It's All in the Words: Developing Multiplication through Contextual Situations

NCTM Annual Meeting
Session 632
Saturday April 14, 2014
Connie Laughlin and Melissa Hedges

Learning Intentions & Success Criteria

Learning Intentions

We are learning to understand common multiplication and division situations.

Success Criteria

We will be successful when we can recognize multiplication and division situations and represent them appropriately (visually and abstractly).

Multiplication Situations

Work with a partner

- Read the problems.
- Draw a representation for each problem.

How do your representations differ?

Problem Types

- Classify the problems as
  - equal groups
  - array/area
  - Comparisons

- What is a useful model?
- Which problem type was the most difficult to find a model for?

CCSSM p. 89 Common multiplication and division situations	**Unknown Product** $3 \times 6 = ?$	**Group Size Unknown** ("How many in each group?" Division) $3 \times ? = 18, and 18 \div 3 = ?$	**Number of Groups Unknown** ("How many groups?" Division) $? \times 6 = 18, and 18 \div 6 = ?$
Equal Groups	**There are 3 bags with 6 plums in each bag. How many plums are there in all?**	If 18 plums are shared equally into 3 bags, then how many plums will be in each bag?	If 18 plums are to be packed 6 to a bag, then how many bags are needed?
Arrays, Area	**There are 3 rows of apples with 6 apples in each row. How many apples are there?**	If 18 apples are arranged into 3 equal rows, how many apples will be in each row?	If 18 apples are arranged into equal rows of 6 apples, how many rows will there be?
Compare	**A blue hat costs $6. A red hat costs 3 times as much as the blue hat. How much does the red hat cost?**	A red hat costs $18 and that is 3 times as much as a blue hat costs. How much does a blue hat cost?	A red hat costs $18 and a blue hat costs $6. How many times as much does the red hat cost as the blue hat?
General	$a \times b = ?$	$a \times ? = p$ and $p \div a = ?$	$? \times b = p$ and $p \div b = ?$

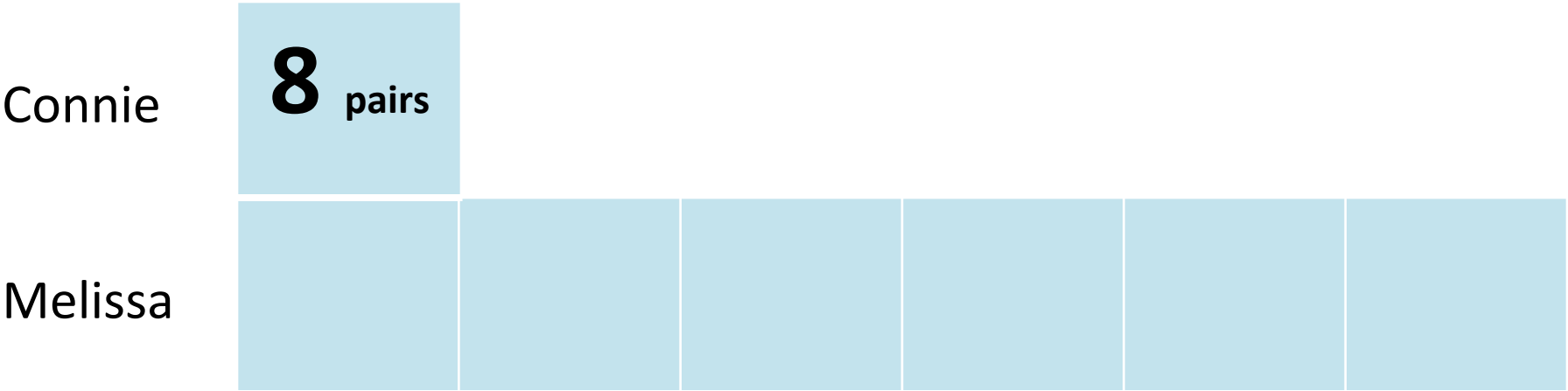
Comparisons Problems

4.OA Use the four operations with whole numbers to solve problems.

4.OA.1 Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 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.

Tape Diagram Representation

Connie has 8 pairs of dress shoes. Melissa has 6 times as many pairs of dress shoes as Connie. How many pairs of dress shoes does Meliisa have?



Comparison Problem #1

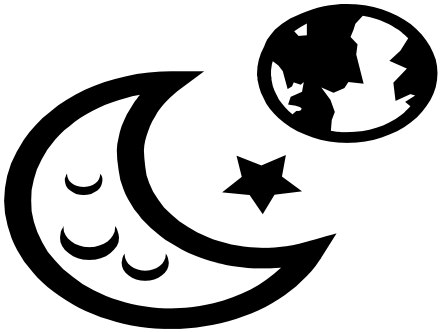
Use tape diagram to represent the problem.

Connie ran 50 meters and Bridget ran 6 times as far as Connie. How many meters did Bridget run?

Comparison Problem #2

Use tape diagram to represent the problem.

Eratosthenes thought that the diameter of the earth was 8,000 miles and the distance from the earth to the moon is 9 times the earth's diameter. How far did Eratosthenes think the earth was from the moon?



Comparison Problem #3

Use tape diagram to represent the problem.

Dylan has a collection of 150 matchbox cars and trucks. He has 4 times as many cars as trucks. How many cars does he have?

Unknown Factor Problems

Rewrite each of the problems on your cards as unknown factor problems in two different ways.

3.OA. Understand properties of multiplication and the relationship between multiplication and division.

6. Understand division as an unknown-factor problem. *For example, find* $32 \div 8$ *by finding the number that makes 32 when multiplied by 8.*

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Arrays, Area	**There are 3 rows of apples with 6 apples in each row. How many apples are there?**	**If 18 apples are arranged into 3 equal rows, how many apples will be in each row?**	**If 18 apples are arranged into equal rows of 6 apples, how many rows will there be?**
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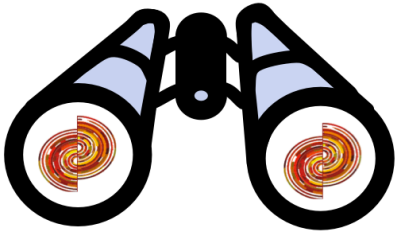
General	$a \times b = ?$	$a \times ? = p$ and $p \div a = ?$	$? \times b = p$ and $p \div b = ?$

Summarizing Our Work

How did our work today on multiplication and division help clarify the ideas of multiplication and division?



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Reflection

With your shoulder partner, describe at least one way that you've deepened your understanding around the Common Core student expectations for multiplication and division.

Thank you

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