


Grade 8 Mathematics

Number and Number Relations: Lesson 13

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 () by them.

Purpose of Lesson 13:

- In this lesson, the tutor and the students will
 - ✓ locate fractions, decimals, and percents on a number line; and
 - ✓ use number sense and estimation skills with fractions, decimals, and percents.

Equipment/Materials Needed:

- Copies of Student Sheets 86 and 87 for students
- Paper and pencils
- Chalkboard
- Blank sheets of paper for each student
- Scissors

Preparations before beginning Lesson 13:

- Run one copy of Student Sheets 86 and 87 for each student.
- Have paper and pencils available.
- Have blank sheets of paper available.
- Cut Student Sheet 86 into two parts.

Lesson 13: Number and Number Relations

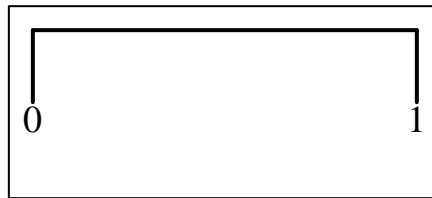
Say:

In this lesson, you will look at fractions, decimals, and percents on number lines. You will start with fractions. Let's look at a ruler from 0 to 1 and enlarge this section of the ruler.

🕒 Give students a blank sheet of paper. You need to demonstrate each step as your students' fold and label the paper.

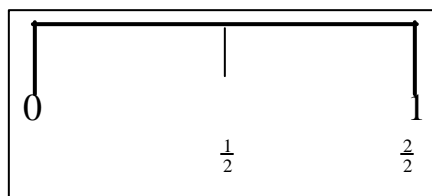
Say:

Turn your sheet of paper sideways. Draw a line across the top of the paper from end to end. Draw a line on each side of the paper that starts at the top line and runs about halfway down the page. Get as close to the edges as possible. Label the line on the left 0 and the line on the right 1.



Say:

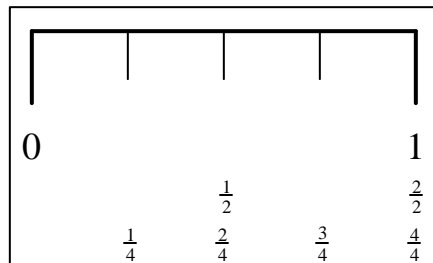
Fold the paper in half. You may need to show the students which way to fold. On the fold line, draw a line from the top line about half as long as the 0 and 1 lines. Ask questions, such as the following: When you folded the paper, how many pieces or parts were formed? (2) How far is it from the 0 line to the fold line? ($\frac{1}{2}$ unit) What number could you use to label the fold line? ($\frac{1}{2}$) How much farther is it to the 1 line? ($\frac{1}{2}$ unit more) How many halves are in one? (2) Let's label 1 as $\frac{2}{2}$ also.



⌚ Have the students fold the paper in half again.

Say:

On the new fold lines, draw a line from the top line about half as long as the $\frac{1}{2}$ line. Ask questions such as the following: When you folded the paper this time, how many pieces or parts were formed? (4) How far is it from the 0 line to the first fold? ($\frac{1}{4}$ unit) Let's label this line as $\frac{1}{4}$. Look at $\frac{1}{2}$. How far is it from 0 to the $\frac{1}{2}$ line in fourths? ($\frac{2}{4}$ units) Let's write $\frac{2}{4}$ under $\frac{1}{2}$. What should we label the third fold line? ($\frac{3}{4}$) How far is it from 0 to 1 in fourths? ($\frac{4}{4}$ units) How many fourths are in one? (4) How many fourths are in $\frac{1}{2}$? (2) Which is less $\frac{1}{4}$ or $\frac{3}{4}$? ($\frac{1}{4}$) Is $\frac{1}{4}$ closer to 0 or 1? (0)

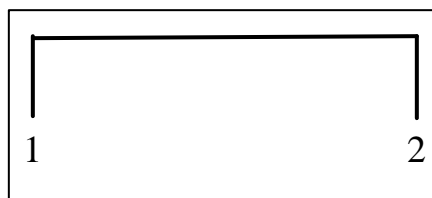


⌚ Have the students fold their papers in half again. Ask similar questions to the ones you asked for fourths. This time you will be working with 8^{ths}. Continue with another fold. This fold will give 16ths.

⌚ Set that paper aside. Give them a new blank sheet of paper.

Say:

We are now going to look at fractions and mixed numbers between one and two. Turn your sheet of paper sideways. Draw a line across the top of the paper from end to end. Draw a line on each side of the paper that starts at the top line and runs about halfway down the page. Get as close to the edges as possible. Label the line on the left 1 and the line on the right 2.



