Just in Time Quick Check

[Standard of Learning 2.NS.3]

Strand: Number and Number Sense

Standard of Learning 2.NS.3

The student will use mathematical reasoning and justification to solve contextual problems that involve partitioning models into equal-sized parts (halves, fourths, eighths, thirds, and sixths).

Students will demonstrate the following Knowledge and Skills:

a) Model and describe fractions as representing equal-size parts of a whole.
b) Describe the relationship between the number of fractional parts needed to make a whole and the size of the parts (i.e., as the whole is divided into more parts, each part becomes smaller).
c) Compose the whole for a given fractional part and its value (in context) for halves, fourths, eighths, thirds, and sixths (e.g., when given $\frac{1}{4}$, determine how many pieces would be needed to make $\frac{4}{4}$).
d) Using same-size fraction pieces, from a region/area model, count by unit fractions up to two wholes (e.g., zero one-fourths, one one-fourth, two one-fourths, three one-fourths, four one-fourths, five one-fourths; or zero-fourths, one-fourth, two-fourths, three-fourths, four-fourths, five-fourths).
e) Given a context, represent, name, and write fractional parts of a whole for halves, fourths, eighths, thirds, and sixths using:
   i) region/area models (e.g., pie pieces, pattern blocks, geoboards);
   ii) length models (e.g., paper fraction strips, fraction bars, rods, number lines); and
   iii) set models (e.g., chips, counters, cubes).
f) Compare unit fractions for halves, fourths, eighths, thirds, and sixths using words (greater than, less than or equal to) and symbols (>, <, =), with region/area and length models.

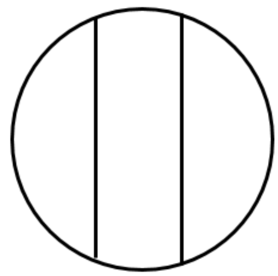
[Just in Time Quick Check]

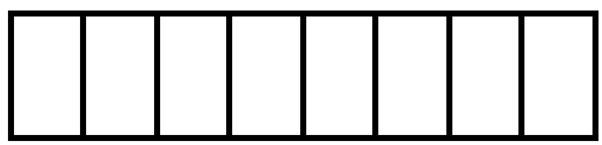
[Just in Time Quick Check Teacher Notes]

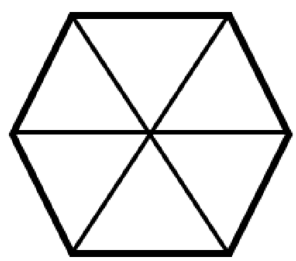
Supporting and Prerequisite SOL: 1.NS.3

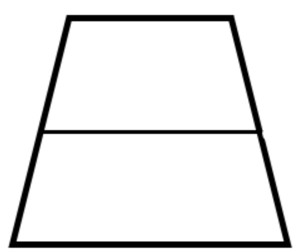
Just in Time Quick Check 2.NS.3

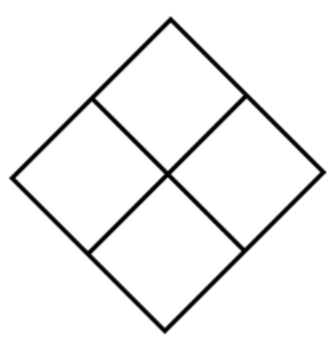
1. Look at each model.
    a) Circle the model if all of its parts are equal.
    b) Draw an **X** on the model if its parts are not equal.



