Grade Level/Course: 3

Lesson/Unit Plan Name: Fractions Greater than One Whole

Rationale/Lesson Abstract: Students apply understanding of unit fractions, equivalent forms of 1, and number lines. They draw models of improper fractions that are between whole numbers, (without necessarily naming them as "improper"), and move to number lines. *It is assumed that students have had experience generating bar models and number lines for fractions less than 1 whole and for fractions equivalent to whole numbers.

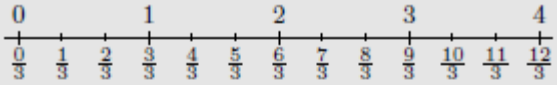
Timeframe: 5 -6 Days

Common Core Standard(s): 3.NF.2b

Below is a an excerpt from the Progressions for the Common Core Standards in Mathematics (draft) written by the Common Core Writing Team in 2013.

*This lesson includes work with concrete models. Teachers are encouraged to adapt the lesson to their students' needs.

The number line marked off in thirds

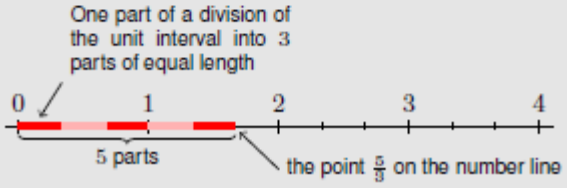


3.NF.2 Understand a fraction as a number on the number line; represent fractions on a number line diagram.

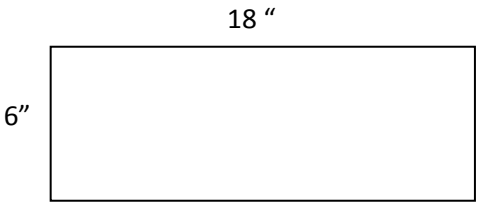
a. Represent a fraction $1/b$ on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size $1/b$ and that the endpoint of the part based at 0 locates the number $1/b$ on the number line.

b. Represent a fraction a/b on a number line diagram by marking off a lengths $1/b$ from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line.

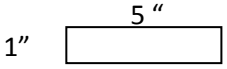
Number line representation of $\frac{5}{3}$



Instructional Resources/Materials:



paper to draw number lines (about 2 pieces per person)



fractions strips for models (about 12 per person)

You will also need: notebook paper, pencils, rulers, crayons, and glue.

Activity/Lesson:

Make Models of Greater Fractions Using Fraction Strips (1 Day)

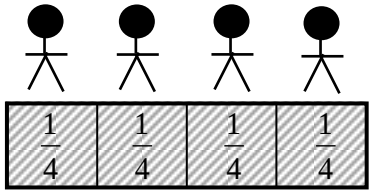
Start with a story:

Five friends are having pizza for lunch. They each get

1 fourth of a pizza. How many pizzas do they need?

(Draw these models on the board as you coach students through the process.)

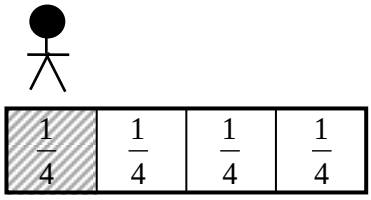
We start with one pizza and partition it into fourths. This particular pizza is shaped like a rectangle, which is unusual. Are you okay with that? (Yes!) How many people will get a piece? (4) That makes sense because there are 4 fourths in 1 whole.



We need a piece for one more person. How will we get the fifth piece? (Get another pizza.)

Let's partition the second pizza into fourths. We can take one of those pieces for the fifth person.

Now all 5 friends are fed!



So…they needed 2 pizzas, but they did not eat all of them.

What fraction tells us how much pizza they ate? Think. Thumbs up if you know. Whisper to your neighbor. Everyone tell me. (5 fourths)

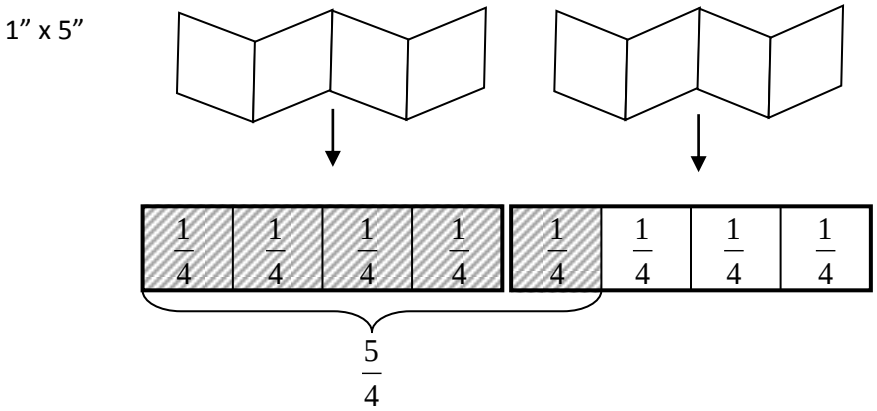
Yes, that's correct. Let's count the fourths. 1 fourth, 2 fourths, …5 fourths.

$$\frac{1}{4}+\frac{1}{4}+\frac{1}{4}+\frac{1}{4}+\frac{1}{4}=\frac{5}{4}$$

How many pieces are left over? (3) So, 3 fourths of a pizza is left. Maybe 3 more friends will come by!

We Do: 5 fourths or $\frac{5}{4}$

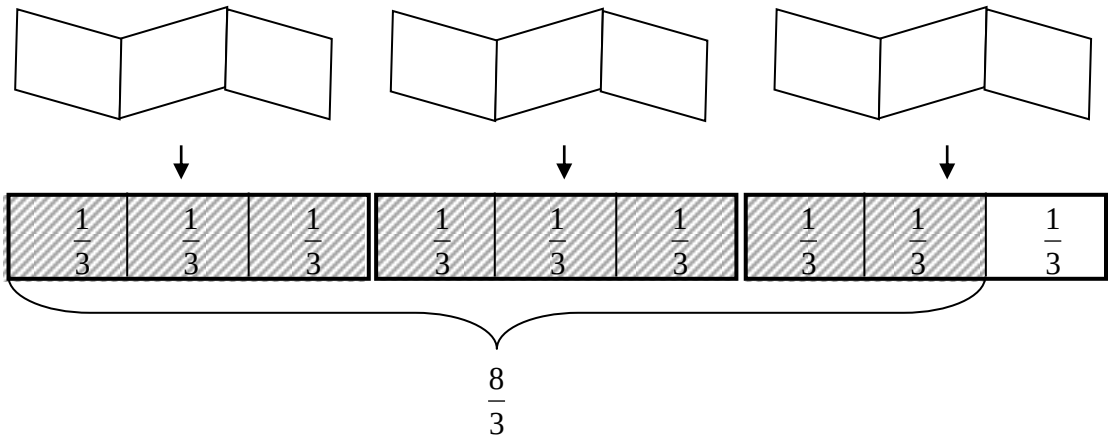
Now let's make a model of 5 fourths using these fractions strips. Let's start with 1 whole and fold it into fourths. Now we have 4 fourths. That's not enough. What did we do in the story? (Get a second whole.) Okay. Get another whole and fold it into fourths. Now we have 8 fourths. That's more than enough. Label each fourth and shade in 5 of the fourths.



