

Grade 4 Mathematics

Number and Number Relations : Lesson 9

Read aloud to the students the material that is printed in **boldface type** inside the boxes. Information in regular type inside the boxes and all information outside the boxes should **not** be read to students. Possible student responses are included in parentheses after the questions.

NOTE: The directions read to students may depend on the available materials. Read only those parts of the lesson that apply to the materials you are using.

Any directions that ask you to do something, such as to turn to a page or to hand out materials to students, will have an arrow symbol (\Rightarrow) by them.

Purpose of Lesson 9:

- In this lesson, the tutor and the students will
 - ✓ recognize fractional parts of a region;
 - ✓ recognize fractional parts of a set; and
 - ✓ compare fractions, using the terminology of more, less, greater, same, between, about, almost.

Equipment/Materials Needed:

- Copies of Student Sheets 27 – 30
- Crayons – 1 or 2 colors per student
- Paper and pencils

Preparations before beginning Lesson 9:

- Gather the materials needed for the lesson: crayons, paper, pencils.
- Run off 1 copy of Student Sheets 27 – 30 for each student.

Lesson 9: Number and Number Relations

Fractions make it possible to represent numbers between whole numbers. Fractions show different types of relationships. In this lesson we will look only at part/whole relationships. Example: If I cut a pizza into 4 pieces and give you 1 piece, you get one-fourth of the pizza. I can show this portion as $\frac{1}{4}$. The whole pizza contains 4 pieces; you get 1 part. This idea is very important for children to understand and we will do many activities to get this concept across. There are different ways to show fractions: regions, area (We will not do here.), sets, and linear models (We will not do here.) Regions are the easiest and linear models the hardest for students to understand, so we will begin with regions. Regions are geometric figures such as circles, squares, rectangles, etc. They can be divided into equal size parts or pieces. Circles are the easiest region for children to understand, so we will begin with circles.

⇒ Give students a copy of Student Sheet 27 and the crayons.

Say:

Let's pretend that these circles are pizzas. Look at the 1st pizza. What do you notice? (It is not cut into slices. It is a whole pizza.) **Let's look at pizza 2. How is it the same as pizza 1?** (It is the same size and same shape.) **How is it different from pizza 1?** (It has been cut into 3 pieces.) **What do you notice about the pieces?** (All of the pieces are the same size and shape.) **Color one of the pieces. One out of 3 pieces is colored. We call this one-third.**

⇒ Write out the word *one-third*. Do **not** write the symbol $\frac{1}{3}$ yet.

Say:

Color another piece. Now 2 out of 3 pieces are colored. What do you think we could call this portion? (two-thirds)

⇒ Write out the word *two-thirds*. Do not write the symbol yet.

Say:

Color in one more part. How many pieces are colored? (All of them, 3)
What name could we give to this portion? (1 whole, $\frac{3}{3}$)

Emphasize that $\frac{3}{3}$ and 1 name the same amount. **Which is greater – $\frac{2}{3}$ or $\frac{3}{3}$? ($\frac{3}{3}$) Which is more – $\frac{2}{3}$ of a pizza or $\frac{3}{3}$ of a pizza? ($\frac{3}{3}$) Which is greater – $\frac{3}{3}$ of a pizza or 1 whole pizza? (Neither; they are the same.)** **Look at Pizza 3. What do you notice about this pizza?** (It is the same size as pizzas 1 and 2. It is cut into 4 pieces. The pieces are all the same size and shape.) **Color in 1 piece. What do you think the name of this piece will be?** (one-fourth) **Why?** (There are 4 pieces in the whole pizza; only 1 piece is colored.)

⇒ Write out the word *one-fourth*. This time show the symbol for $\frac{1}{4}$.

Say:

We can write the amount one-fourth as a fraction. The top number stands for the number of pieces we have colored and the bottom number stands for the number of pieces in the pizza. (Note: Please write fractions like this symbol: $\frac{1}{4}$. It is just easier to write them as $\frac{1}{4}$ while typing and takes up less space.)

Color in a second piece. How much is colored in now? (two-fourths, $\frac{2}{4}$) **Color in a third piece. What is the name of this fractional amount?** (three fourths, $\frac{3}{4}$) **Color in the last piece. How much is shaded now?** ($\frac{4}{4}$ or 1 whole) **Which is more – $\frac{3}{3}$ or $\frac{4}{4}$?** (Neither. They are the same size.)