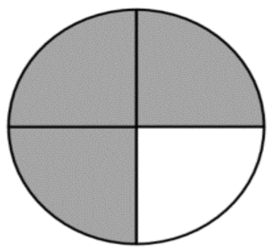




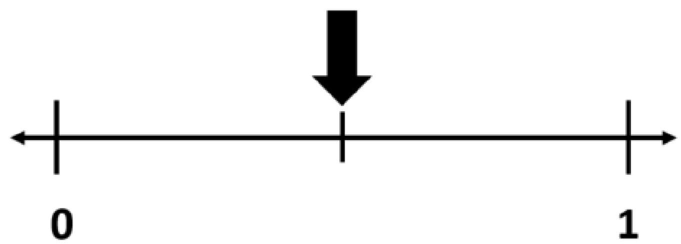




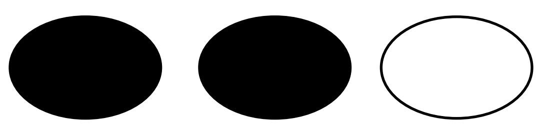
2. Write the fraction for each picture.
    a) What fraction of the circle is shaded gray? __________



    b) On the number line, the arrow is pointing to the fraction _________.

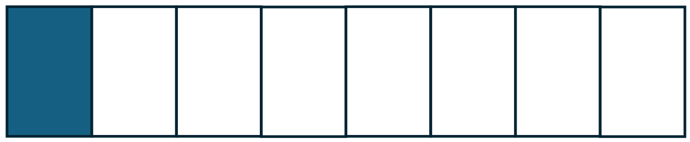


    c) Write the fraction of this set that is shaded black. __________



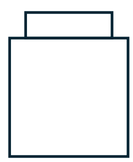
3. Answer each question.

   a) $\frac{1}{8}$ of this rectangle is shaded. How many eighths are needed to make one whole?

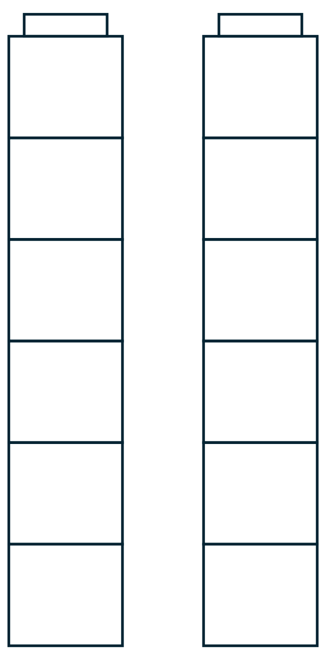


   b) $\frac{1}{3}$ of this rectangle is shaded. How many thirds are needed to make one whole?

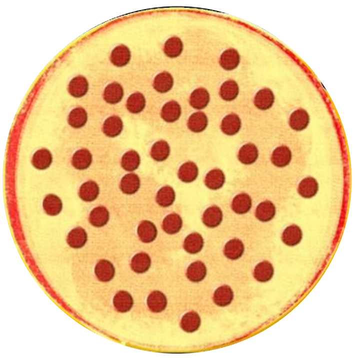
4. This block represents one-sixth.



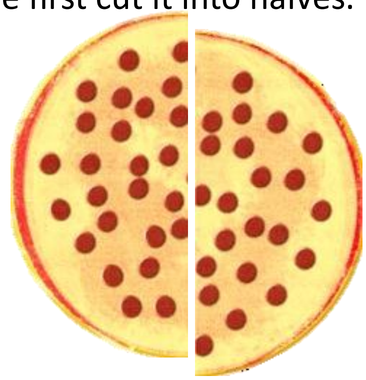
   Count by sixths to determine the value of the blocks below.



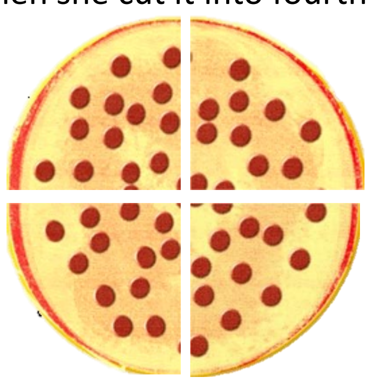
5. Amanda has a pizza.



She first cut it into halves.