Say:

Fold your paper in half. Draw a line from the top line about half of the way of the one and two lines. How far is this line from 1? ($\frac{1}{2}$ unit) What could we label this line? ($1\frac{1}{2}$) Note: Do not accept $\frac{1}{2}$. How many halves are in one? (2) Label 1 as $\frac{2}{2}$. How many halves are in two? (4) Label 2 as $\frac{4}{2}$. Is there another way that you could label $1\frac{1}{2}$ using halves? ($\frac{3}{2}$) It may help to have the 0 to 1 ruler that students just made on their desks. They can then see that from 0 to $\frac{1}{2}$ is $\frac{1}{2}$ unit, from 0 to 1 is $\frac{2}{2}$ unit, so 0 to $1\frac{1}{2}$ would be $\frac{3}{2}$ units.

✎ Have the students fold the paper in half again. This time ask the same types of questions about 4^{ths} . Label fold lines as both mixed numbers and fractions greater than one. You may want to do 8^{ths} and 16^{ths} if you have time, but the main idea here is that $1\frac{1}{2}$ names the same amount as $\frac{3}{2}$.

Say:

Let's look at another fractional amount. Let's look at tenths. Folding into tenths would be much, much more difficult to do, so I will give you a paper that has been folded into tenths and labeled with marks.

✎ Give students Part A of Student Sheet 86.

Say:

Let's label the two end lines as 0 and 1. How many spaces are between 0 and 1? (10) Label each mark with a fraction. ($\frac{1}{10}, \frac{2}{10}, \frac{3}{10}, \frac{4}{10}, \frac{5}{10}, \frac{6}{10}, \frac{7}{10}, \frac{8}{10}, \frac{9}{10}$) Could you write 1 using tenths? ($\frac{10}{10}$) You could also use decimals to label the marks. $\frac{1}{10}$ could be labeled as 0.1. Label the rest of the marks using decimals. (0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1 or 1.0) Which is larger, 0.2 or 0.6? (0.6) Which is smaller, 0.1 or 1.0? (0.1)

Give students Part B of Student Sheet 86.

Say:

This ruler is just like the ruler in Part A except that there are marks between the tenths. Let's label 0 and 1 and all the tenths. How many spaces are between 0 and $1/10$? (10); between $1/10$ and $2/10$? (10); between 0 and 1? (100) This ruler is broken into hundredths. Now you can't label each one of the marks because you don't have room, but you can label some of them. How many hundredths are in $1/10$? (10 hundredths) You could also label $1/10$ as $10/100$. Label the rest of the tenths as hundredths. ($\frac{20}{100}, \frac{30}{100}, \frac{40}{100}, \frac{50}{100}, \frac{60}{100}, \frac{70}{100}, \frac{80}{100}, \frac{90}{100}, \frac{100}{100}$) Which number is halfway between 0 and 1? ($5/10$ or $50/100$) We could also call this mark $1/2$. One fourth is a special fraction in mathematics. We use it quite often. See whether you can find approximately where $1/4$ would be found on this ruler. Let them try folding. It should be halfway between $20/100$ and $30/100$ and is, in fact, $25/100$. Do the same thing with $3/4$. (0.75) If you feel that the students are having problems with finding decimals, give them other fractions to locate on the ruler.

Say:

There is another way to label numbers whose denominators are 100. The ruler has been broken into 100 parts. The word *percent* means parts per hundred. The sign “%” is used to show percents. 0 is written as 0% and 1 is written as 100%. 0.25 means $\frac{25}{100}$, so 0.25 would be written as 25%. How would you write 0.50 as a percent? (50%) How would you write 0.75 as a percent? (75%) Label the following percents on the ruler: 0%, 10%, 25%, 60%, 75%, and 100%.

Give students Student Sheet 87.

Answers:

