Parent/Student Resource Packet
Fraction Unit

Unit Summary: In this unit, students will develop an understanding of fractions, beginning with unit fractions (fractions with a 1 as the numerator). Students will view fractions in general as being built out of unit fractions, and they will use written fractions, along with visual fraction models, to represent parts of a whole. Students will understand that the size of a fractional part is relative to the size of the whole. For example, ½ of the paint in a small bucket could be less paint than 1/3 of the paint in a larger bucket, but 1/3 of ribbon is longer than 1/5 of the same ribbon because when the ribbon is divided into 3 equal parts, the parts are longer than when the ribbon is divided into 5 equal parts. Students will use fractions to represent numbers equal to, less than, and greater than one. They solve problems that involve comparing fractions by using visual fraction models and strategies based on noticing equal numerators or denominators. The grade 3 expectations limit fractions to those with denominators of 2,3,4,6, and 8. Also fraction models in third grade include area (parts of a whole) models and number lines.

Students will know and be able to:

- Identify, model, understand, and use vocabulary such as numerator/denominator, and shaded/unshaded.
- Model the partitioning or splitting of an object into equal parts (Include "parts of a whole" models with circle, rectangles, squares, and number lines).
- Understand and explain that a fraction is made up (composed) of many pieces of a "unit fraction", which has a numerator of 1. (Ex: The fraction 3/5 is composed of 3 pieces that each has a size of 1/5).
- Work with a number line to represent numbers in between whole numbers (Ex: between 0 and 1).
- Divide a number line between 0 and 1 into equal segments (i.e. ¼) and determine that each segment is equal in length. Similarly, determine the distance of segments (Ex: 3 segments from 0 to 1 = ¾).
- Use visual fraction models (area models) and number lines to explore the idea of equivalent fractions. (Students should only

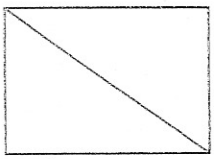
explore equivalent fractions using models, rather than using algorithms or procedures). Students should recognize and generate simple equivalent fractions, for example – 1/2=2/4 or 4/6=2/3.

- Write whole numbers as fractions. (this relates to fractions as division problems where the fraction 3/1 is 3 wholes divided into one group. Students must develop an understanding of a/1. (Ex: If 6 brownies were divided by 2 people than 6/2 represents how to solve how many each person would get).
- Understand the a/a is equal to 1. (Be able to locate 4/4 and 1 at the same point on a number line).
- Compare two fractions <u>with the same numerator or the same denominator</u>, with or without visual fraction models, including number lines. (Ex: Encourage students to compare and reason about the size of pieces, and consider the fact that 1/3 of a piece of cake is larger than ¼ of the <u>same</u> cake. When the same (whole) cake is split into equal pieces, thirds are larger than fourths.
- Reason that when comparing fractions it is only valid if the wholes are identical in size. (Ex: ½ of a large pizza is different than ½ of a small pizza). Students should be given opportunities to discuss and reason about which ½ is larger.

Vocabulary: partition, numerator, denominator, equal fraction, fractional, shaded, unshaded, whole, equivalent, half, third, fourths, fifths, sixths, eighths, tenths, compare, group, number line, unit fraction

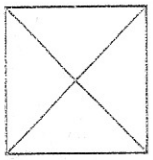
Equal Parts of a Whole

A whole can be divided into equal parts in different ways.

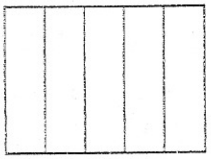


2 equal parts
halves

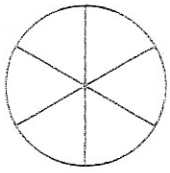
3 equal parts
thirds



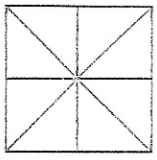
4 equal parts
fourths



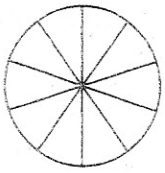
5 equal parts
fifths



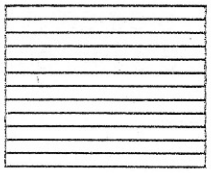
6 equal parts
sixths



8 equal parts
eighths



10 equal parts
tenths



12 equal parts
twelfths

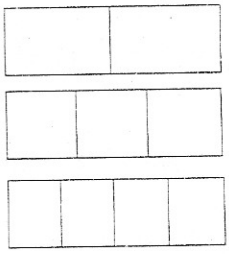
Equal Parts of a Whole

When you divide a shape into **equal parts**, each part must be exactly the same size.

