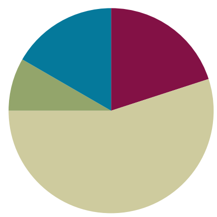
Lesson 24

Objective: Express whole numbers as fractions and recognize equivalence with different units.

Related Topics: More Lesson Plans for the Common Core Math

Suggested Lesson Structure

Fluency Practice	(12 minutes)
Application Problem	(5 minutes)
Concept Development	(33 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (12 minutes)

- Sprint: Adding by 7 **2.NBT.5** (8 minutes)
- Write Equal Fractions **3.NF.3d** (4 minutes)

Sprint: Adding by 7 (8 minutes)

Materials: (S) Adding by 7 Sprint

Write Equal Fractions (4 minutes)

Materials: (S) Personal white boards

T: (Project number line with endpoints 0 and 1 partitioned into 2 equal parts by a dotted line.) Say the unit fraction represented by the dotted line.

S: 1 half. (Write $\frac{1}{2}$ below the dotted line.)

T: (To the right of the number line, write $\frac{1}{2} = \frac{\ }{4}$.) On your personal white boards, write the number sentence and fill in the blank.

S: (Write $\frac{1}{2} = \frac{2}{4}$.)

T: (Write $\frac{2}{4}$ below $\frac{1}{2}$ on the number line.)

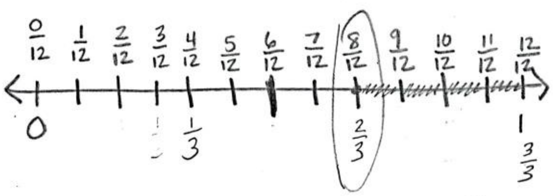
Continue the process for new number lines: $\frac{1}{3} = \frac{2}{\ }$ and $\frac{1}{4} = \frac{\ }{8}$.

Application Problem (5 minutes)

The zipper on Robert's jacket is 1 foot long. It breaks on the first day of winter. He can only zip it $\frac{8}{12}$ of the way before it gets stuck. Draw and label a number line to show how far Robert can zip his jacket.

a. Divide and label the number line in thirds. What fraction of the way can he zip his jacket in thirds?

b. What fraction of Robert's jacket is not zipped? Write your answer in twelfths and in thirds.



a) Robert can zip his jacket $\frac{2}{3}$ of the way.

b) $\frac{4}{12}$ or $\frac{1}{3}$ of his jacket is not zipped.

NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Partitioning the unit interval into two different unit fractions is a stimulating challenge for students above grade level.

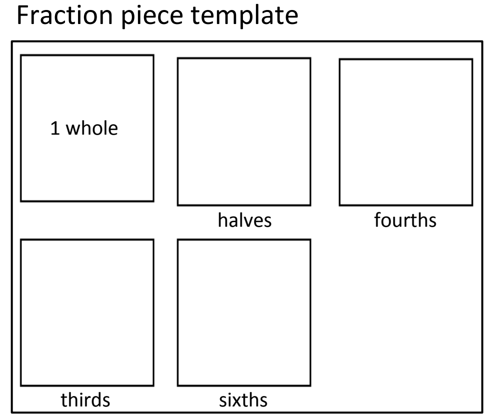
Students below grade level can draw two separate number lines or use fraction strips to solve.

Concept Development (33 minutes)

Materials: (S) Fraction piece template (pictured below), scissors, envelopes, personal white boards, sentence strips, crayons

Each student starts with a fraction piece template, an envelope, and scissors.

Fraction piece template



T: Cut out each of the boxes on your fraction piece template and initial each box so you know which ones are yours.

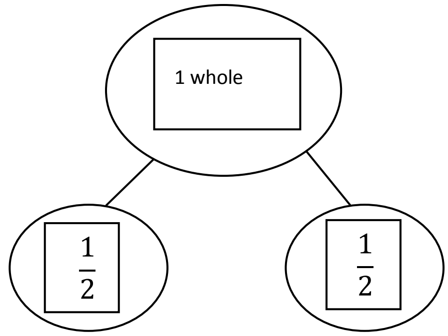
S: (Students cut and initial.)

T: Place the box that says '1 whole' on your personal white board. Take another box. How many halves make 1 whole? Show by folding and labeling each unit fraction.

S: (Students fold the second box in half and label $\frac{1}{2}$ on each of the 2 parts.)