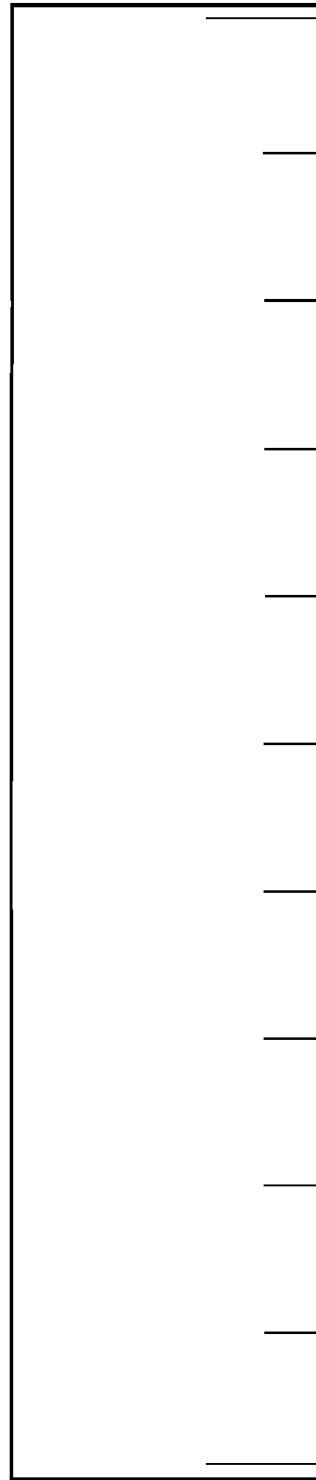
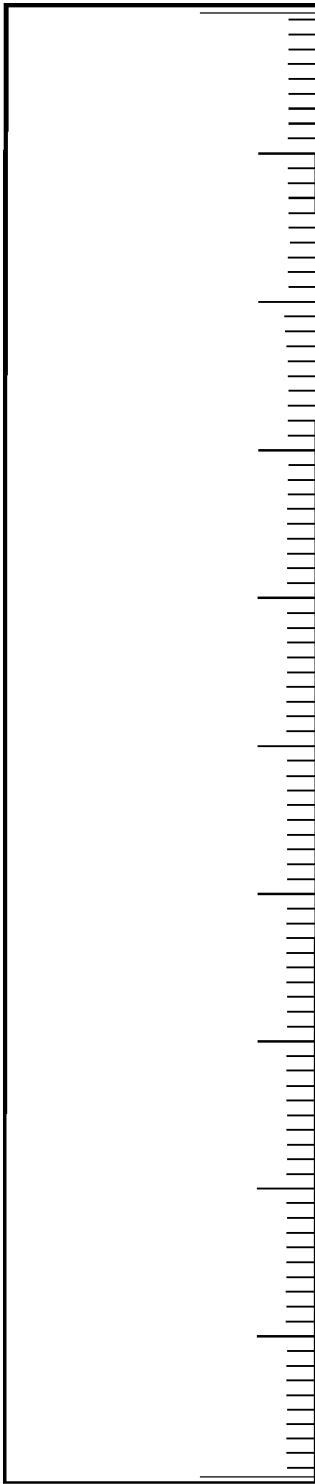
- | | | | |
|----------------------|-----------|------------|---------|
| 1. $1/8$ cup of milk | 2. Monday | 3. 0.7 lb. | 4. 0.25 |
| 5. $3/4$ | 6. Less | 7. $1/3$ | 8. Yes |
| 9. 15% | 10. 14% | | |

Have one student summarize today's lesson. Visualizing a number line can help you compare fractions, decimals, and percents.

Student Sheet 86 (Number Relations: Lesson 13)

Part B

Part A



Student Sheet 87 (Number Relations: Lesson 13)

Answer the following questions. Think about your number lines as you answer the questions.

1. Debra was making a cake. She had four recipes in front of her. One recipe called for $\frac{1}{2}$ cup of milk, one called for $\frac{3}{4}$ cup of milk, one called for $\frac{1}{3}$ cup of milk, and the last one called for $\frac{1}{8}$ cup of milk. Which recipe needed the least amount of milk?
2. After a hurricane a few years ago, many students were absent from school. In Ms. Evans' class on Monday, $\frac{1}{2}$ of the students were absent. On Tuesday, $\frac{1}{3}$ were absent. On Wednesday, $\frac{1}{8}$ were absent, and on Thursday, $\frac{1}{6}$ were absent. On which day were the most students absent?
3. Arthur's mother asked him to buy ground beef for dinner. He looked at two packages. One was labeled 0.7 pound and one was labeled as 0.65 pound. Which package contained the most ground beef?
4. Edith ordered a quarter-pound hamburger. There is $\frac{1}{4}$ pound of meat in the burger. How would $\frac{1}{4}$ be written as a decimal?
5. Dottie's temperature went up 0.75 of a degree. How would this amount be written as a fraction?
6. The average person in the United States eats 0.5 lbs. of cheese each week. Is this amount more or less than $\frac{3}{4}$ pound of cheese?
7. Shoes are marked $33\frac{1}{3}\%$ off. What is this amount as a fraction?
8. It took Jude 38 minutes to finish the test. Is 38 minutes more than 50% of an hour?
9. Eighty-five of 100 students passed the test. What percentage of the students failed the test?
10. Seven of 50 students said their favorite meal was pizza. What percentage of the students chose pizza?