Using Diagrams to Find the Number of Groups

6.NS.A.1 Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. For example, create a story context for $(2/3) \div (3/4)$ and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that $(2/3) \div (3/4) = 8/9$ because $3/4$ of $8/9$ is $2/3$. (In general, $(a/b) \div (c/d) = ad/bc$.) How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi?

Addressing

Lesson # 6
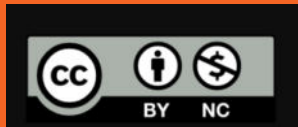
Let's draw tape diagrams to think about division with fractions.

Today's Goals

❏ I can use a tape diagram to represent equal-sized groups and find the number of groups.
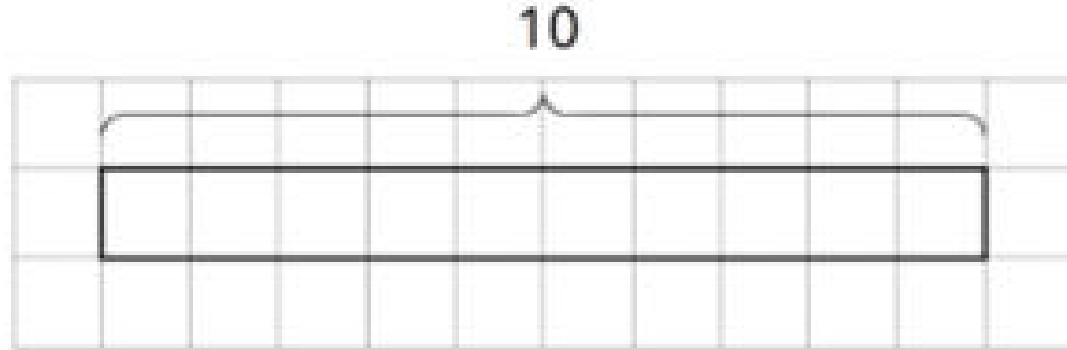
How Many of These in That?

Warm Up 6.1
- Think Pair Share

1.) How Many of These in That?

We can think of the division expression 10 ÷ 2½ as the answer to the question: "How many groups 2½ of are in 10?" Complete the tape diagram to represent the question. Then answer the questions.

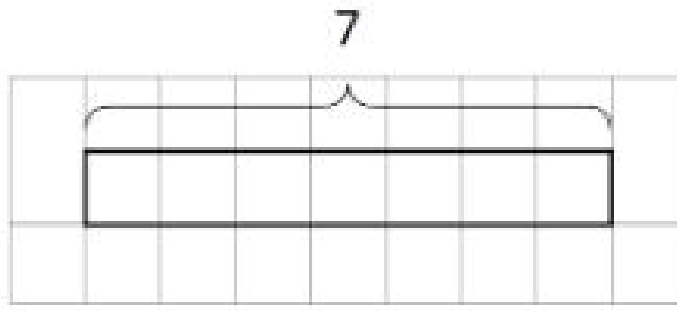How many groups of 2½ of are in 10? _____

Write a multiplication equation for this problem _____

2.) How Many of These in That?

Complete the tape diagram to represent the question: "How many groups of 2 are in 7?" Then answer the questions below.

How many groups of 2 are in 7? _____

Write a division equation for this problem _____

Write a multiplication equation for this problem _____

Representing Groups of Fractions with Tape Diagrams

Activity 6.2
- MLR2: Collect & Display

Do you remember who was right?

Put a checkmark by the correct statement.

Diego and Jada were asked "How many rhombuses are in a trapezoid?"

☐ Diego says, "1 ⅓. If I put 1 rhombus on a trapezoid, the leftover shape is a triangle, which is ⅓ of the trapezoid."

☐ Jada says, "I think it's 1 ½. Since we want to find out 'how many rhombuses,' we should compare the leftover triangle to a rhombus. A triangle is ½ of a rhombus."

Groups of ⅔

To make sense of the question "How many ⅔'s are in 1?," Andre wrote equations and drew a tape diagram.

$$? \cdot \frac{2}{3} = 1$$

$$1 \div \frac{2}{3} = ?$$

1 group of $\frac{2}{3}$
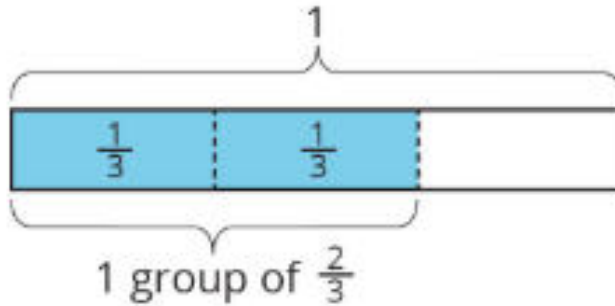
In an earlier task, we used pattern blocks to help us solve the equation 1÷ ⅔ = ?. Explain how Andre's tape diagram can also help us solve the equation.

