1. Begin with 12 cubes and remove the same number of cubes over and over again until there are none left. Remember, you must remove the *same number* each time. Make a model of your idea with the cubes.

2. Use the first row of the "Stuck on Division" recording sheet to
    a. write about what you did
    b. draw a diagram of your model
    c. write a subtraction number sentence that describes your model
3. Find a way to separate your cubes into equal groups. How can you show the dividend, divisor, and quotient with your cubes?
4. Use the second row of the "Stuck on Division" recording sheet to
    a. write about what you did
    b. draw a diagram of your cube groups
    c. write a division number sentence
5. Now think of a multiplication fact whose product is twelve. Can you make groups of cubes that prove that division is the opposite of multiplication?
6. Use the third row of the "Stuck on Division" recording sheet to
    a. write about what you did
    b. draw a diagram of your cube groups
    c. write the fact family for your diagram
7. Compare your answers with your friends. Did everyone have the same answers? How can you tell whose solutions are correct?

FORMATIVE ASSESSMENT QUESTIONS

- Can you explain more than one way to think about dividing a number?
- How can you write your model in a number sentence so others will understand your model?
- How can we show your model as both a division number sentence and a subtraction number sentence?

DIFFERENTIATION

Extension

Have students to complete the chart with 13 blocks. Ask students to include leftovers in their explanations, diagrams, and number sentences.

Intervention

Direct instruction in small groups can provide support for students who struggle with these concepts and can enable them to develop the ability to describe their thinking.

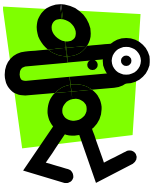
TECHNOLOGY CONNECTION

- http://mcq.wrdsb.on.ca/Admin/Documents/WORC/PDFs/LESSON%20PrimaryMath.pdf
- http://www.lessonplanspage.com/MathLAMultiplicationDivisionUsingTheDoorbellRang23.htm Both websites above provide teacher resources for the book *The Doorbell Rang* by Pat Hutchins.

- http://www.stuartjmurphy.com/activities/activity_ideas.php Stuart Murphy website with activity suggestions for *Divide and Ride.* (Click on level 3 and then click on the title of the book.)

Name _____Date _____

Stuck on Division
Task Sheet



Use 12 connecting cubes to complete this task.

1. Begin with 12 cubes and remove the same number of cubes over and over again until there are none left. Remember, you must remove the *same number* each time. Make a model of your idea with the cubes.

2. Use the first row of the "Stuck on Division" recording sheet to
   a. write about what you did
   b. draw a diagram of your model
   c. write a subtraction number sentence that describes your model

3. Find a way to separate your cubes into equal groups. How can you show the dividend, divisor, and quotient with your cubes?

4. Use the second row of the "Stuck on Division" recording sheet to
   a. write about what you did
   b. draw a diagram of your cube groups
   c. write a division number sentence

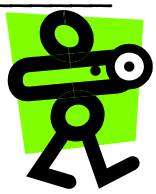
5. Now think of a multiplication fact whose product is twelve. Can you make groups of cubes that prove that division is the opposite of multiplication?

6. Use the third row of the "Stuck on Division" recording sheet to
   a. write about what you did
   b. draw a diagram of your cube groups
   c. write the fact family for your diagram

7. Compare your answers with your friends. Did everyone have the same answers? How can you tell whose solutions are correct?

Name _____ Date _____

Stuck on Division
Recording Sheet



Division is…	Diagram	Number Sentence
Repeated subtraction		
Separating a whole into equal groups		
The opposite of multiplication		