This rectangle is divided into 2 equal parts, or **halves**.

This rectangle is divided into 3 equal parts, or **thirds**.

This rectangle is divided into 4 equal parts, or **fourths**.



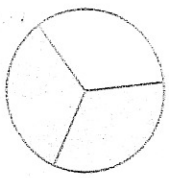
Naming Fractional Parts

You can write a fraction to describe the equal parts of a whole. The bottom part of the fraction is called the **denominator**. It tells how many equal parts the whole is divided into.

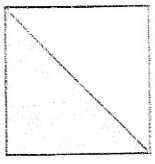
There are 5 equal parts. One is shaded.

$\frac{1}{5}$ ← Numerator
← Denominator

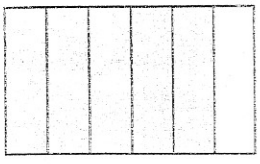
The top part of the fraction is called the **numerator**. It tells how many of the equal parts of the whole are specified.



$\frac{2}{3}$ of the circle is shaded.



$\frac{1}{2}$ of the square is shaded.

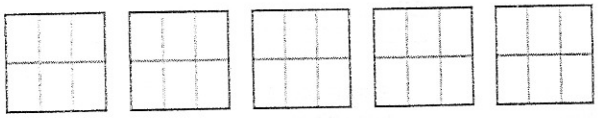


$\frac{5}{6}$ of the rectangle is shaded.

Six brothers share 5 sandwiches equally. How much does each brother get? Draw to model the problem.

Step 1 Draw 5 squares for the sandwiches.

Step 2 There are 6 brothers. Draw lines to divide each sandwich into 6 equal parts.



Step 3 Each brother will get 1 equal part from each sandwich.

So, each brother gets 5 sixths of a sandwich.

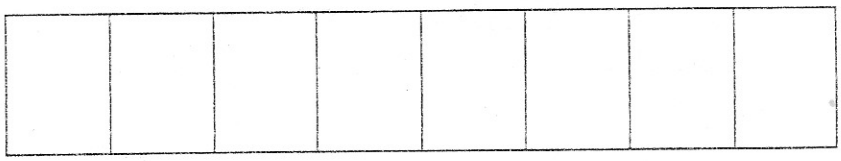
Unit Fractions of a Whole

A **fraction** is a number. It names part of a whole or part of a group.

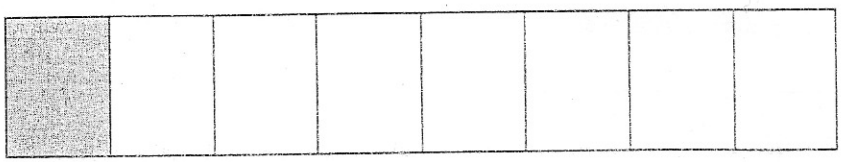
The top number tells how many equal parts are being counted.
The bottom number tells how many equal parts are in the whole.
A **unit fraction** names 1 equal part of a whole. It always has 1 as its top number.

How much is 1 part of a fruit bar that is cut into 8 equal parts?

Step 1 Use fraction strips. Make a strip showing 8 equal parts, or eighths.



Step 2 Shade 1 of the parts and name it.



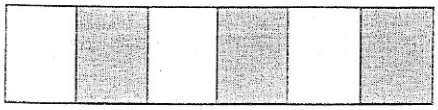
This fraction is called $\frac{1}{8}$.

So, 1 part of a fruit bar that can be divided into 8 equal parts is $\frac{1}{8}$.

Fractions of a Whole

Some shapes can be cut into equal parts.
A fraction can name more than 1 equal part of a whole.

Write a fraction in words and in numbers to name the shaded part.



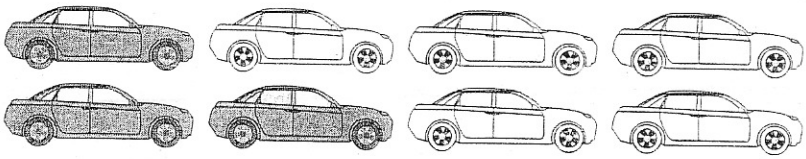
How many equal parts make up the whole shape? 6 equal parts

How many parts are shaded? 3 parts

So, 3 parts out of 6 equal parts are shaded. Read: three sixths. Write: $\frac{3}{6}$

Fractions of a Group

Adam has a collection of cars.
What fraction names the shaded part of the collection?