_____

_____

_____

Tape Diagram 1

Write a multiplication equation and a division equation for the following question. Draw a tape diagram to find the solution. Use the grid to help you draw, if needed.
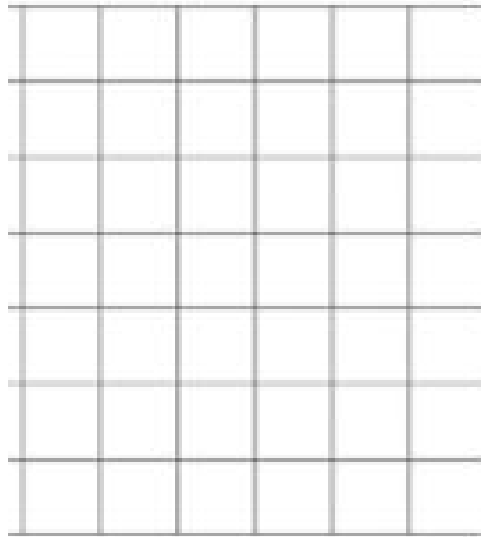
1. How many ¾'s are in 1?

a.) Multiplication Equation_____

b.) Division Equation_____

c.) When drawing the diagram, how many boxes should equal one whole?_____

d.) _____ boxes = 1 group of ¾.   1 box = _____ groups of ¾.

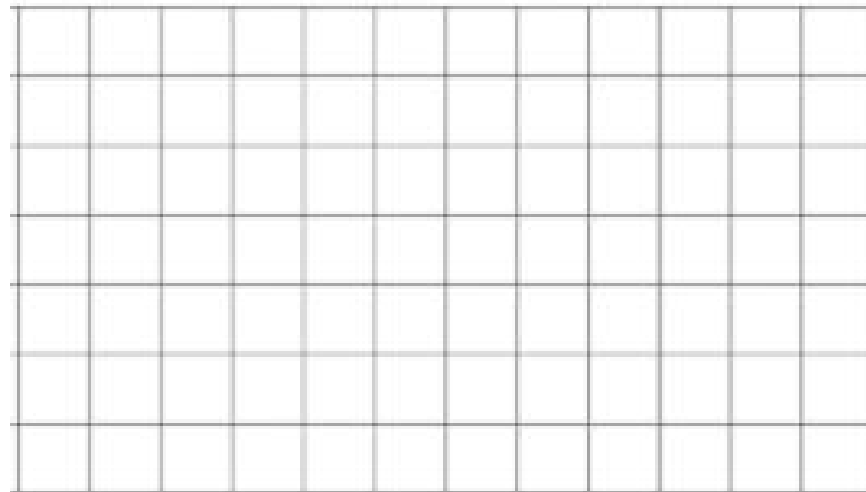e.) Draw the diagram and write the answer to the question_____

Tape Diagram 2

Write a multiplication equation and a division equation for the following question. Draw a tape diagram to find the solution. Use the grid to help you draw, if needed.

1. How many ⅔'s are in 3?

a.) Multiplication Equation_____

b.) Division Equation_____

c.) When drawing the diagram, how many boxes should equal one whole?_____

d.) _____ boxes = 1 group of ⅔.   1 box = _____ group of ⅔.

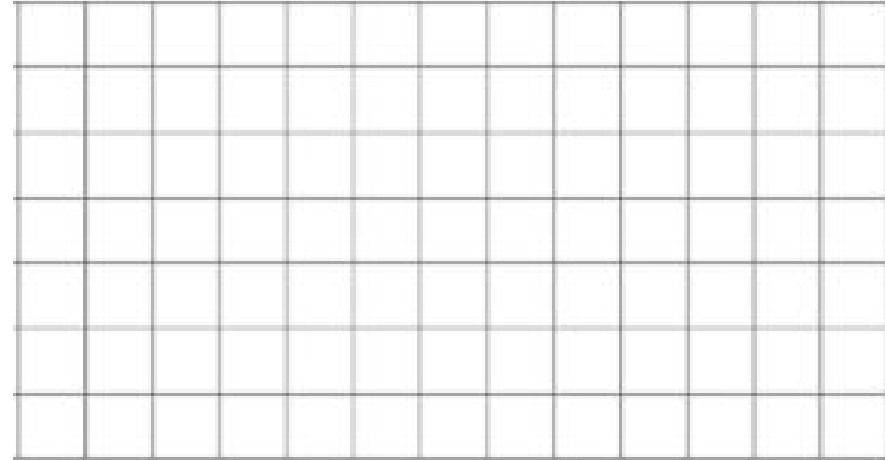e.) Draw the diagram and write the answer to the question_____