T: Now cut on the fold. Draw circles around your whole and your parts to make a number bond.

S: (Students draw a number bond using their shapes to represent wholes and parts.)



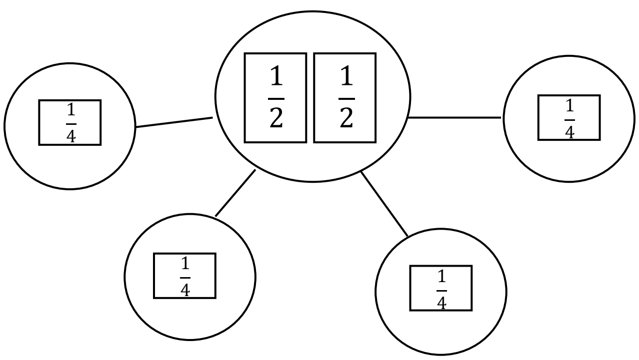
T: In your whole, write an equality that shows how many halves are equal to 1 whole. Remember, the equal sign is like a balance. Both sides have the same value.

S: (The ‘1 whole’ box now reads: 1 whole = $\frac{2}{2}$.)

T: Put your halves inside your envelope.

Follow the same sequence for each box so that children have all pieces indicated on the template cut. Have students update the equality on their ‘1 whole’ square each time they cut a new piece. At the end it should read: 1 whole = $\frac{2}{2} = \frac{3}{3} = \frac{4}{4} = \frac{6}{6}$. Discuss the equality with students to ensure they understand the meaning of the equal sign and the role it plays in this number sentence.

T: (Project or show the following.)



T: Use your pieces to make this number bond on your personal board.

S: (Copy the number bond.)

MP.7

T: Discuss with your partner: Is this number bond true? Why or why not?

S: No, because the whole has only 2 pieces, but there are 4 parts! → But fourths are just halves cut in 2. So they’re the same pieces, but smaller now. → $\frac{2}{4}$ is equivalent to $\frac{1}{2}$. → So $\frac{2}{2} = \frac{4}{4}$, just like what we wrote down on our ‘1 whole’ rectangle.

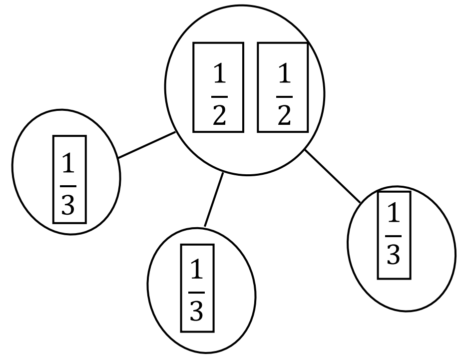
T: I hear students saying that $\frac{2}{2}$ and $\frac{4}{4}$ both equal 1 whole. So can we say that this is true? (Project or show the following.)

NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Students below grade level may appreciate tangibly proving that 2 halves is the same as 4 fourths. They or you can place the (paper) fourths on top of the halves to show equivalency.

MP.7

S: No, because thirds aren't halves cut in 2. They look completely different. → But when we put our thirds together and our halves together, they make the same whole. → And before we found with our pieces that 1 whole = $\frac{2}{2} = \frac{3}{3} = \frac{4}{4}$. → Then it must be true!



Follow the same sequence with a variety of 'wholes' and 'parts' until students are comfortable with this representation of equivalence.

T: Now let's place our different units on the same number line. Use your sentence strip to represent the interval from 0 to 1 on a number line. Mark the end points in with your pencil now.

S: (Mark end points 0 and 1 below the number line with pencil.)

T: Go ahead and fold your sentence strip to partition one unit at a time into halves, fourths, thirds, and then sixths. Label each fraction above the number line. As you count, be sure to rename 0 and the whole. Use a different color crayon to mark and label the fraction for each unit.

S: (Students fold sentence strips and label first halves, then fourths, then thirds, then sixths in different colors. They rename 0 and 1 in terms of each new unit.)

T: You should have a crowded number line! Compare it with your partner's.

S: (Students compare.)