(Tape yours to the board and label "5 fourths or $\frac{5}{4}$".) (Students put their models to the side.)

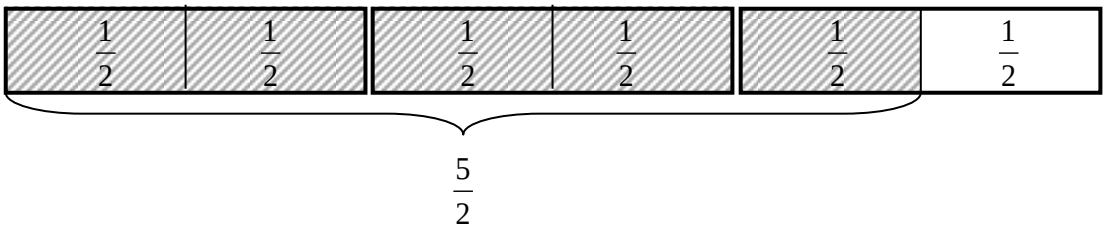
We Do: 8 thirds or $\frac{8}{3}$ (For this example, students move toward independence.)

Let's try 8 thirds. How many thirds are in 1 whole? (3) How many wholes do you think we'll need? Think. Share. Show me on your fingers how many wholes you'll need. (Take a quiet hand to share reasoning.) Okay, fold 3 wholes into thirds. Now we have 9 thirds, which is more than enough. What do we do now? Think. Share with your neighbor. (Choose a student to share. Be sure students know what to do. They can also look back at their last example.)

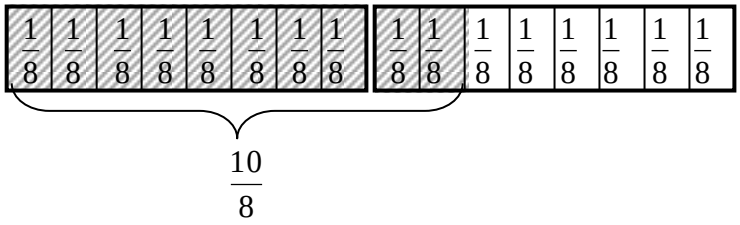


(Tape and label this example and the you tries to the board as well.)

You Try: 5 halves or $\frac{5}{2}$



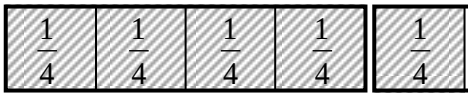
You Try: 10 eighths or $\frac{10}{8}$



*Students will use these strips to make number lines. If you spill over into the next day, be sure they have them in a safe place.

Follow Up Comparison:

What is the same about $\frac{5}{2}$ and $\frac{5}{4}$? What is different?



It may be helpful to cut off or fold back the extra units, so students can more clearly see the length of each fraction. If you do, you will need to unfold (or tape back together) the fraction strips for the next part of the lesson.

If students are having trouble coming up with ideas…

How many pieces in 5 halves? (5) How many pieces in 5 fourths?(5)

So we can say that they both have 5 pieces.

Is 5 halves greater than 1 whole? (yes) Is 5 fourths greater than 1 whole? (yes)

So we can say they are both greater than 1 whole.

Which fraction is greater? (5 halves) Why? They both have 5 pieces. (The halves are bigger.)

So we can say that 5 halves is greater than 5 fourths because the pieces are bigger.

Draw Number Lines Using the Models as Templates (1 Day)

Students use the models they just made to make number lines.

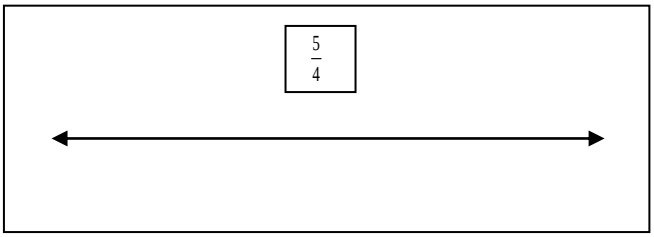
I Do/We Do: 5 fourths

(This can be demonstrated first using larger fraction strips on the board. Then the students can do it along with you the second time around; or students can follow along with the teacher the first time around.)

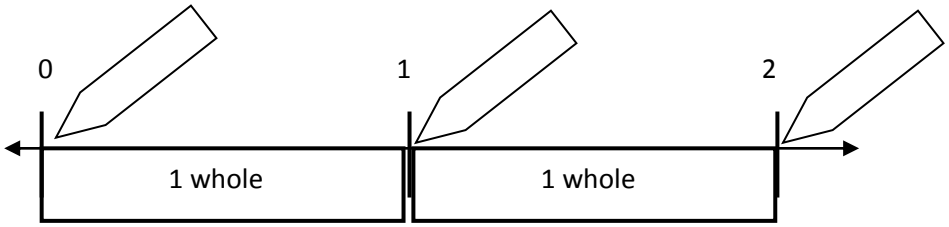
We are going to make number lines to match our fraction strips. We'll start with 5 fourths. We need a long number line because we have more than 1 whole. On your paper, draw a number line almost all the way across the page (like mine.)

Students will use the

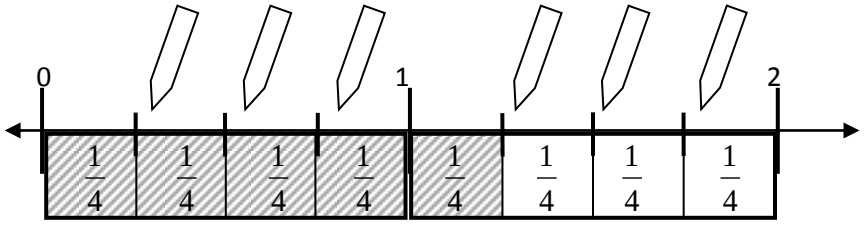
6 " x 18 " paper for this.



(Use a blank fraction strip to mark off each whole.) When we made 5 fourths, we used 2 wholes, so let's mark off 2 wholes on the number line.

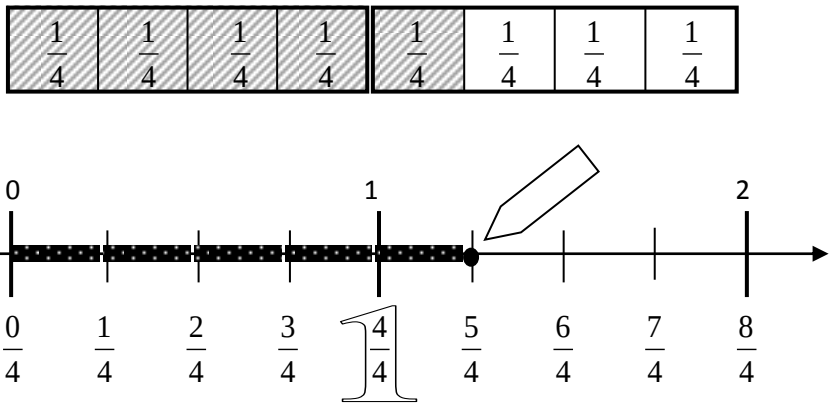


Now we can use the fraction strips we made earlier to mark of all the fourths.