Tape Diagram 3

Write a multiplication equation and a division equation for the following question. Draw a tape diagram to find the solution. Use the grid to help you draw, if needed.

1. How many 3/2's are in 5?

a.) Multiplication Equation_____

b.) Division Equation_____

c.) When drawing the diagram, how many boxes should equal one whole?_____

d.) _____ boxes = 1 group of 3/2.   1 box = _____ groups of 3/2.

e.) Draw the diagram and write the answer to the question_____

Finding Number of Groups

Activity 6.3
- MLR1: Stronger & Clearer Each Time

Finding Number of Groups 1

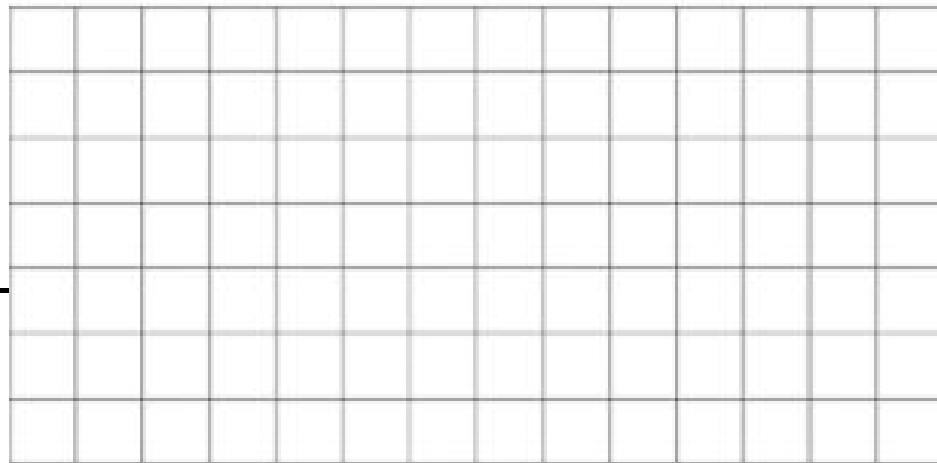How many ½ pound groups of candy can be made from 2 ¾ pounds of candy?

a.) Multiplication Equation_____

b.) Division Equation_____

c.) When drawing the diagram, how many boxes should equal one whole? _____

d.) _____ boxes = 1 group of ½.   1 box = _____ groups of ½.

e.) Draw the diagram and write the answer to the question

Finding Number of Groups 2

A baker used 2 kilograms of flour to make several batches of a pastry recipe. The recipe called for ⅖ kilogram of flour per batch. How many batches did she make?
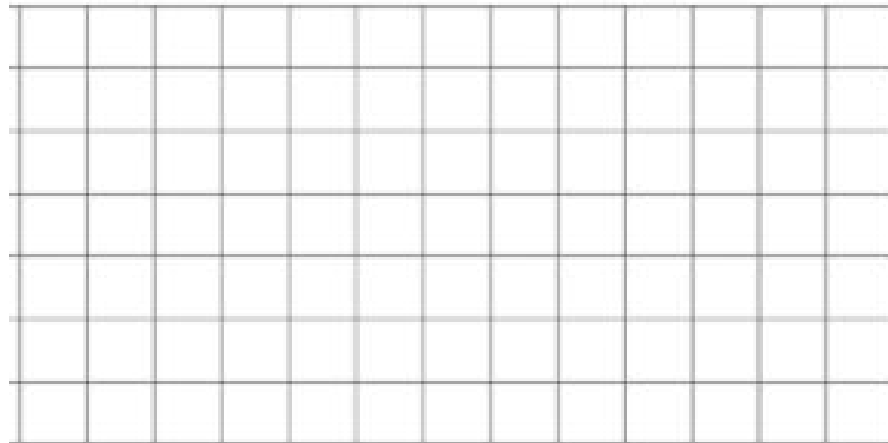
a.) Multiplication Equation_____