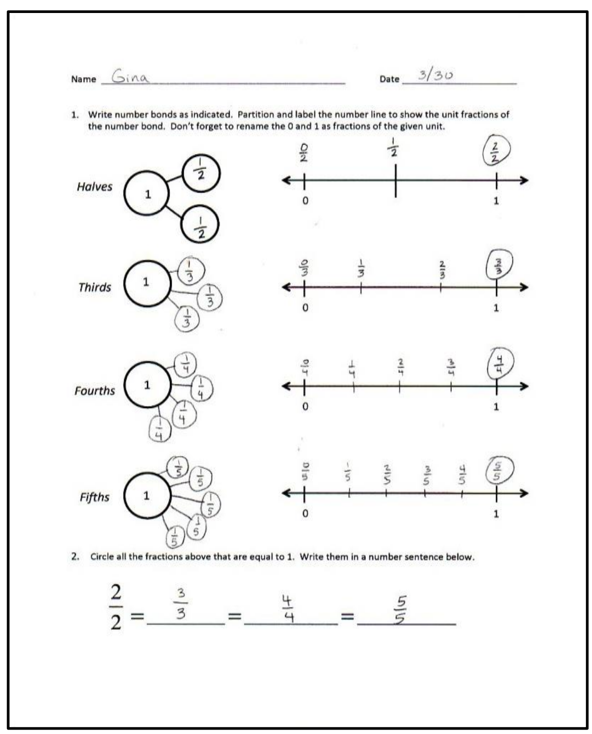
T: Before today, we've been noticing lots of equivalent fractions between wholes on the number line. Today notice the fractions you wrote at 0 and 1. Look first at the fractions for 0. What pattern do you notice?

S: They all have a 0 on the top! → That's because there are 0 parts. → The bottom number changes. It shows you what unit you're going to count by. → Since our number line starts at 0, there are 0 of that unit in all of the fractions.

T: Even though the unit is different in each of our fractions at 0, are they equivalent? Think back to our work with shapes earlier.

S: We saw before that fractions with different units can still make the same whole. This time the whole is just 0!

Follow the sequence to study the fractions written at 1. For both 0 and 1 students should see that every color they used is present.


Name Gina Date 3/30

1. Write number bonds as indicated. Partition and label the number line to show the unit fractions of the number bond. Don't forget to rename the 0 and 1 as fractions of the given unit.

Halves

Thirds

Fourths

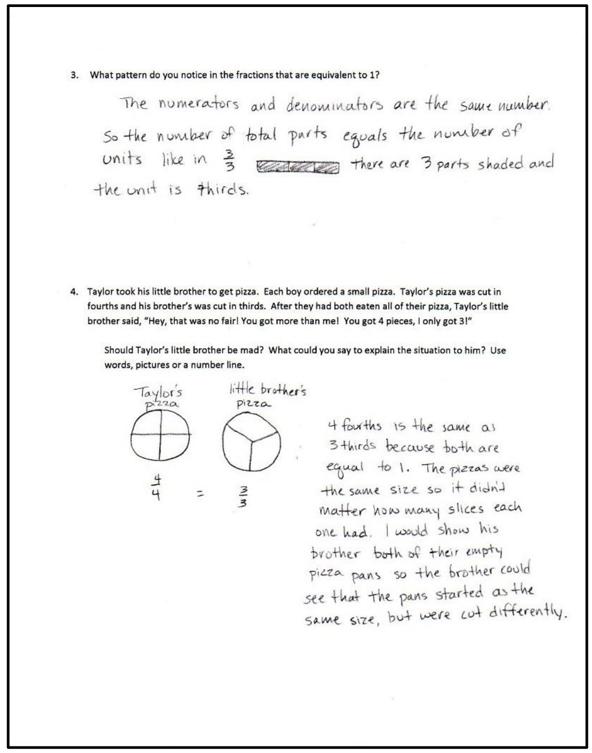
Fifths

2. Circle all the fractions above that are equal to 1. Write them in a number sentence below.

$\frac{2}{2} = \frac{3}{3} = \frac{4}{4} = \frac{5}{5}$

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.



3. What pattern do you notice in the fractions that are equivalent to 1?

The numerators and denominators are the same number. So the number of total parts equals the number of units like in $\frac{3}{3}$ there are 3 parts shaded and the unit is thirds.

4. Taylor took his little brother to get pizza. Each boy ordered a small pizza. Taylor's pizza was cut in fourths and his brother's was cut in thirds. After they had both eaten all of their pizza, Taylor's little brother said, "Hey, that was no fair! You got more than me! You got 4 pieces, I only got 3!"

Should Taylor's little brother be mad? What could you say to explain the situation to him? Use words, pictures or a number line.