Now we can label the fourths on the number line. One fourth, 2 fourths, 3 fourths….8 fourths.

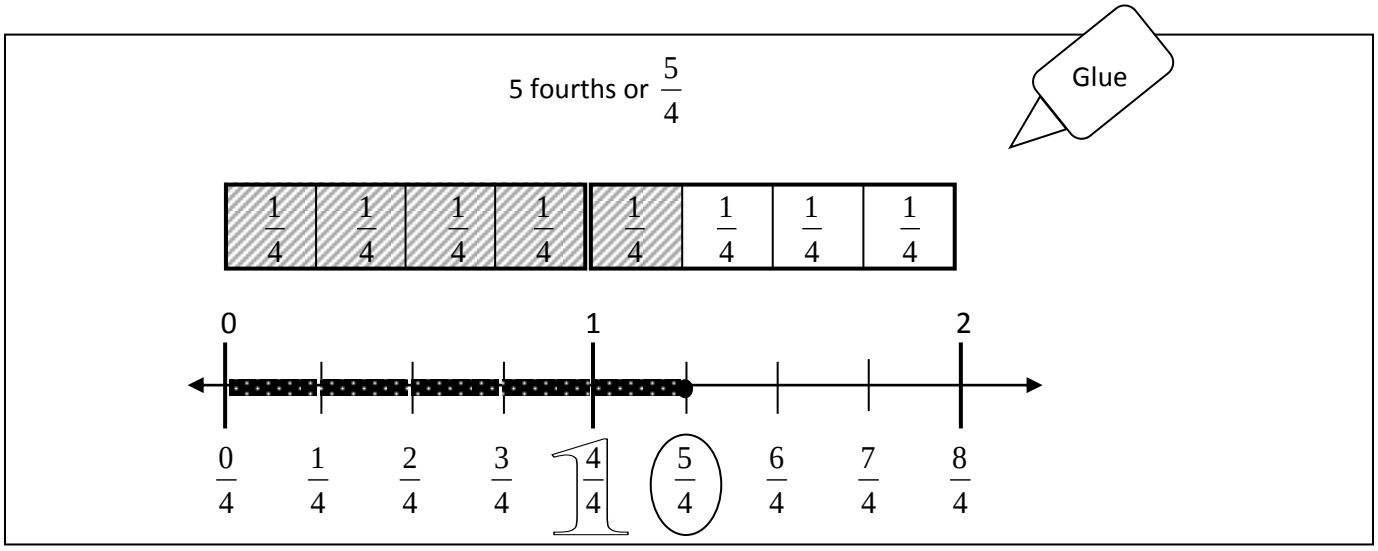
I can also show the 5 jumps on my number line and plot a point at 5 fourths to match my model.



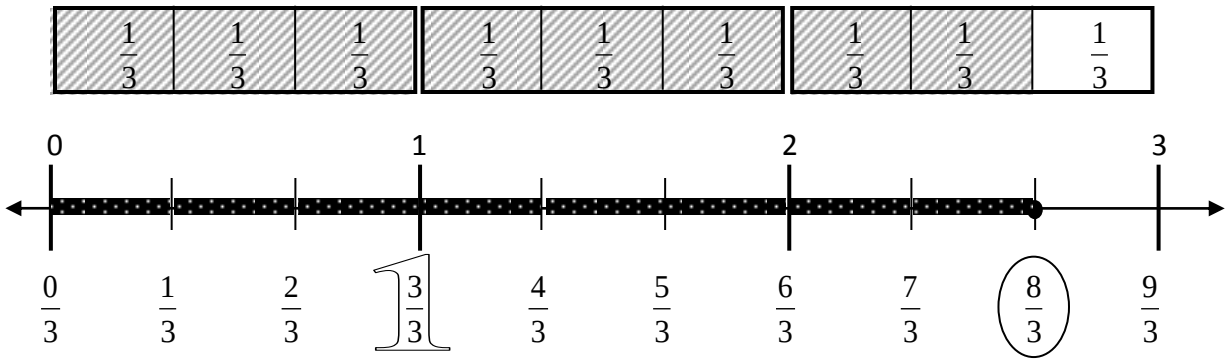
Students can also color each individual unit like the second example in the Progressions documents. (See cover page of lesson.)

Teacher sample and student work may look like this:

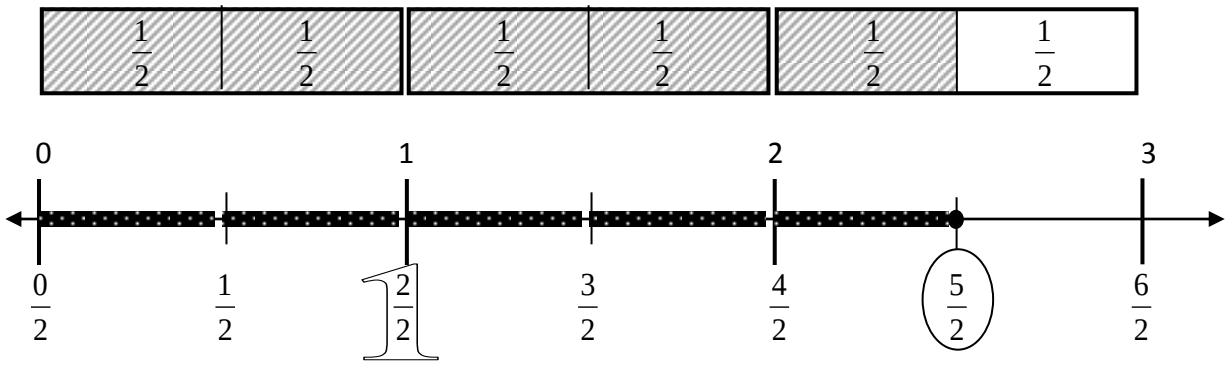
Students glue the strips to the paper near the number line.



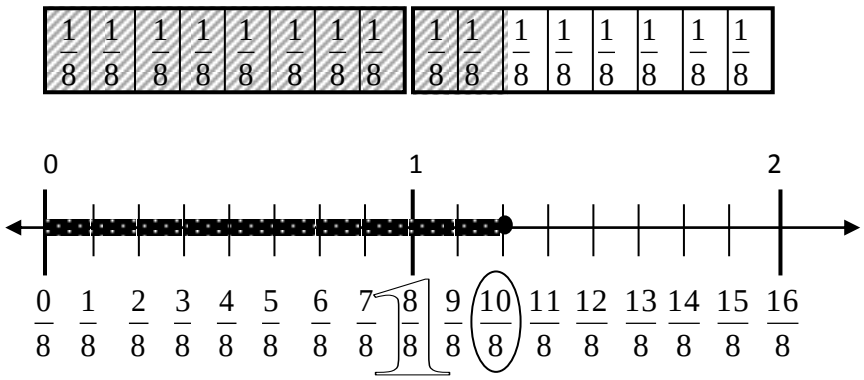
We Do: $\frac{8}{3}$ (In this example, have students walk you through the process to insure that they understand the task. Examples of teacher questions: How many wholes do we have? How do we mark off each whole? How do we mark off each third?)