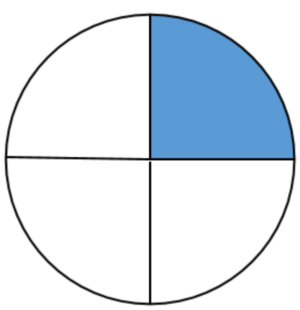
Then she cut it into fourths.



Describe what happens to the size of each piece of pizza as it is cut into more pieces.

6. Aniyah has $\frac{1}{3}$ of a brownie and Jason has $\frac{1}{2}$ of a same sized brownie. Who has more of a brownie? Draw a picture to show how you know.

7. Compare the fractions shaded in the pictures below.
   a) Write the fraction shaded under each picture.
   b) Write "greater than," "equal to," or "less than" on the line between the pictures to compare the fractions.



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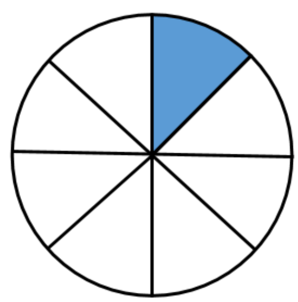
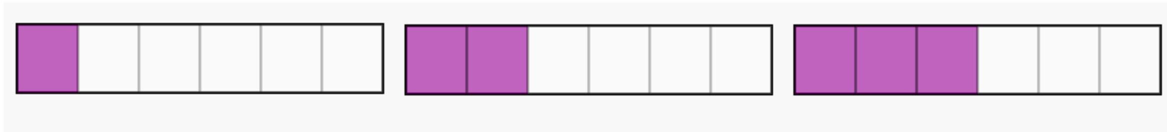


____________________ ____________________

8. A fraction is shaded in each picture. Write the fraction shaded in each picture.

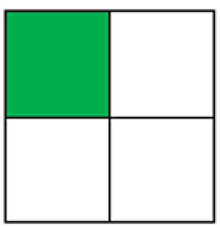
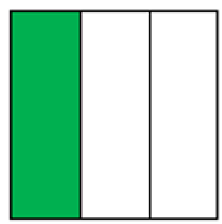


________ ________ ________

________ ________ ________

How many parts make one whole in each picture above? ________________

9. Use these pictures to answer the questions.

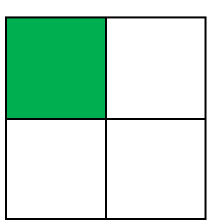
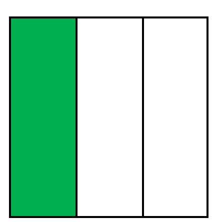
How many parts make one whole in each picture?

________________ ________________

What fraction is shaded in each picture?

________________ ________________

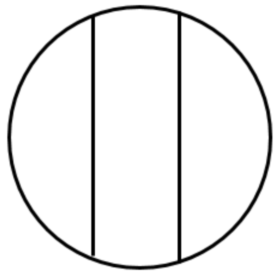
Use one of these symbols to compare the fractions shaded: >, <, or = .

 ________ 

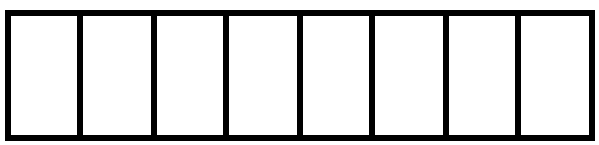
2.NS.3 Just in Time Quick Check Teacher Notes

Common Errors/Misconceptions and their Possible Indications

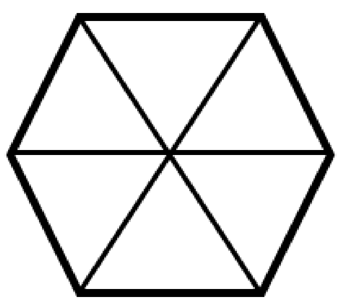
1. Look at each model.
   a) Circle the model if all of its parts are equal.
   b) Draw an **X** on the model if its parts are not equal.