Step 1 Count how many cars are shaded. There are 3 shaded cars.
This number will be the numerator, or the top number of the fraction.

Step 2 Count the total number of cars. 8 This number will be the denominator, or the bottom number of the fraction.

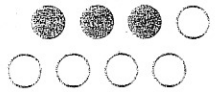
Step 3 Read the fraction: three eighths, or three out of eight.

So, $\frac{3}{8}$ of Adam's cars are shaded.

Fractions and Sets

When a group of individual items is collected into a whole, you can use a fraction to name a part of the group.

What fraction of the marbles are black?

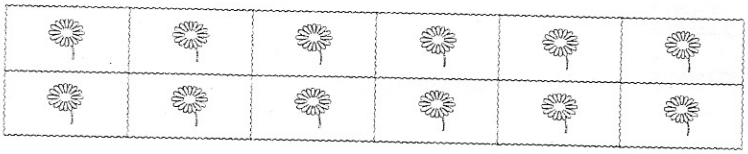


$\frac{3}{8}$ ← Number of black marbles
$\frac{3}{8}$ ← Total number of marbles

$\frac{3}{8}$ of the marbles are black.

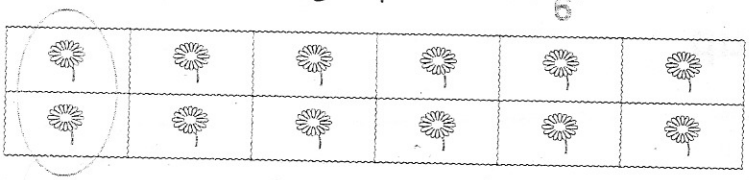
Find Part of a Group Using Unit Fractions

Lauren bought 12 stamps for postcards. She gave Brianna $\frac{1}{6}$ of them. How many stamps did Lauren give to Brianna?



Step 1 Find the total number of stamps. 12 stamps

Step 2 Since you want to find $\frac{1}{6}$ of the group, there should be 6 equal groups. Circle one of the groups to show $\frac{1}{6}$.



Step 3 Find $\frac{1}{6}$ of the stamps. How many stamps are in 1 group? 2 stamps

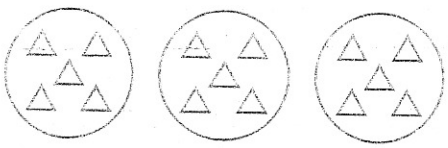
So, Lauren gave Brianna 2 stamps. $\frac{1}{6}$ of 12 = 2

Finding Fractional Parts of a Set

How to divide to find a fraction of a set:

Find $\frac{1}{3}$ of 15 triangles.

First, divide the 15 triangles into 3 equal groups.

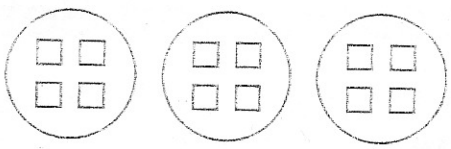


15 ÷ 3 = 5

So, $\frac{1}{3}$ of 15 = 5.

Find $\frac{1}{3}$ of 12 squares.

First, divide the 12 squares into 3 equal groups.



12 ÷ 3 = 4

So, $\frac{1}{3}$ of 12 = 4.

Problem Solving • Find the Whole Group Using Unit Fractions

There are 3 apple juice boxes in the cooler. One fourth of the juice boxes in the cooler are apple juice. How many juice boxes are in the cooler?

Read the Problem	Solve the Problem
What do I need to find? I need to find how many juice boxes are in the cooler.	**Describe how to draw a diagram to solve.** The denominator in $\frac{1}{4}$ tells you that there are 4 parts in the whole group. Draw 4 circles to show 4 parts. Since 3 juice boxes are $\frac{1}{4}$ of the group, draw 3 counters in the first circle. Since there are 3 counters in the first circle, draw 3 counters in each of the remaining circles. Then count all of the counters. So, there are 12 juice boxes in the cooler.
What information do I need to use? There are 3 apple juice boxes. One fourth of the juice boxes are apple juice.	
How will I use the information? I will use the information in the problem to draw a diagram.	