You try: $\frac{5}{2}$



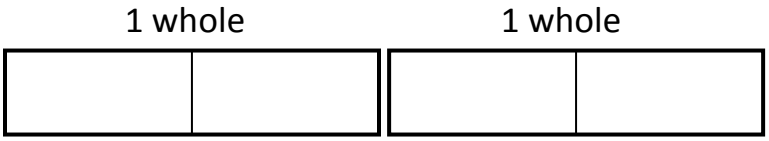
You try: $\frac{10}{8}$



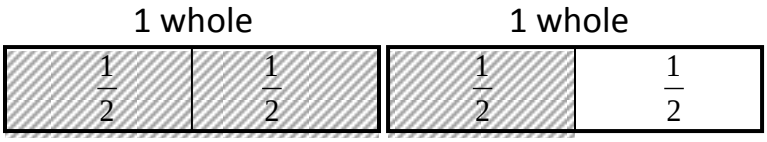
Draw Models and Number Lines for Greater Fractions –(2 Days)

We Do: 3 halves or $\frac{3}{2}$

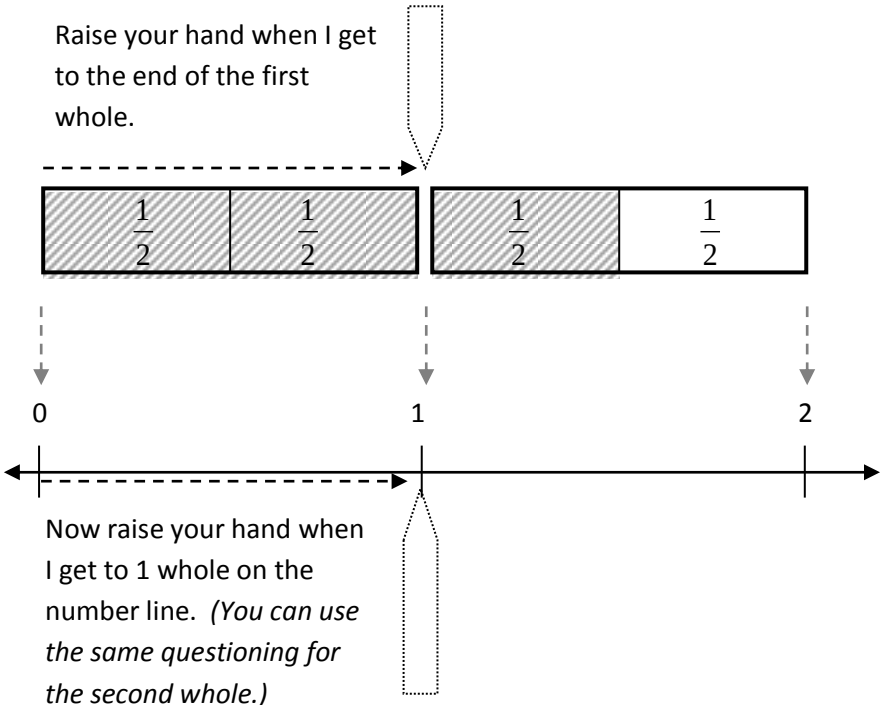
How many wholes do you think we will need? (Take predictions.) Let's draw the first whole and divide it into halves. Then draw the second whole right next to the first whole. Leave a little space in between each whole.



Label the halves and shade in 3 halves.

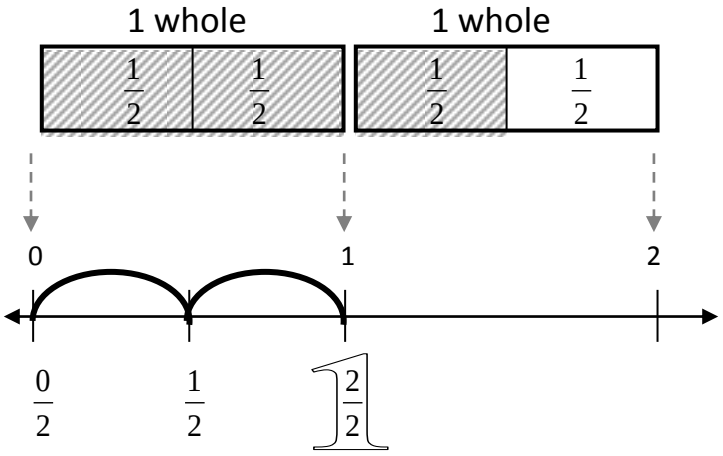


Now draw a number line all the way across the page. Mark off 0, 1, and 2 wholes. Use the model drawing to help you find where to mark off each whole.

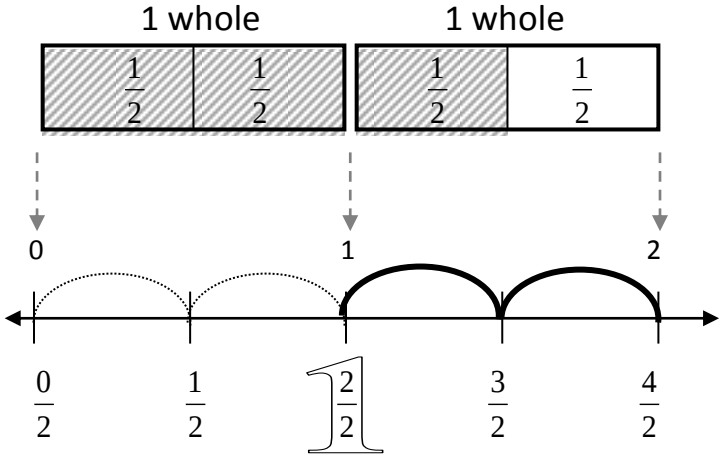


Now mark off each half on your number line. You can use the model drawing to help you.

I know from my drawing that each whole is partitioned into 2 halves, so I can partition each whole on my number line into 2 halves. Let's start with the first whole.



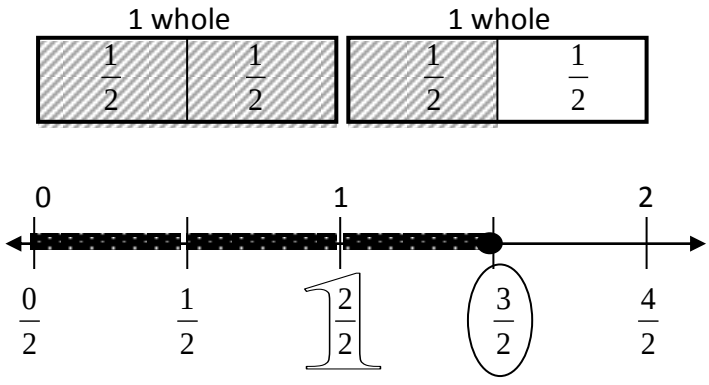
Now I can partition the second whole into halves.



