

Grade 3 Target F

Domain, Target, Standards, DOK, Vertical Alignments, Achievement Levels, Evidence Required, Vocabulary, Response Types, Materials, Attributes, Question Types, and Question Banks (Examples)

[Content Domain: Numbers and Operations - Fractions](#)

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Content Domain: Numbers and Operations - Fractions

Target F [m]: 3.NF.A Develop understanding of fractions as numbers.

Standards included in Target F: 3.NF.A.1, 3.NF.A.2, 3.NF.A.3

Note that area models, strip diagram models, and number line models of a/b are all essentially special cases of the core fraction concept as defined in 3.NF.A.1: namely, a parts when a whole is partitioned into b equal parts. In the case of a number line, the “whole” in question is the interval from 0 to 1.

3.NF.A Develop understanding of fractions as numbers.

3.NF.A.1 Understand a fraction $1/b$ as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a part of size $1/b$.

3.NF.A.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.

3.NF.A.3 Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.

- a. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.
- b. Recognize and generate simple equivalent fractions, e.g., $1/2 = 2/4$, $4/6 = 2/3$. Explain why the fractions are equivalent, e.g., by using a visual fraction model.
- c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. Examples: Express 3 in the form $3 = 3/1$; recognize that $6/1 = 6$; locate $4/4$ and 1 at the same point of a number line diagram.
- d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual fraction model.

Vertical Alignment

Related Grade 2 standards

2.G.A Reason with shapes and their attributes.

2.G.A.3 Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, half of, a third of, etc., and describe the wholes as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.

Related Grade 4 Standards

4.NF.A Extend understanding of fraction equivalence and ordering.

4.NF.A.1 Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.

4.NF.A.2 Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as $1/2$. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual fraction model.

4.NF.B Build fractions from unit fractions.

4.NF.B.3 Understand a fraction a/b with $a > 1$ as a sum of fractions $1/b$.

4.NF.B.4 Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.

Achievement Level Descriptors

Level 1 Students should be able to identify a fraction as a number and identify a fraction on a number line when the increments are equal to the denominator.

Level 2 Students should be able to understand a fraction $1/b$ as the quantity formed by 1 part when a whole is partitioned into b equal parts; recognize simple equivalent fractions; express whole numbers as fractions; and recognize that comparisons are valid only when the two fractions refer to the same whole.

Level 3 Students should be able to understand a fraction a/b as the quantity formed by a parts of size $1/b$; represent a fraction on a number line with partitioning; generate simple equivalent fractions and recognize when they are equal to whole numbers; and compare two fractions with the same numerator or the same denominator by reasoning about their size.

Level 4 Students should be able to explain why two fractions are equivalent and approximate the location of a fraction on a number line with no partitioning.

Evidence Required

1. The student identifies a fraction $1/b$ as 1 part of a whole that is partitioned into b equal parts, and a fraction a/b as the quantity formed by a parts of size $1/b$ using a model. For this evidence statement, a/b may be greater than, less than, or equal to 1.
2. The student identifies and represents fractions on a number line using the interval 0-1 as the whole with or without partitioning.
3. The student identifies two fractions as equal if they are the same size or the same point on a number line.
4. The student generates simple equal fractions using a visual fraction model.
5. The student expresses whole numbers as fractions and recognizes fractions equal to whole numbers.
6. The student compares two fractions with the same numerator or the same denominator using the symbols $<$, $=$, $>$.

Vocabulary

equal, denominator, numerator, less than, greater than, number line

Response Types

Multiple Choice, single correct response; Multiple Choice, multiple correct responses; Equation/Numeric; Hot Spot; Drag and Drop; Matching Tables; Graphing

Materials

visual fraction models, number lines, equations, area models, strip diagram models

Attributes

Fractions in 3rd grade are limited to denominators of 2, 3, 4, 6, and 8. In fraction comparisons, all fractions must have the same numerator or denominator. Unit fractions are 1 part of the whole (e.g., 1/3, 1/2, 1/6).

Claim 1: Concepts and Procedures (DOK 1, 2) Question Banks

Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.