Fractions on a Number Line

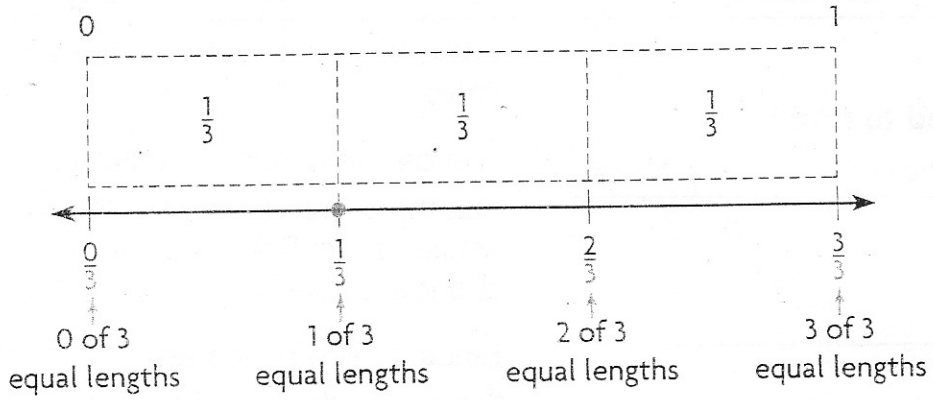
Use the fraction strips to help name the points on the number line.

Draw a point to show $\frac{1}{3}$.

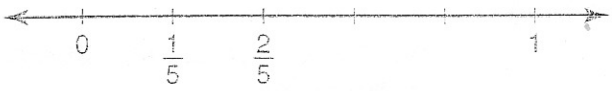
Step 1 The denominator is 3, so use fraction strips for thirds. Place the fraction strips above the number line. Use the fraction strips to divide the number line into three equal lengths.

Step 2 Label each mark on the number line.
Think: The distance between each mark is $\frac{1}{3}$ of the total distance, so count the number of $\frac{1}{3}$ lengths.

Step 3 Draw a point on the number line to show $\frac{1}{3}$.



Fractions on the Number Line



Here is the number line for a denominator of 5, or fifths.

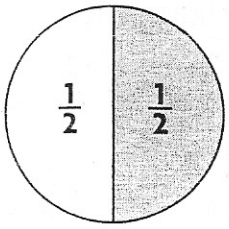
The next two fractions would be $\frac{3}{5}$ and $\frac{4}{5}$.

Model Equivalent Fractions

Equivalent fractions are two or more fractions that name the same amount.

You can use fraction circles to model equivalent fractions.

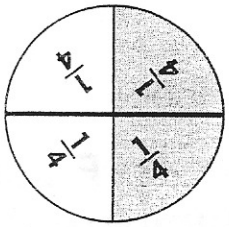
Find a fraction that is equivalent to $\frac{1}{2}$. $\frac{1}{2} = \frac{\square}{4}$



Step 1 Look at the first circle. It is divided into 2 equal parts. Shade one part to show $\frac{1}{2}$.

Step 2 Draw a line to divide the circle into 4 equal parts because 4 is the denominator in the second fraction.

Step 3 Count the number of parts shaded now. There are 2 parts out of 4 parts shaded.



$\frac{1}{2} = \frac{2}{4}$ So, $\frac{1}{2}$ is equivalent to $\frac{2}{4}$.

Equivalent Fractions

Kaitlyn used $\frac{3}{4}$ of a sheet of wrapping paper.

Find a fraction that is equivalent to $\frac{3}{4}$. $\frac{3}{4} = \frac{\square}{8}$

Step 1 The top fraction strip is divided into 4 equal parts. Shade $\frac{3}{4}$ of the strip to show how much paper Kaitlyn used.

$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$

Step 2 The bottom strip is divided into 8 equal parts. Shade parts of the strip until the same amount is shaded as in the top strip.
6 parts of the bottom strip are shaded.

$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

$\frac{3}{4} = \frac{6}{8}$

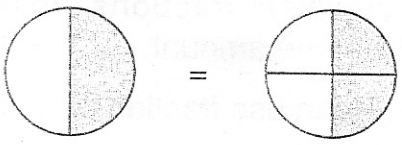
So, $\frac{6}{8}$ is equivalent to $\frac{3}{4}$.

Equivalent Fractions

Figure A has 1 out of 2 parts shaded.
The fraction which is shaded is $\frac{1}{2}$.