4 fourths is the same as 3 thirds because both are equal to 1. The pizzas were the same size so it didn't matter how many slices each one had. I would show his brother both of their empty pizza pans so the brother could see that the pans started as the same size, but were cut differently.

Student Debrief (10 minutes)

Lesson Objective: Express whole numbers as fractions and recognize equivalence with different units.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

You may choose to use any combination of the questions below to lead the discussion.

- Invite students to share their thinking about Problem 3.
- Invite students to share their work on Problem 4.
- Have students use their fraction shapes from the lesson to model the number bonds in Problem 1.
- Ask students to generate other fractions equivalent to wholes. Provide the unit, and ask them to generate the fraction. For example:

T: The unit is 1 millionth. What fraction is equivalent to the whole?

S: Wow! I million over 1 million!

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

A # Correct _____

Add.

1	0 + 7 =		23	6 + 7 =	
2	1 + 7 =		24	16 + 7 =	
3	2 + 7 =		25	26 + 7 =	
4	3 + 7 =		26	36 + 7 =	
5	7 + 3 =		27	46 + 7 =	
6	7 + 2 =		28	66 + 7 =	
7	7 + 1 =		29	7 + 7 =	
8	7 + 0 =		30	17 + 7 =	
9	4 + 7 =		31	27 + 7 =	
10	14 + 7 =		32	37 + 7 =	
11	24 + 7 =		33	87 + 7 =	
12	34 + 7 =		34	8 + 7 =	
13	44 + 7 =		35	18 + 7 =	
14	84 + 7 =		36	28 + 7 =	
15	64 + 7 =		37	38 + 7 =	
16	5 + 7 =		38	78 + 7 =	
17	15 + 7 =		39	9 + 7 =	
18	25 + 7 =		40	19 + 7 =	
19	35 + 7 =		41	29 + 7 =	
20	45 + 7 =		42	39 + 7 =	
21	75 + 7 =		43	49 + 7 =	
22	55 + 7 =		44	79 + 7 =	

B Improvement _____ # Correct _____

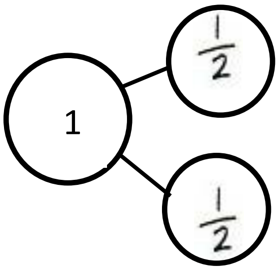
Add.

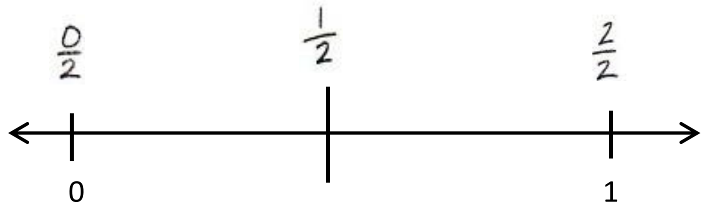
1	7 + 0 =		23	6 + 7 =	
2	7 + 1 =		24	16 + 7 =	
3	7 + 2 =		25	26 + 7 =	
4	7 + 3 =		26	36 + 7 =	
5	3 + 7 =		27	46 + 7 =	
6	2 + 7 =		28	76 + 7 =	
7	1 + 7 =		29	7 + 7 =	
8	0 + 7 =		30	17 + 7 =	
9	4 + 7 =		31	27 + 7 =	
10	14 + 7 =		32	37 + 7 =	
11	24 + 7 =		33	67 + 7 =	
12	34 + 7 =		34	8 + 7 =	
13	44 + 7 =		35	18 + 7 =	
14	74 + 7 =		36	28 + 7 =	
15	54 + 7 =		37	38 + 7 =	
16	5 + 7 =		38	88 + 7 =	
17	15 + 7 =		39	9 + 7 =	
18	25 + 7 =		40	19 + 7 =	
19	35 + 7 =		41	29 + 7 =	
20	45 + 7 =		42	39 + 7 =	
21	85 + 7 =		43	49 + 7 =	
22	65 + 7 =		44	89 + 7 =	

Name ____ Date ______________________

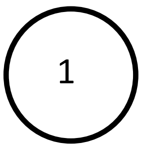
1. Write number bonds as indicated. Partition and label the number line to show the unit fractions of the number bond. Don't forget to rename the 0 and 1 as fractions of the given unit.