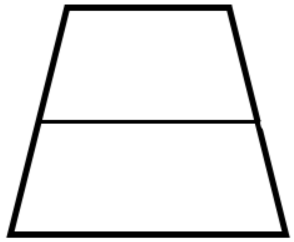
Students may think that this model shows thirds because there are three parts in the circle and the two line segments appear to be spaced apart evenly. Students may see the parts as equal because of the spacing of the vertical line segments. These students would benefit from cutting the circle into the three parts shown and comparing the parts by covering to show that the three parts are not all the same size.



Students may focus on the length and width of the rectangle, which are not the same, and for that reason identify this model as one in which the parts are not equal. Paper folding activities, in which rectangular strips of paper of different lengths are folded into congruent fractional parts, may help students focus on the subdivided parts of the rectangle, which are the same size, even though the length and width are different.



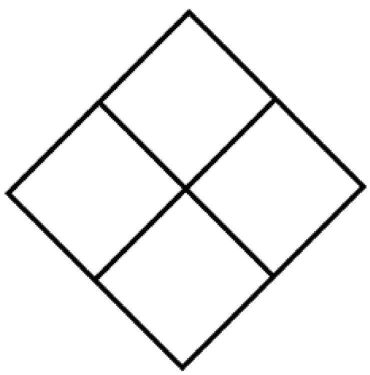
Students may not believe the triangles that make up the hexagon are equal parts because of their different spatial orientations. These students may benefit from combining same-sized pattern blocks in different orientations to make one whole.



Students may think this model shows halves because the vertical line segment separating the figure into two parts appears to be halfway between the top of the figure and its base. These students do not understand that the parts within the whole must be the same size. Cutting out this figure and folding along the line segment that subdivides the figure will help students recognize that the parts are not equal even though they are the same height.

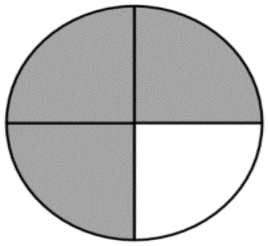
Students may benefit from activities in which they start with a whole and break or cut the whole into additional parts. Directly comparing (covering or tracing) to determine whether the parts are the same size or different sizes after each break or cut helps students develop understanding of this concept. As the whole is divided into more parts, students begin to understand that each part becomes smaller (e.g., folding a paper in half one time creates two equal halves; folding it in half again creates four equal fourths, which creates smaller pieces or parts; folding it in half again creates eight equal eighths, which are even smaller pieces or parts). The same process can be applied to relate thirds and sixths.

Teachers are encouraged not only to have students create models that have equal parts but also to have students create and discuss models that have parts that are not the same size.



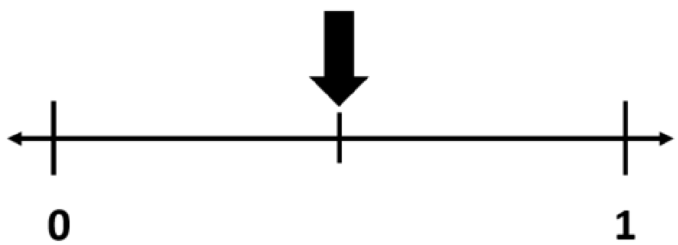
Students may not consider the parts within the figure to be equal because they are not horizontally oriented. Presenting students with fraction models (and models of polygons in general) that are not "sitting" on a horizontal base and with models they can physically rotate and then reconsider helps develop an understanding that changing orientation does not change size or area.