b.) Division Equation_____

c.) When drawing the diagram, how many boxes should equal one whole? _____

d.) _____ boxes = 1 group of ⅖.   1 box = _____ groups of ⅖.
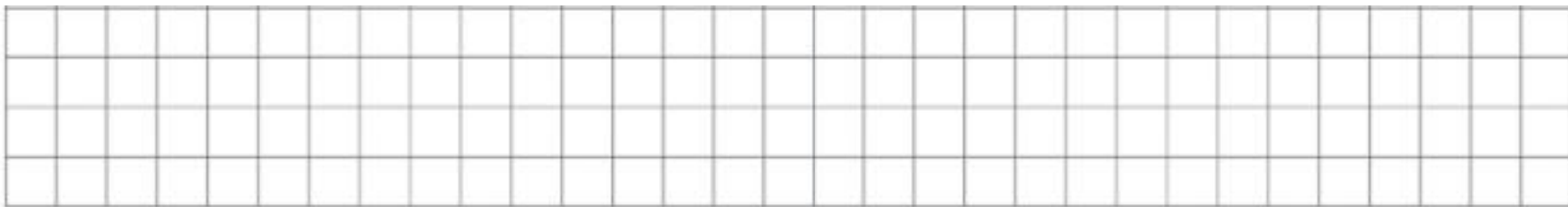
e.) Draw the diagram and write the answer to the question_____

Finding Number of Groups 3

How many ⅜ inch thick books make a stack that is 6 inches tall?

a.) Multiplication Equation_____

b.) Division Equation_____

c.) When drawing the diagram, how many boxes should equal one whole? _____

d.) _____ boxes = 1 group of ⅜.   1 box = _____ groups of ⅜.

e.) Draw the diagram and write the answer to the question_____

Let's Talk About It

A friend is unsure what 2 ÷ ⅘ means and isn't sure how to find its value. How would you help your friend make sense of the expression? How do you think about it?

Share two ways that you find helpful for reasoning about an expression like this.

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Lesson Synthesis

- In the question 'how many ¾ are in 6' (or 6 ÷ ¾ = ?) what does each number represent?
- What would a tape diagram for this situation show?
- How does the diagram help us answer the question?
- What if the length can't be broken equally into ¾s? How do we deal with the remainder?
- We have used pattern blocks, fraction strips, and other diagrams to help us think about division with fractions. How are tape diagrams and these other tools alike?
- How are tape diagrams different than those tools for reasoning about 6 ÷ ¾ or 18 ÷ ⅖ ?

Today's Goals

❏ I can use a tape diagram to represent equal-sized groups and find the number of groups.

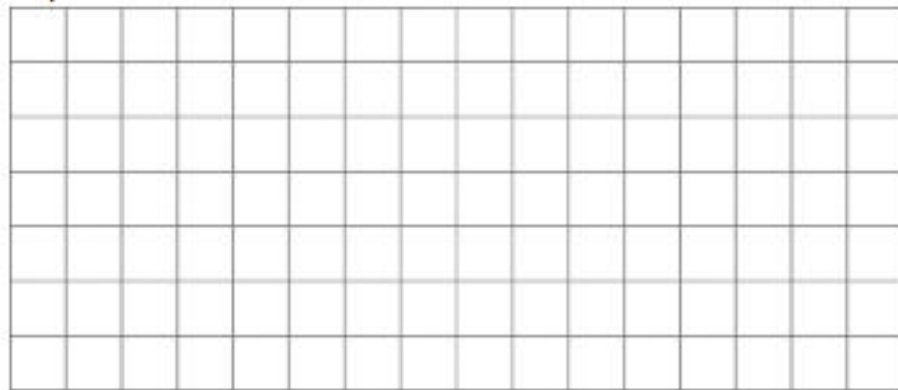# How Many in 2?

Cool Down 6.4

Exit Ticket

Write a multiplication equation and a division equation for the following question. Draw a tape diagram to find the solution. Use the grid to help you draw, if needed.

1. How many ¾'s are in 2?

a.) Multiplication Equation_____

b.) Division Equation_____

c.) When drawing the diagram, how many boxes should equal one whole?_____

d.) _____ boxes = 1 group of ¾.   1 box = _____ groups of ¾.

e.) Draw the diagram and write the answer to the question