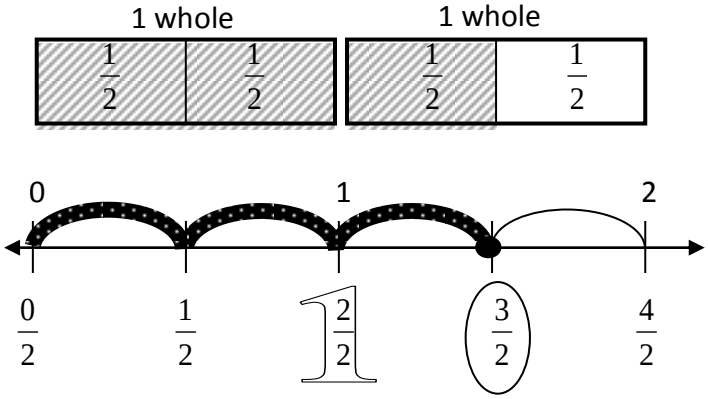
Now plot 3 halves on your number line. (Students can also color each unit as before, or just color the 3 jumps to emphasize 3 halves.)

Possible Student Notes:

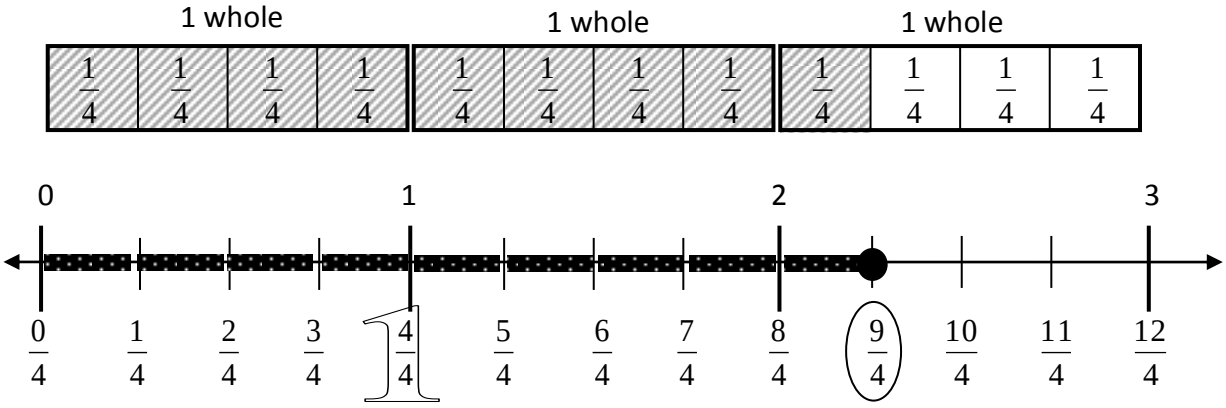
$\frac{3}{2}$ or 3 halves



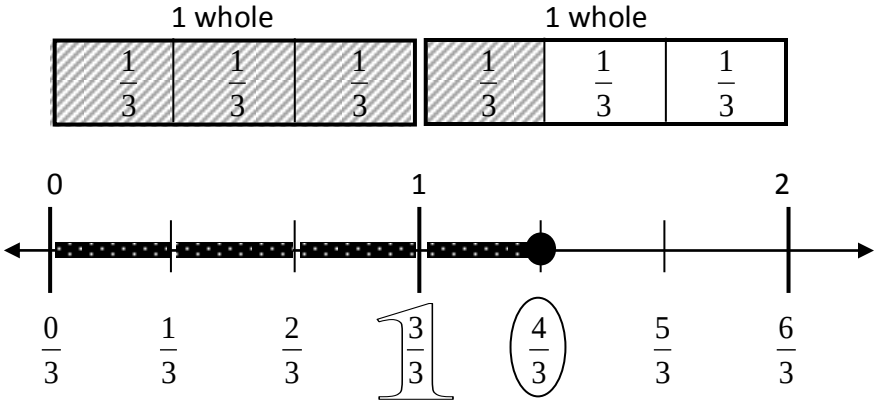
$\frac{3}{2}$ or 3 halves



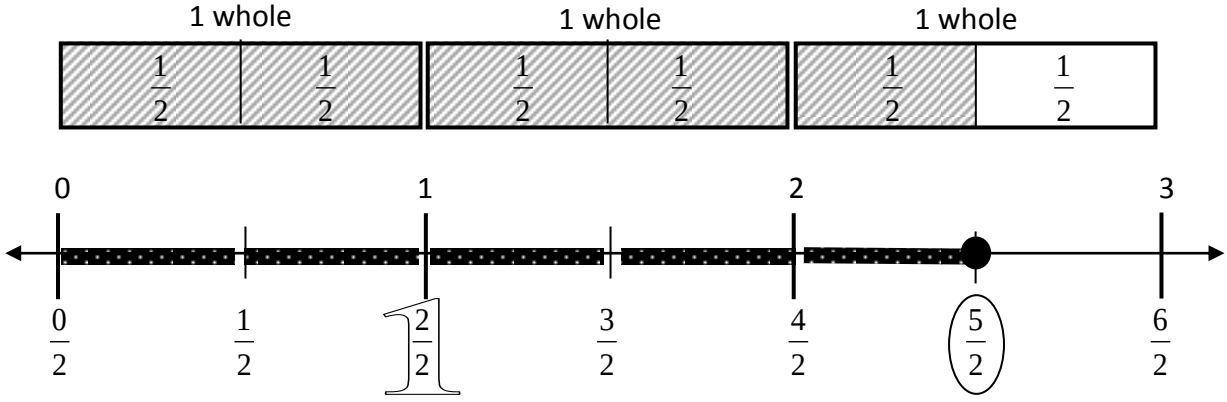
We Do: Draw a model for 9 fourths or $\frac{9}{4}$ (Have students walk you through the example to insure that they understand the process. Examples of teacher questions: How many wholes do you think we will need? How will we partition each whole? How do we draw our number line?