2. Write the fraction for each picture.
   a) What fraction of the circle is shaded gray? _________



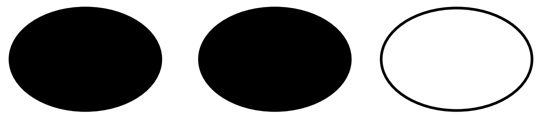
Students may write the fraction $\frac{1}{3}$ because 1 part is not shaded gray and 3 parts are shaded gray, or they may write $\frac{3}{1}$ because there are 3 parts shaded gray and 1 part unshaded. Students may think the numerator is the number of parts for one color and the denominator is the number of parts for the other color. This may indicate that students do not recognize the part-whole relationship represented by fraction notation and would benefit from explicit instruction in and practice with the naming conventions for fractions.

   b) On the number line, the arrow is pointing to the fraction ________.



Students may think the denominator for the fraction is 3, because there are three tick marks on the number line; since the arrow is pointing to the second tick mark, they may write $\frac{2}{3}$. This error may indicate a misconception that the denominator of a fraction modeled on a number line represents the number of tick marks on the number line instead of the number of equal spaces between whole numbers. These students may benefit from creating number lines, which includes determining the number of tick marks needed to create the number of equal parts between the whole numbers. Gluing same-size strips of alternating colors of paper end-to-end to create physical models of number lines may also help students build understanding for these linear models and what is being counted.

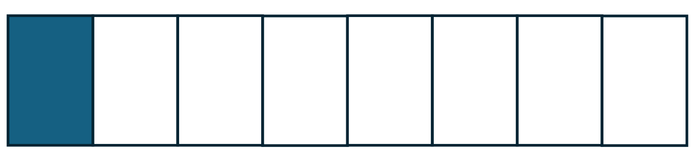
   c) Write the fraction of this set that is shaded black. _________



Students may not understand that the unit is the set that includes the three figures (i.e., this whole set has three parts). Students may write the fraction $\frac{2}{1}$ or $\frac{1}{2}$ to represent this picture because they are focusing on the parts only and not on the whole set. These students would benefit from building set models using concrete manipulatives and naming the fractions represented.

Students might also write 2, because two of the figures are shaded black. These students may not have an understanding that a fraction of a set would have a numerator and a denominator. Students may benefit from creating multiple representations for a given fraction (set model, linear model, area/region model) and describing the parts and the whole in each model.

3. Answer each question.
   a) $\frac{1}{8}$ of this rectangle is shaded. How many eighths are needed to make one whole?

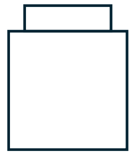
   Students may believe that seven-eighths are needed to make one whole because there are seven unshaded pieces in the diagram. Students may benefit from shading the remaining fractional pieces to show the entire whole shaded, then counting the fractional pieces.

   b) $\frac{1}{3}$ of this rectangle is shaded. How many thirds are needed to make one whole?

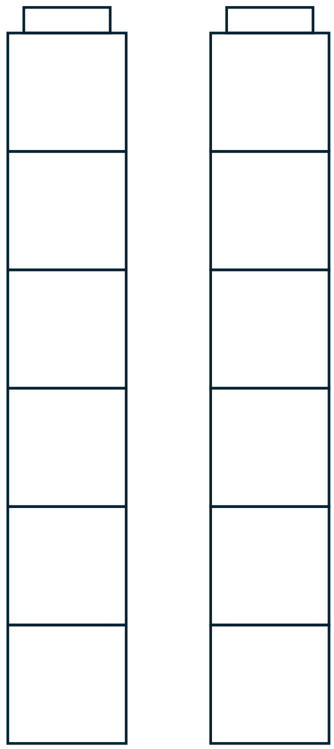
   

   Students may believe that two-thirds are needed to make a whole because there are two unshaded pieces in the diagram. Students may benefit from experiences where they build *the whole with fraction pieces and count the unit fractions "one-third, two-thirds, three-thirds" and discuss how three-thirds is the same as one-whole.*

4. This block represents one-sixth.

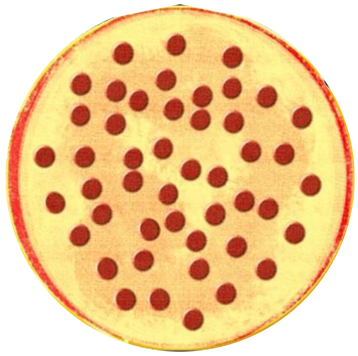


Count by sixths to determine the value of the blocks below.