Say:

Look at the 4th pizza. (Note: The 4th pizza is cut into halves. This pizza was saved until later, because of the word *half* or *halves*. The word *third* matches 3, *fourth* matches 4; but *half* doesn't match 2. **What do you notice about this pizza?** (It is the same size as the other pizzas. It is cut into 2 pieces. The pieces are the same size and same shape.) **Color in 1 piece. What is the name for this fractional amount?** (one half or $\frac{1}{2}$). **Color in the second piece. What is the name for this fractional amount?** ($\frac{2}{2}$ or 1 whole.) **Which is greater – $\frac{2}{2}$ or $\frac{4}{4}$?** (Neither. They are the same size, 1 whole.)

Say:

Look at the 5th pizza. What do you notice? (It is the same size as the other pizzas. It is cut into 3 pieces, but the pieces are not the same size or shape.) **Remember that fractions have to be equal parts. Are any of these 3 pieces the same as the $\frac{1}{3}$ in Pizza 2? We are not going to talk about fractions with this pizza, because it is not divided into equal sized parts.**

Say:

Look at pizza 6. What do you notice about it? (It is the same size as the other pizzas. It is cut into 8 pieces. The pieces are all the same size and shape.) **Shade in one part. What is the fractional name for this amount?** (One eighth or $1/8$.) If you feel the students need more practice, color in the rest of the parts. **Let's put this sheet away.**

⇒ Give Student Sheet 28. Because circle models are overused, some children often think that all fractions are round. For that reason, this sheet will use rectangles. We will focus more on comparing in this activity.

Say:

Let's pretend that these are power bars. What do you notice about the first bar? (It is not cut into parts. It is a whole bar. It is 1 whole, etc.) **Let's look at the 2nd power bar. What do you notice about it?** (It is cut into 4 pieces. All the pieces are the same size. Each piece is called one-fourth, etc.) **Color in one-fourth. Tell me the fraction; write the word and the symbol next to power bar 2.** (one-fourth, $1/4$) **Is $1/4$ greater than 1 whole power bar?** (No) **Is it about 1 whole?** (No, it is a lot smaller.)

Say

Let's look at the 3rd power bar. What do you notice about it? (It is the same as power bar 2.) **This time, shade in 2 pieces. What fraction did you shade? Tell me the word; write the word and the symbol next to power bar 3.** (two-fourths, $2/4$) **Which is larger – $1/4$ or $2/4$ of a power bar?** ($2/4$) **How do you know?** Both power bars are cut into fourths; but in $1/4$, we colored in only 1 part. In $2/4$, we colored in another piece, so we have more pieces.)

Say:

Let's look at the 4th power bar. What do you notice about it? (It is the same size as the others. It has been cut into 3 pieces. All the pieces are the same size and shape.) **Shade in 1 piece. What fraction did you shade? Tell me the word; write the word and the symbol next to power bar 4.** (one third, $1/3$) **Which is larger – $1/4$ or $1/3$ of a power bar?** ($1/3$) **How do you know?** (Both power bars are the same size; but power bar 4 was cut into more pieces, so they have to be smaller.)

Say:

Let's look at the 5th power bar. What do you notice about it? (It is the same size as the others. It has been cut into 2 pieces. All the pieces are the same size and shape.) **Shade in 1 piece. What fraction did you shade? Tell me the word; write the word and the symbol next to power bar 3.** (one half, $1/2$) **Which is larger – $1/2$ or $1/4$ of a power bar?** ($1/2$) **How do you know?** (Both power bars are the same size; but power bar 3 was cut into more pieces, so they have to be smaller.) **Which is larger – $1/2$ or $2/4$ of a power bar?** (Neither. They are the same size.)

Say:

Let's look at the 6th power bar. What do you notice about it? (It is the same size as the others. It has been cut into 6 pieces. All the pieces are the same size and shape.) **Shade in 2 pieces. What fraction did you shade? Tell me the word; write the word and the symbol next to power bar 4.** (two sixths, $2/6$) **Which is larger – $2/6$ or $1/3$ of a power bar?** (Neither. They are the same size.) **How do you know?** (Both power bars are the same size; the same amount of power bar is shaded in both pictures.) **Is $2/6$ almost a whole power bar?** (No, it is a lot smaller than 1 whole.)