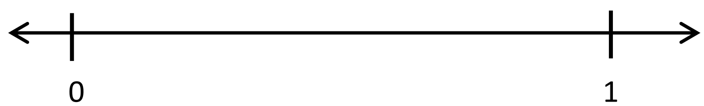
Halves



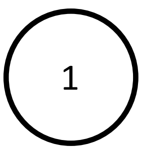


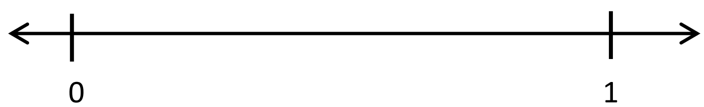
Thirds



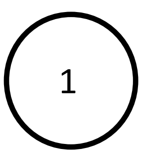


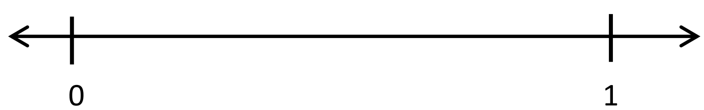
Fourths





Fifths





2. Circle all the fractions above that are equal to 1. Write them in a number sentence below.

$$\frac{2}{2} = \_\_\_\_\_\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_\_\_\_$$

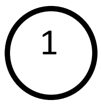
3. What pattern do you notice in the fractions that are equivalent to 1?

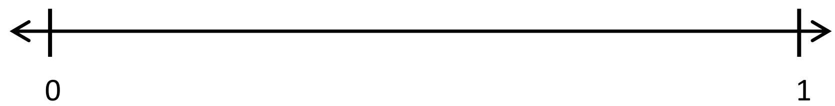
4. Taylor took his little brother to get pizza. Each boy ordered a small pizza. Taylor's pizza was cut in fourths, and his brother's was cut in thirds. After they had both eaten all of their pizza, Taylor's little brother said, "Hey that was no fair! You got more than me! You got 4 pieces, I only got 3!"

   Should Taylor's little brother be mad? What could you say to explain the situation to him? Use words, pictures, or a number line.

Name ____ Date ______________________

1. Write number bonds as indicated. Partition and label the number line to show the unit fractions of the number bond. Don't forget to rename the 0 and 1 as fractions of the given unit.

Fourths 

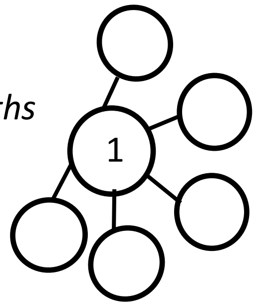


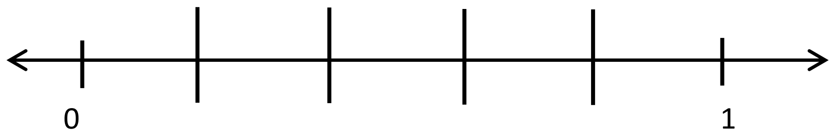
2. How many copies of $\frac{1}{4}$ does it take to make 1 whole? What's the fraction for 1 whole in this case? Use the number line and/or the number bonds to help you explain.

Name ____ Date ______________________

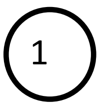
1. Write number bonds as indicated. Partition and label the number line to show the unit fractions of the number bond. Don't forget to rename the 0 and 1 as fractions of the given unit.