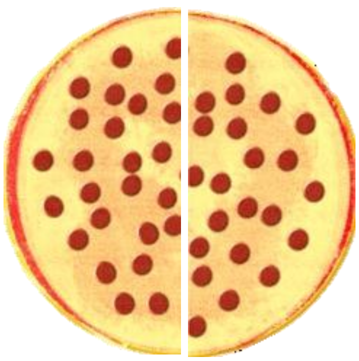


Students may state that the model represents twelve because there are twelve connected cubes displayed in the model. Students making this error see counting pieces as being the same as counting value. Students may benefit from labeling each fractional part in the model as one-sixth, then counting the unit fractions to determine the total of twelve-sixths. Other students may successfully count a total of twelve-sixths but struggle with the idea of a fraction that has a larger number in the numerator than the denominator. Students making this error may benefit from counting experiences where they count fractional pieces beyond one whole.

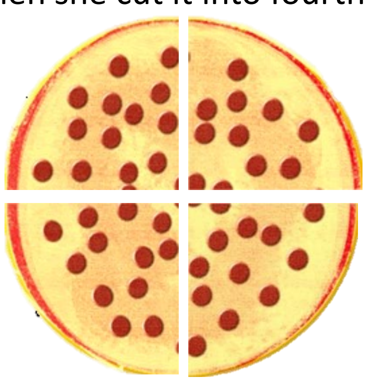
5. Amanda has a pizza.



She first cut it into halves.



Then she cut it into fourths.



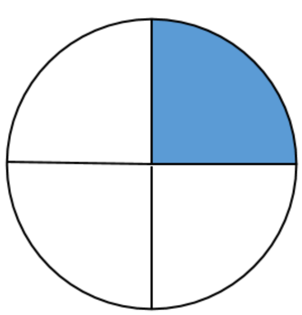
Describe what happens to the size of each piece of pizza as it is cut into more pieces.

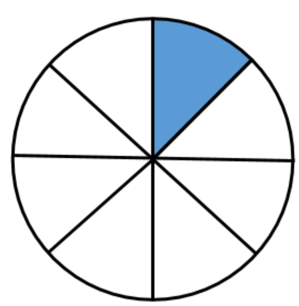
Students may state that the size of each piece of pizza remains the same as it is cut into more pieces. Other students may state that the size of each piece of pizza becomes larger because each time the pizza is cut, it results in more pieces of pizza. Students making these errors *may benefit from paper folding activities or paper cutting activities and discussions that include naming the resulting fractions and discussing their relative size.*

6. Aniyah has $\frac{1}{3}$ of a brownie and Jason has $\frac{1}{2}$ of a same sized brownie. Who has more of a brownie? Draw a picture to show how you know.

Students may think that $\frac{1}{3}$ is larger than $\frac{1}{2}$ because they are looking at the numbers in the denominator and applying their knowledge of whole numbers. Dividing a whole into parts and naming the parts after each division is made helps students develop understanding of fractions and fraction notation. These experiences help students conceptualize that as the whole is divided into more parts, each part becomes smaller (e.g., folding a paper in half one time creates two halves; folding it in half again creates four fourths, which are each smaller; folding it in half again creates eight eighths, which are even smaller).

7. Compare the fractions shaded in the pictures below.
   a) Write the fractions shaded under each picture.
   b) Write “greater than,” “equal to,” or “less than” on the line between the pictures to compare the fractions.