Claim 1 3.NF.A.1 DOK Level 1

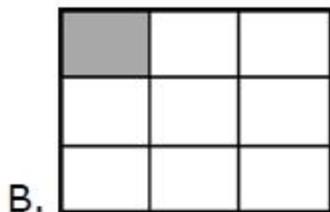
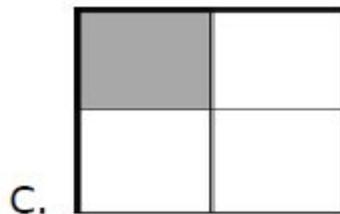
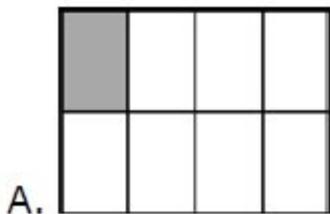
Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b.

Evidence Required

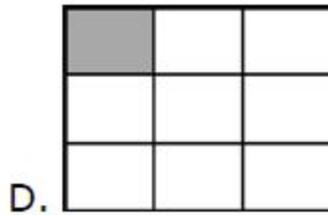
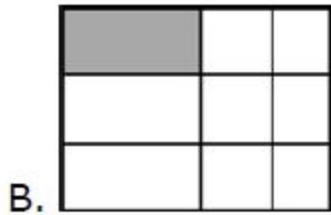
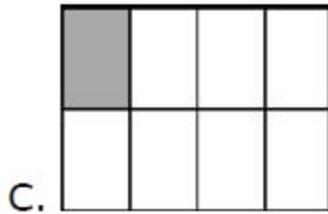
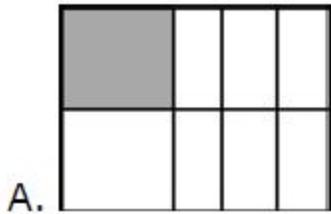
The student represents a fraction 1/b as 1 part of a whole that is partitioned into b equal parts, and a fraction a/b as the quantity formed by a parts of size 1/b using a model. For this evidence statement, a/b may be greater than, less than, or equal to 1.

Question Type 1: The student is presented with a fraction in the form of $\frac{a}{b}$.

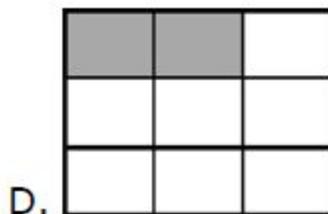
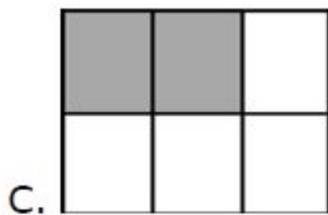
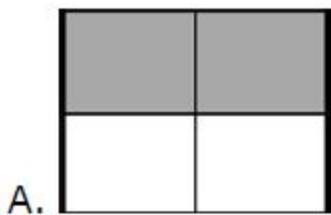
1. Which model shows $\frac{1}{8}$ of the whole figure shaded?



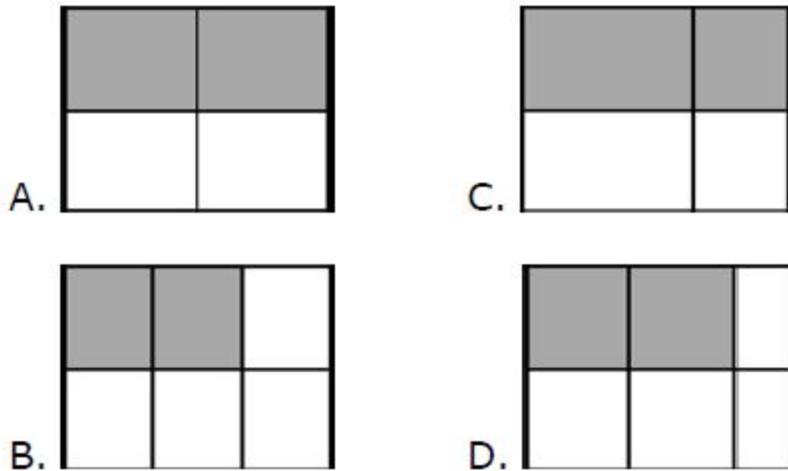
2. Which model shows $\frac{1}{8}$ of the whole figure shaded?