Say:

Let's look at the 7th power bar. What do you notice about it? (It is the same size as the others. It has been cut into 4 pieces. All the pieces are **not** the same size and shape.) **Since it is not divided into equal parts, we are not going to talk about fractions with it.**

Say:

Let's look at the 8th power bar. What do you notice about it? (It is the same size as the others. It has been cut into 12 pieces. All the pieces are the same size and shape.) **Shade in 11 pieces. What fraction did you shade? Tell me the word; write the word and the symbol next to power bar 4.** (eleven-twelfths, $11/12$) **Which is larger – $1/2$ or $11/12$ of a power bar?** ($11/12$) **Which is less – $1/4$ or $11/12$ of a power bar?** ($1/4$) **Is $11/12$ close to 1 whole power bar?** (Yes, it is almost 1 whole.)

⇒ In this part, you will work with groups of objects rather than regions. Place 1 nickel and 5 pennies in front of you. If you have coins available, use them; if not, draw 6 circles on your paper. Write 5¢ on 1 of one them and 1¢ on the others.

Say:

How many coins do I have? (6) How many nickels do I have? (1) Write a fraction that could describe the number of nickels in the set. Tell me the word and write the symbol. (one sixth, $1/6$) How many are pennies? (5) Write a fraction that could describe the number of pennies in the set. (five sixths, $5/6$)

⇒ Replace one of the pennies with another nickel.

Say:

How many coins do I have? (6) How many nickels do I have? (2) Write a fraction that could describe the number of nickels in the set. Tell me the word and write the symbol. (two sixths, $2/6$) How many are pennies? (4) Write a fraction that could describe the number of pennies in the set. (four sixths, $4/6$)

⇒ Replace one of the pennies with another nickel.

Say:

How many coins do I have? (6) How many nickels do I have? (3) Write a fraction that could describe the number of nickels in the set. Tell me the word and write the symbol. (three sixths, $3/6$) How many are pennies? (3) Write a fraction that could describe the number of pennies in the set. (three sixths, $3/6$)

⇒ Arrange the coins so that the 3 pennies are in one row and the 3 nickels are in another row.

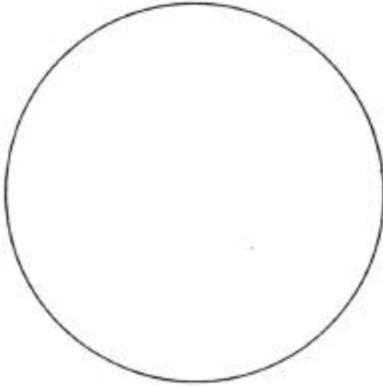
Say:

Could anyone describe another way to name the fractional part of nickels in the set? (Hopefully, some will see that another name is $1/2$.) The fractions $1/2$ and $3/6$ are equivalent fractions. Equivalent fractions name the same amount. Don't spend a lot of time here. You just want them to get the idea of equivalent.

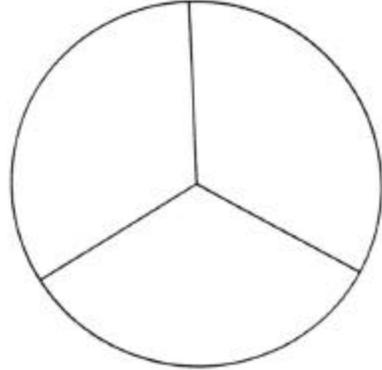
⇒ Give students a sheet of paper. They should still have their crayons.

Student Sheet 27 (Number: Lesson 9)