Figure B has 2 out of 4 parts shaded.
The fraction which is shaded is $\frac{2}{4}$.

Figure A = Figure B



Both figures have the same amount shaded. This means that the fractions $\frac{1}{2}$ and $\frac{2}{4}$ are equivalent. They both state that half of the figure is shaded.

So, $\frac{2}{4} = \frac{1}{2}$.

Relate Fractions and Whole Numbers

A **fraction greater than 1** has a numerator greater than its denominator.

Jason ran 2 miles and Tyra ran $\frac{6}{3}$ miles. Did Jason and Tyra run the same distance?

Step 1 Use fraction strips to show the distances.
Use 2 whole strips to show Jason's distance.
Use six $\frac{1}{3}$-strips to show Tyra's distance.

Jason	1			1		
Tyra	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$

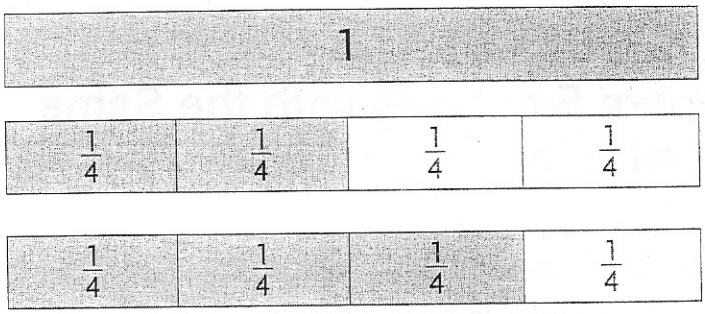
$1 = \frac{3}{3}$ $2 = \frac{6}{3}$

Step 2 Compare the fraction strips.
Since the fraction strips for 2 and $\frac{6}{3}$ are the same length, they are equal.

So, Jason and Tyra ran the same distance.

Problem Solving • Compare Fractions

Nick walked $\frac{2}{4}$ mile to the gym. Then he walked $\frac{3}{4}$ mile to the store. Which distance is shorter?

Read the Problem	Solve the Problem
What do I need to find? I need to find which distance is shorter.	
What information do I need to use? Nick walked $\frac{2}{4}$ mile to the gym. Then he walked $\frac{3}{4}$ mile to the store.	**Compare the lengths.** $\frac{2}{4} < \frac{3}{4}$ The length of the $\frac{2}{4}$ model is less than the length of the $\frac{3}{4}$ model. So, the distance to the gym is shorter.
How will I use the information? I will use fraction strips and compare the lengths of the models to find which distance is shorter.	

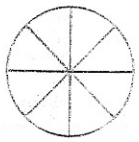
Comparing and Ordering Fractions

Compare $\frac{1}{3}$ and $\frac{4}{8}$.

Figure A

$\frac{1}{3}$

Figure B

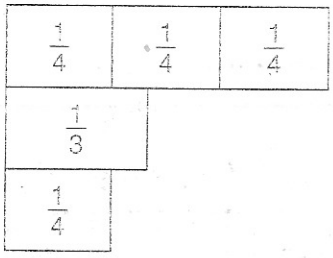


$\frac{4}{8}$

Both figures are the same size. One has been divided into thirds, and the other has been divided into eighths. You can see that more of Figure B, $\frac{4}{8}$, is shaded than Figure A, $\frac{1}{3}$. So $\frac{4}{8}$ is greater than $\frac{1}{3}$.

$\frac{4}{8} > \frac{1}{3}$

Order $\frac{1}{4}$, $\frac{1}{3}$, and $\frac{3}{4}$ from greatest to least.



$\frac{3}{4} > \frac{1}{3}$

$\frac{1}{3} > \frac{1}{4}$

So, the fractions in order from greatest to least are $\frac{3}{4}$, $\frac{1}{3}$, $\frac{1}{4}$.

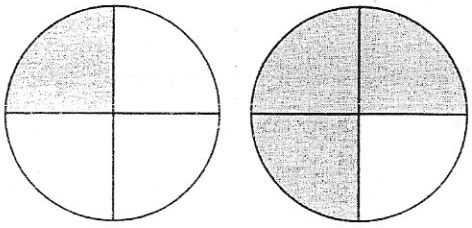
Compare Fractions with the Same Denominator

Pete's Prize Pizzas makes a special pizza. Of the toppings, $\frac{1}{4}$ is peppers and $\frac{3}{4}$ is ham. Does the pizza have more peppers or ham?