You Try: 4 thirds or $\frac{4}{3}$



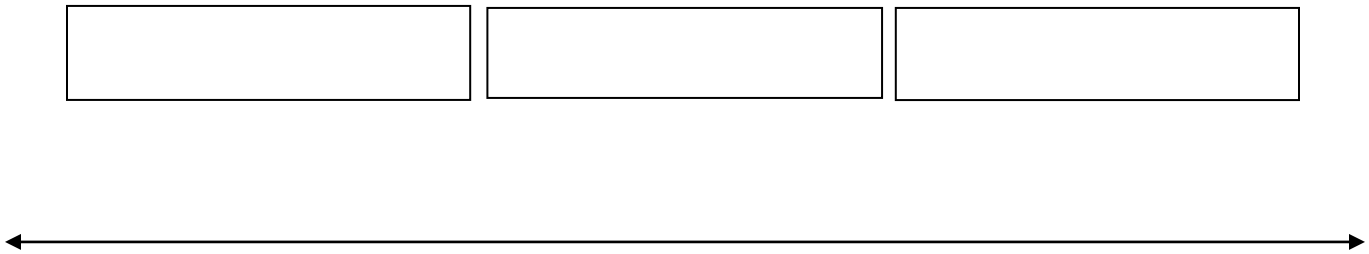
You Try: 5 halves or $\frac{5}{2}$

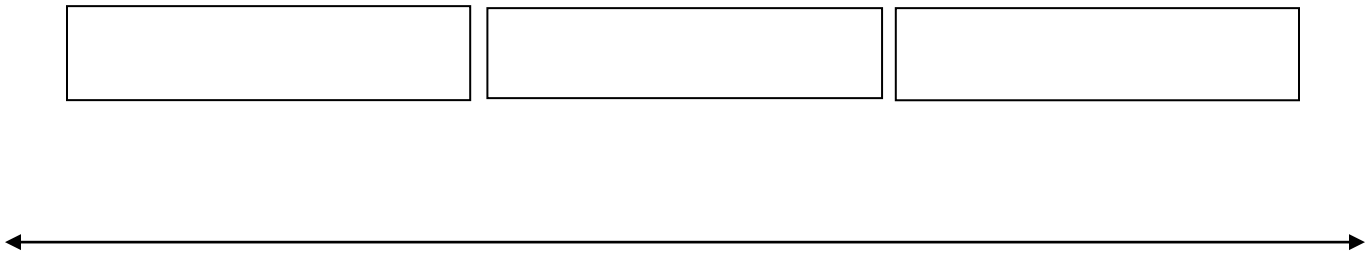


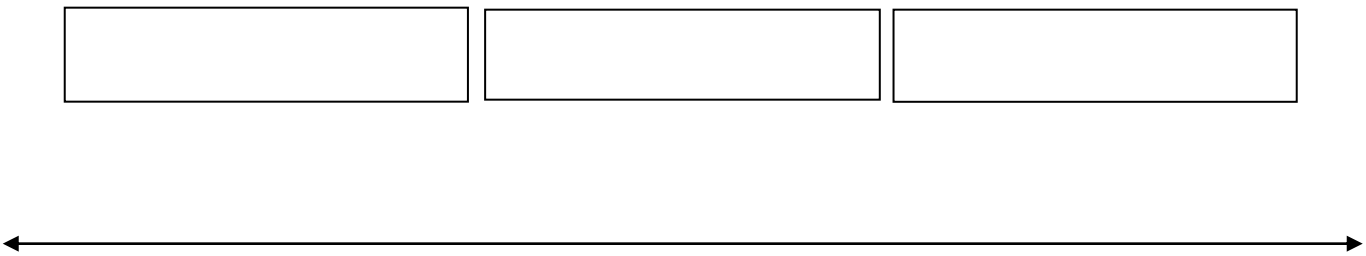
Additional Practice: After students have had a chance with simpler fractions, you can give them more challenging fractions to work with:

Examples: $\frac{8}{3}$ $\frac{10}{4}$ $\frac{8}{6}$ $\frac{11}{8}$

For those that have fine motor challenges: This template may be useful:

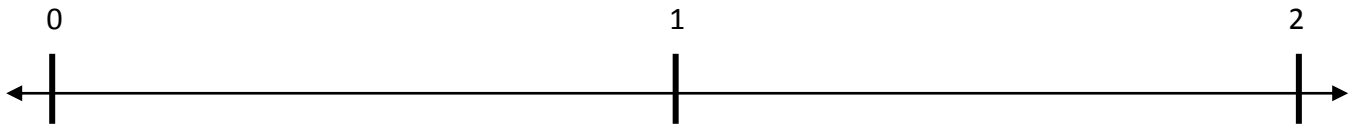




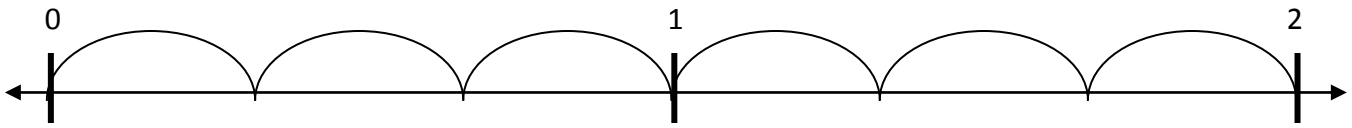


Practice on the Number Line Only (Students can use model drawings to help if needed.) 1 Day

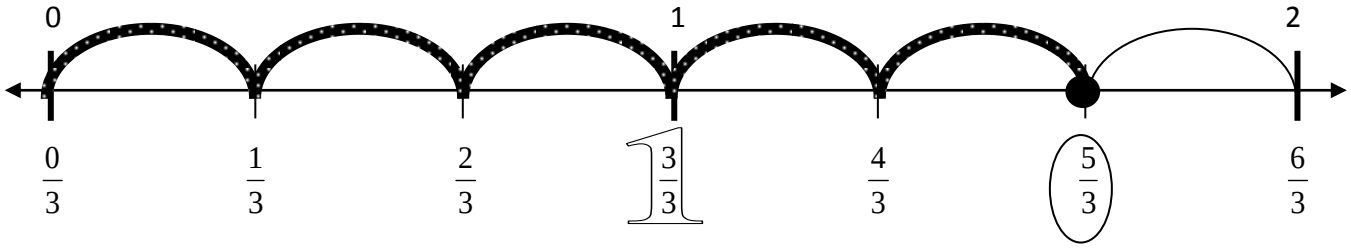
We Do: Draw this number line. Partition each whole into thirds. Then plot $\frac{5}{3}$.

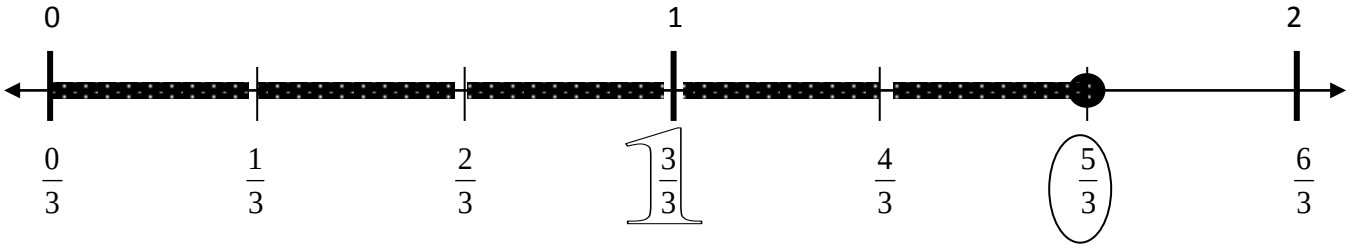


(Model partitioning into thirds.)