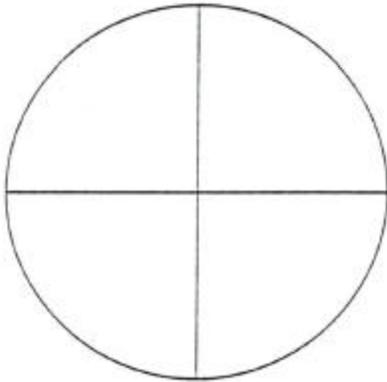
Pizza 1



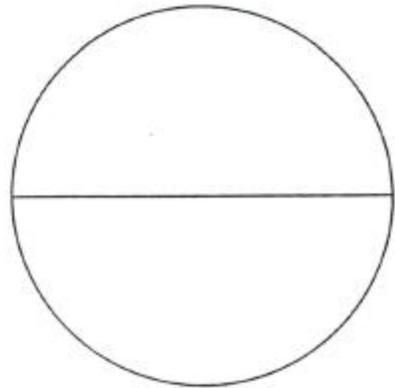
Pizza 2



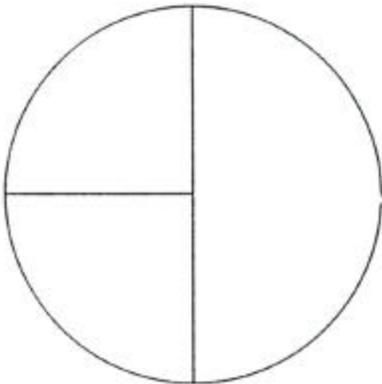
Pizza 3



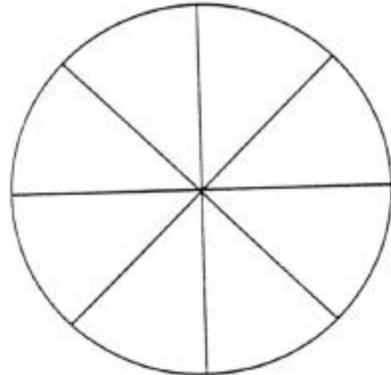
Pizza 4



Pizza 5



Pizza 6



Student Sheet 28 (Number: Lesson 9)

Power Bar 1

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Power Bar 2

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Power Bar 3

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Power Bar 4

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Power Bar 5

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Power Bar 6

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Power Bar 7

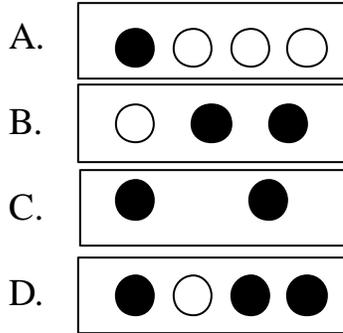
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Power Bar 8

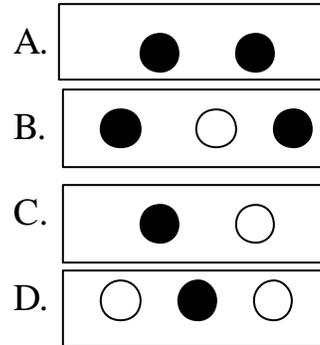
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Student Sheet 29 (Number: Lesson 9)

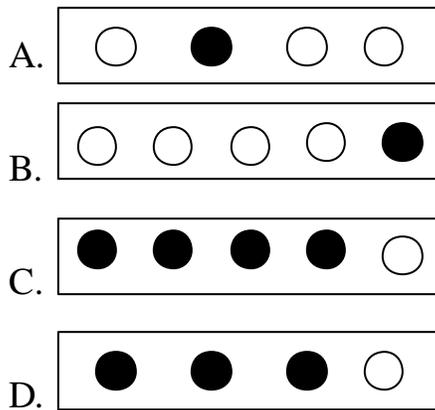
1. Find the picture in which $\frac{2}{3}$ of the circles have been shaded.



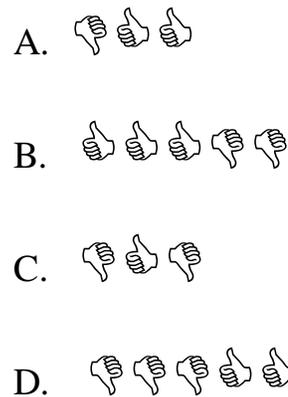
2. Find the picture in which of $\frac{1}{2}$ of the circles have been shaded.



3. Find the picture in which $\frac{1}{4}$ of the circles have been shaded.



4. Find the picture in which $\frac{2}{3}$ of the thumbs are up.



5. What part of the set is shaded? _____

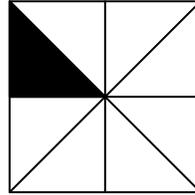


6. What part of the set of numbers are 5's? _____

2 3 5 1 6 5 7 5

Student Sheet 30 (Number: Lesson 9)

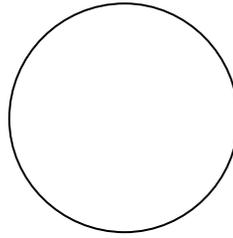
1. What part of the figure is shaded?



2. What part of the figure is shaded?



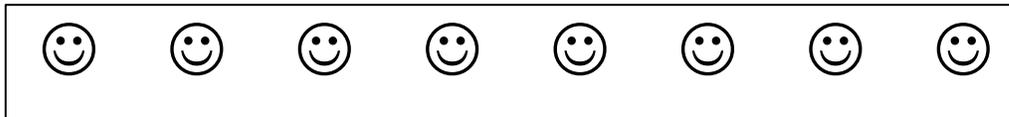
3. Shade in $\frac{1}{2}$ of the circle.



4. Shade in $\frac{1}{4}$ of the rectangle.



5. Shade in $\frac{3}{4}$ of the set of happy faces.



6. Shade in $\frac{1}{3}$ of the set of sad faces.