Compare $\frac{1}{4}$ and $\frac{3}{4}$.

Step 1 The denominators of both fractions are the same, 4. Use fraction circles divided into fourths to model the fractions.

Step 2 Shade 1 part of the first circle to show $\frac{1}{4}$. Shade 3 parts of the second circle to show $\frac{3}{4}$.



Step 3 Compare. 3 parts is more than 1 part.

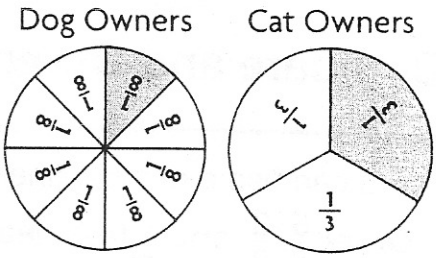
$\frac{3}{4} > \frac{1}{4}$

So, the pizza has more **ham**.

Compare Fractions with the Same Numerator

Ryan takes a survey of his class. $\frac{1}{8}$ of the class has dogs, and $\frac{1}{3}$ of the class has cats. Are there more dog owners or cat owners in Ryan's class?

Compare the fractions. $\frac{1}{8} \bullet \frac{1}{3}$



Step 1 Divide the first circle into 8 equal parts. Shade $\frac{1}{8}$ of the circle to show dog owners.

Step 2 Divide the second circle into 3 equal parts. Shade $\frac{1}{3}$ of the circle to show cat owners.

Step 3 Compare the shaded parts of the circles. Which shaded part is larger?

$\frac{1}{3}$ **is larger than** $\frac{1}{8}$. $\frac{1}{8} < \frac{1}{3}$

So, there are more **cat owners** than **dog owners** in Ryan's class.

Compare Fractions

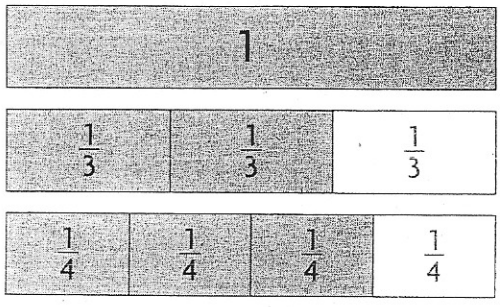
Mrs. Brown's recipe uses $\frac{2}{3}$ cup of flour. Mrs. Young's recipe uses $\frac{3}{4}$ cup of flour. Which recipe uses more flour?

Compare $\frac{2}{3}$ and $\frac{3}{4}$.

- You can compare fractions using fraction strips.

Step 1 Model each fraction.

Step 2 Compare the lengths of the models. The length of the $\frac{3}{4}$ model is greater than the length of the $\frac{2}{3}$ model.



$\frac{3}{4} > \frac{2}{3}$

So, Mrs. Young's recipe uses more flour.

Compare $\frac{3}{6}$ and $\frac{4}{6}$. Which is greater?

- The denominators are the same, so compare the numerators.

$3 < 4$, so $\frac{3}{6} < \frac{4}{6}$.

So, $\frac{4}{6}$ is greater than $\frac{3}{6}$. $\frac{4}{6} > \frac{3}{6}$

Compare and Order Fractions

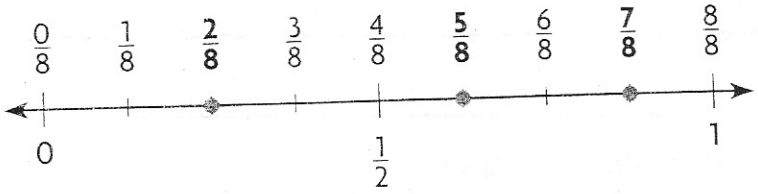
You can use a number line to compare and order fractions.

Order $\frac{5}{8}$, $\frac{2}{8}$, and $\frac{7}{8}$ from least to greatest.

Since you are comparing eighths, use a number line divided into eighths.

Step 1 Draw a point on the number line to show $\frac{5}{8}$.

Step 2 Repeat for $\frac{2}{8}$ and $\frac{7}{8}$.



Step 3 Fractions increase in size as you move right on the number line. Write the fractions in order from left to right.

So, the order from least to greatest is $\frac{2}{8}$, $\frac{5}{8}$, $\frac{7}{8}$.