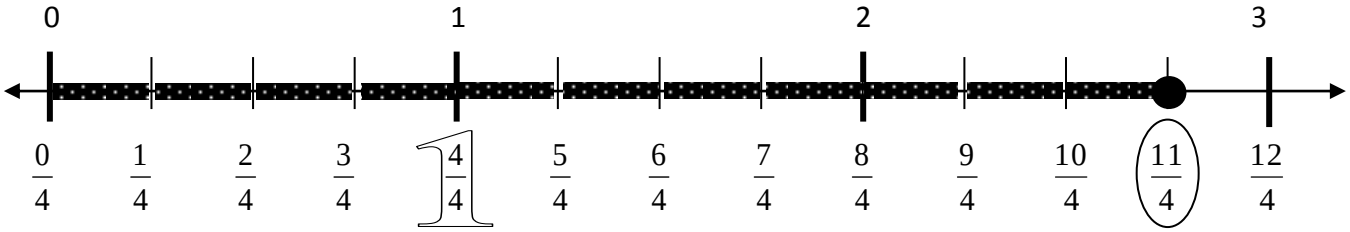
Possible solutions :



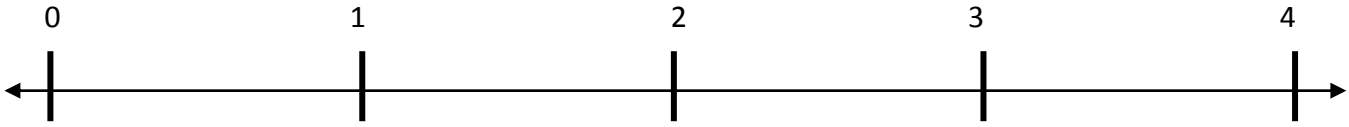


We Do: Partition each whole into fourths. Then plot $\frac{11}{4}$.

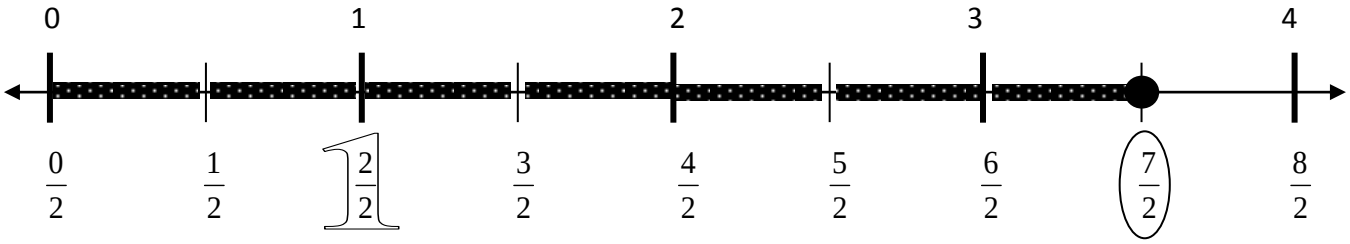
Solution:



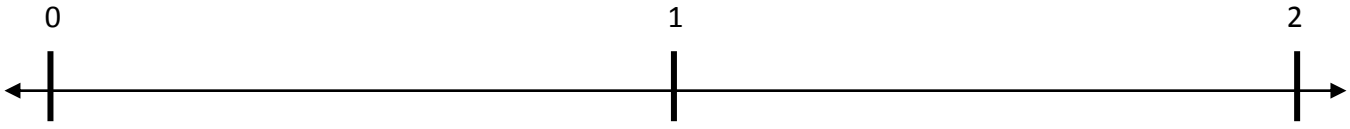
You Try: Partition into halves. Plot $\frac{7}{2}$.



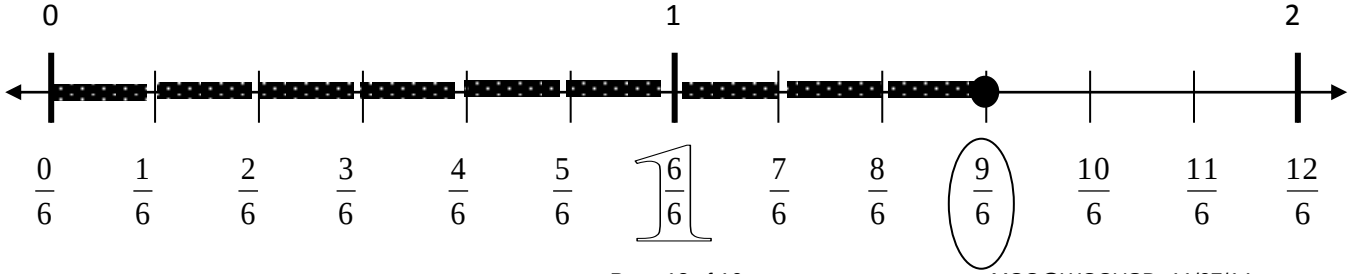
Solution:



You Try: Partition each whole into sixths. Then plot $\frac{9}{6}$.

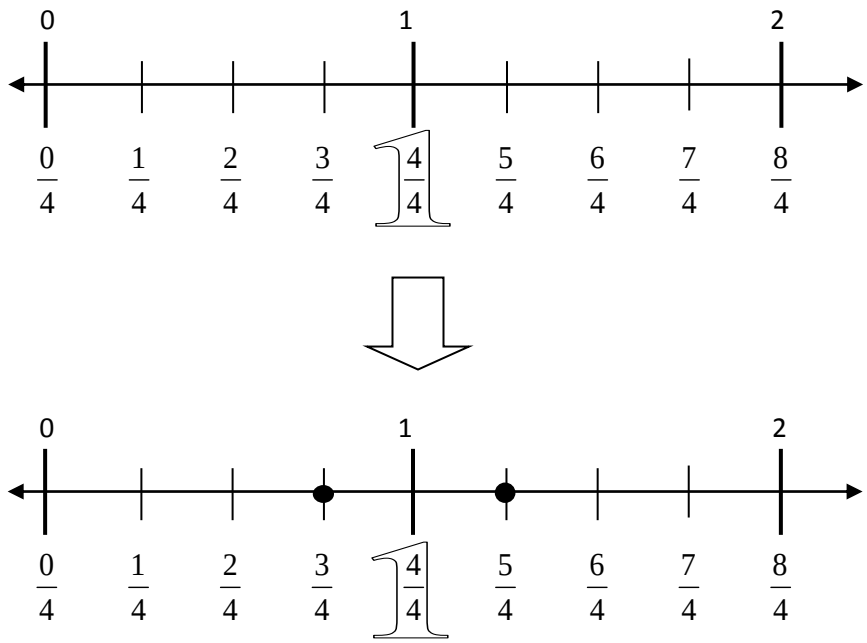


Solution:



Follow Up Comparison-- Discuss with the class:

Plot $\frac{3}{4}$ and $\frac{5}{4}$ on this number line. What is the same about $\frac{3}{4}$ and $\frac{5}{4}$? What is different?



If time is allowed for students to discuss and share out, their ideas can guide your questioning. Here are some sample questions teachers can ask to get a discussion going.

What is the denominator in 3 fourths? (4) What is the denominator in 5 fourths? (4)

So, we can say that they both have a denominator of 4. Or…We can say they are both fourths.

Which is greater? (5 fourths).

So, we can say that 5 fourths is greater than 3 fourths.

How much greater? (2 fourths)

So, we can say that 5 fourths is 2 fourths more than 3 fourths.

Is 3 fourths greater than 1 or less than 1? (less)

I s 5 fourths greater than 1 or less than 1? (greater)

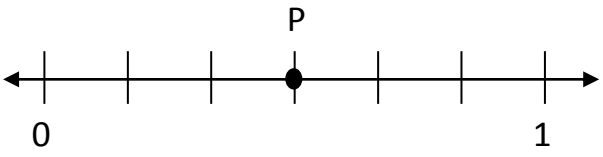
So, we can say that 3 fourths is less than 1 whole, but 5 fourths is greater than 1 whole.