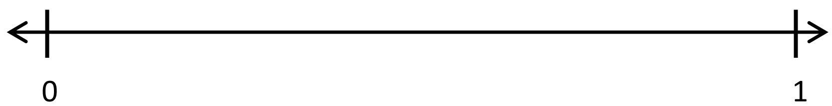
Fifths



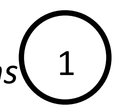


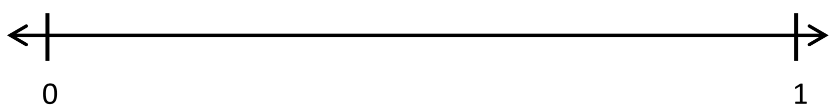
Sixths



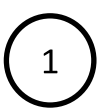


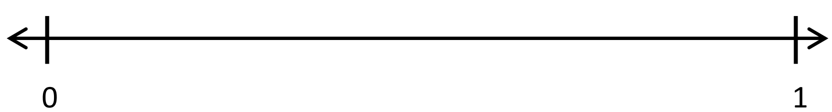
Sevenths





Eighths



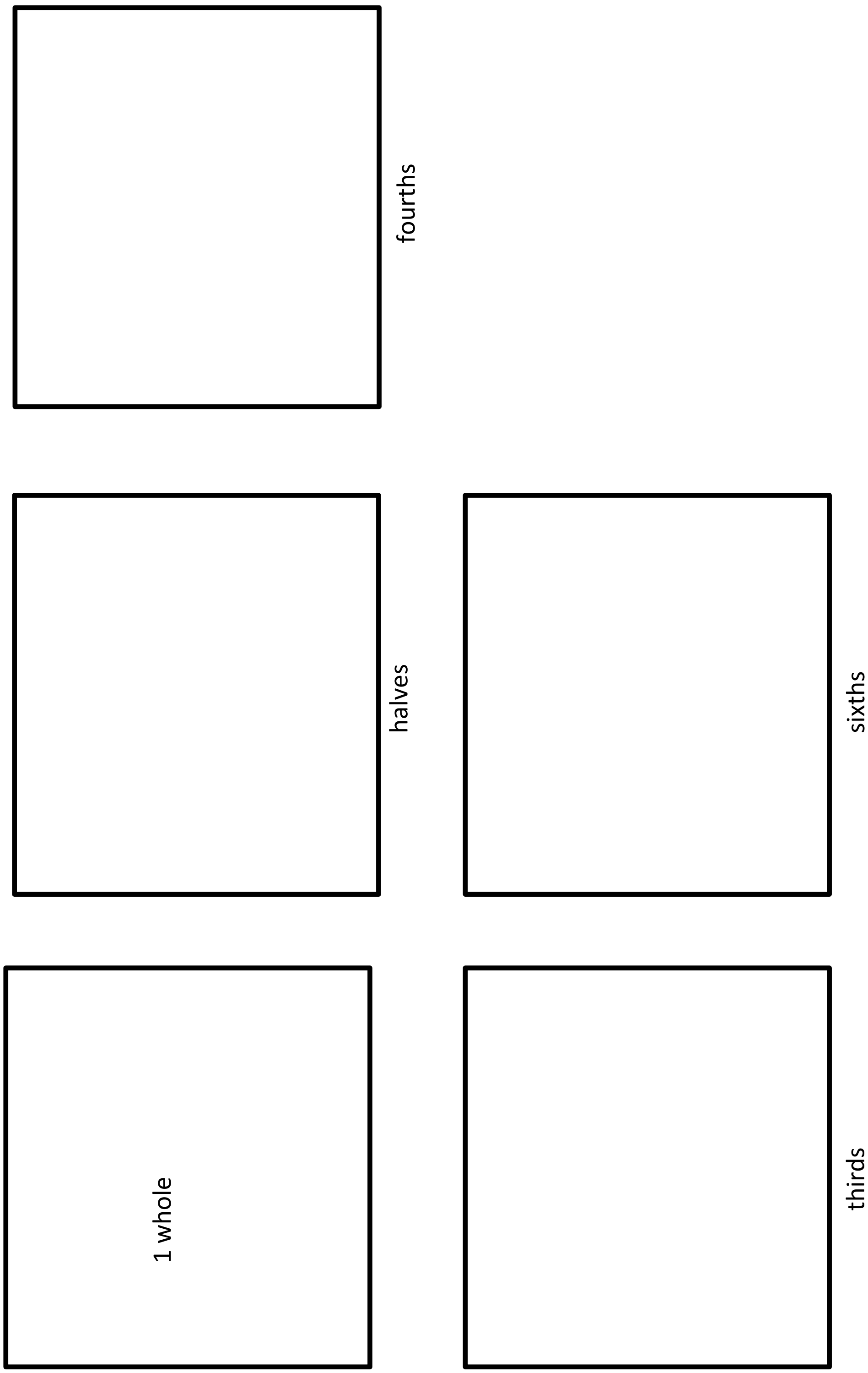


2. Circle all the fractions above that are equal to 1. Write them in a number sentence below.

$\frac{5}{5}$ = ___________________ = _______________________ = ________________________

3. What pattern do you notice in the fractions that are equivalent to 1? Following this pattern, how would you write the next whole as a fraction?

4. In an Art class, Mr. Joselyn gave everyone a 1 foot skewer to measure and cut. Vivian broke hers into 5 equal pieces, and Scott broke his into 7 equal pieces. Scott said to Vivian, "The total length of my stick must be longer than yours because I have 7 pieces and you only have 5." Is Scott correct? Use words, pictures, or a number line to help you explain.


fourths
halves
sixths
1 whole
thirds