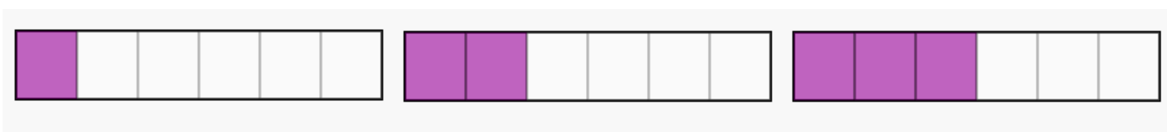




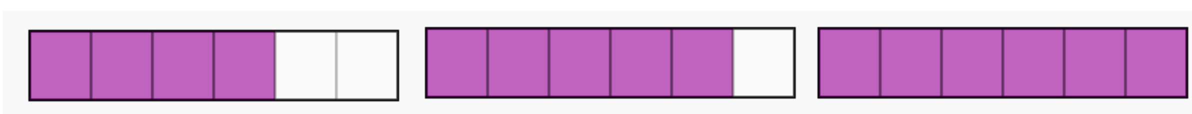
Students may have the misconception that $\frac{1}{8}$ is larger than $\frac{1}{4}$ when only looking at the denominators and/or using whole number understanding that 8 is larger than 4. When looking at the pictures, they see that the circle of eighths has more pieces than the circle of fourths. To help students develop conceptual understanding for comparing fractions, provide hands-on opportunities to break same-size wholes into different numbers of parts, naming the fractions and reflecting on both the number and size of pieces after each break.

Creating and using physical models to compare unit fractions builds a mental image of fractions and the understanding that as the number of pieces of a whole increases, the size of one single piece decreases (i.e., the larger the denominator the smaller the piece). Folding paper into halves, fourths, eighths, thirds, and sixths and then cutting 1 of the two halves apart, 1 of the three thirds apart, 1 of the four fourths apart, etc. is one way to model each unit fraction. With this representation, students can compare pieces by laying them on top of each other to see which is larger or smaller. These pieces can also be ordered from least to greatest to begin a discussion of ordering fractions or to make connections to the locations of these fractions on a number line.

8. A fraction is shaded in each picture. Write the fraction shaded in each picture.



_________ __________ _________



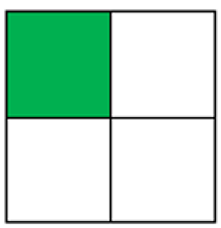
_________ __________ _________

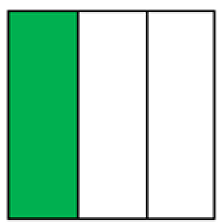
How many parts make one whole in each picture above? ________________

Students may reverse the numerator and denominator, which indicates they do not have a firm grasp of fraction notation and may not understand which number in the fraction represents the count of the number of parts referenced and which number in the fraction represents the number of parts that make up the whole.

Counting by unit fractions (e.g., “one-fourth, two-fourths, three-fourths, four-fourths”) helps students understand fractions as numbers within our number system while also providing a basis for comparisons. Opportunities to count unit fractions represented as region/area and length/measurement models should be provided.

9. Use these pictures to answer the questions.





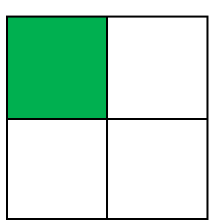
How many parts make one whole in each picture?

__________ __________

What fraction is shaded in each picture?

__________ __________

Use one of these symbols to compare the fractions shaded: >, <, or = .



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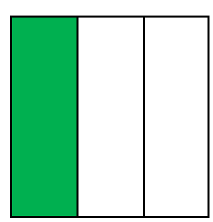

Students may say $\frac{1}{4} > \frac{1}{3}$ because they know from their whole number knowledge that 4 is greater than 3. Students frequently confuse the greater than (>), less than (<), and equal to (=) symbols. Reading comparisons aloud (“one-fourth is less than one-third”) and using the language *represented by the symbolic notation builds meaning for symbolic notation while fostering the use of appropriate mathematics vocabulary.*