(Ideally, conclusions like these would be recorded as a way to model the type of writing we want students to develop.)

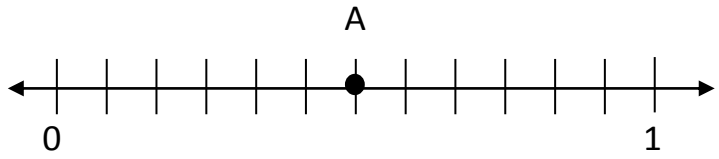
Warm Up

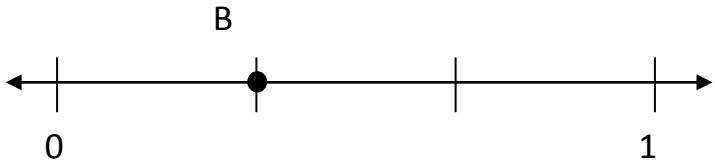
SBAC Practice Test Question

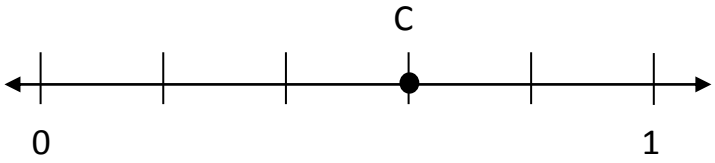
Use this number line to solve the problem.

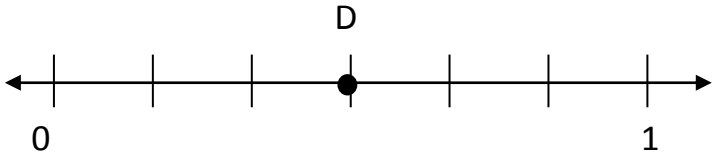


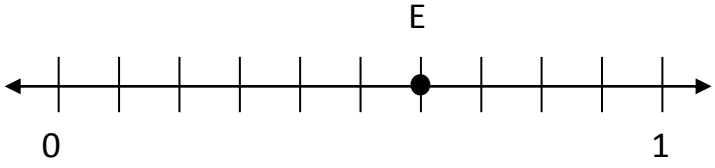
Choose **all** the number lines that show an number equal to the number shown by point P.











Review

Compare: $\frac{2}{3} \bigcirc \frac{2}{6}$

Prove your answer 2 ways.

Current

Partition each whole into thirds.

1 whole | 1 whole | = $\frac{\square}{3}$

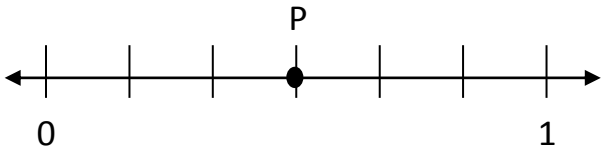
Partition each whole into fourths.

1 whole | 1 whole | = $\frac{\square}{4}$

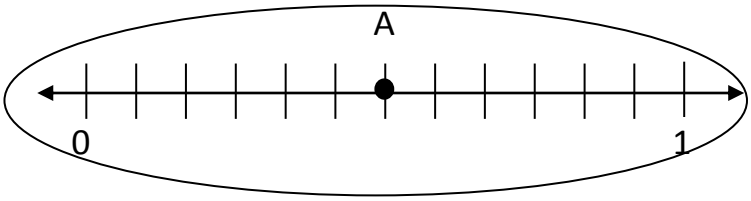
Warm Up Debrief

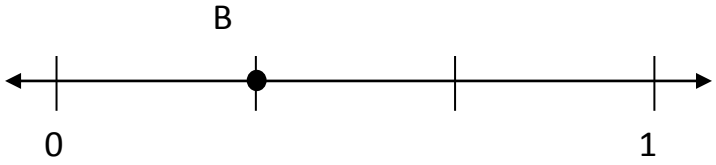
SBAC Practice Test Question

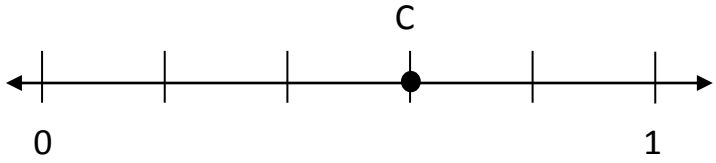
Use this number line to solve the problem.

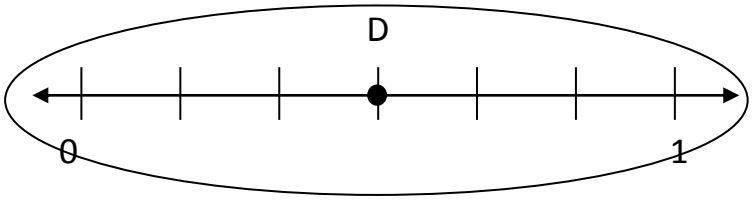


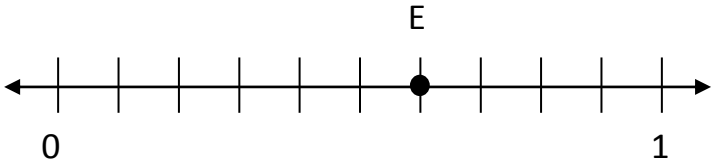
Choose **all** the number lines that show an number equal to the number shown by point P.







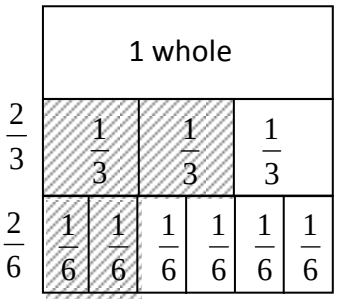


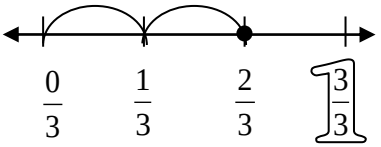


The scoring guide indicates 1 point is given if the first and fourth options are selected.

Review

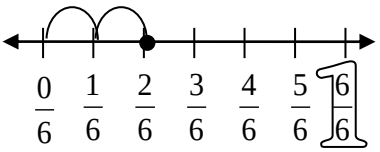
Compare: $\frac{2}{3} \bigcirc \frac{2}{6}$

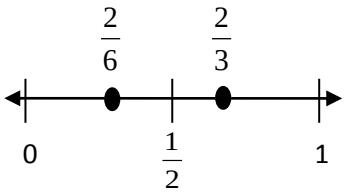




Students can also reason it out:

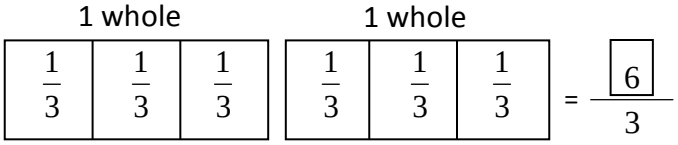
I know $\frac{1}{3} > \frac{1}{6}$, so $\frac{2}{3} > \frac{2}{6}$.





Current

Partition each whole into thirds.



Partition each whole into fourths.