3. Which model shows $\frac{2}{6}$ of the whole figure shaded?



4. Which model shows $\frac{2}{6}$ of the whole figure shaded?



Rubric: (1 point) The student selects the correct model (e.g., A; C; C; B).
 Response Type: Multiple Choice, single correct response

Claim 1 3.NF.A.2 DOK Level 2

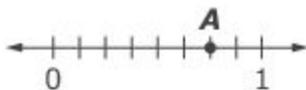
3.NF.A.2 Understand a fraction as a number on the number line; represent fractions on a number line diagram.

- 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.

Evidence Required

The student identifies and represents fractions on a number line using the interval 0–1 as the whole, with or without partitioning.

Question Type 1: The student is presented with a fractional number line where a fraction is designated by a point on the number line.



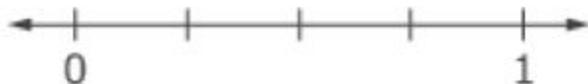
Enter the fraction located at point A on the number line.

Rubric: (1 point) The student enters the fraction that is located at the point on the number line (e.g., $\frac{6}{8}$).

Response Type: Equation/Numeric

Question Type 2: The student is presented with a fractional number line.

Use the Add Point tool to place a point on the number line where $\frac{2}{4}$ should be located.



Rubric: (1 point) The student places a point at the correct location on the number line (e.g., $\frac{2}{4}$ is placed halfway between 0 and 1).

Response Type: Graphing

Question Type 3: The student is presented with a number line and two or more fractions in the form $\frac{a}{b}$.

Drag each fraction to the number line, as close to the exact location as possible.



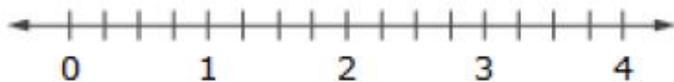
$$\frac{3}{8} \quad \frac{1}{8}$$

Rubric: (2 points) The student places both fractions at the correct location on the number line (e.g., $\frac{1}{8}$ and $\frac{3}{8}$ are placed at their approximate location). A tolerance of \pm half of the unit fraction is acceptable for scoring (e.g., $\pm \frac{1}{16}$ because $\frac{1}{8}$ is the unit).

(1 point) The student places one fraction within the interval of tolerance for its correct location AND places the other fraction on the correct side (less than or greater than) of the correctly placed fraction. The same tolerance level as the 2-point rubric is allowed for determining the correct location.

Response Type: Drag and Drop

Question Type 4: Place each fraction on the number line, as close to its exact location as possible.



$$\frac{2}{2} \quad \frac{1}{4} \quad \frac{4}{1} \quad \frac{2}{4}$$

Rubric: (2 points) The student places all fractions at the correct location on the number line (e.g., $\frac{2}{2}$, $\frac{1}{4}$, $\frac{2}{4}$ and $\frac{4}{1}$ are placed at their approximate location). A tolerance of \pm half of the unit fraction is acceptable for scoring (e.g., $\pm \frac{1}{8}$ for fourths).

(1 point) The student places three out of four fractions at the correct location, within the interval of tolerance, AND places the other fraction on the correct side (less than or greater than) of the correctly placed fractions.

Response Type: Drag and Drop

Claim 1 3.NF.A.2 DOK Level 1

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

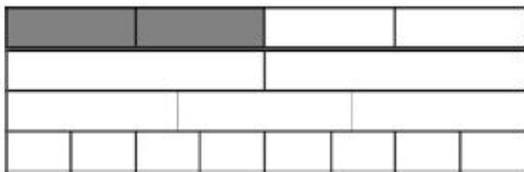
- a. Represent a fraction $1/b$ on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size $1/b$ and that the endpoint of the part based at 0 locates the number $1/b$ on the number line.
- b. Represent a fraction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

Evidence Required

The student identifies two fractions as equal if they are the same size or at the same point on a number line.

Question Type 1: The student is presented with a visual fraction model with a fraction shaded.

Use the fraction strip model shown to help you with this problem.



Enter a fraction equal to $\frac{2}{4}$ that has a **different** denominator.

Rubric: (1 point) The student enters an equivalent fraction (e.g., $\frac{1}{2}$ or $\frac{4}{8}$).

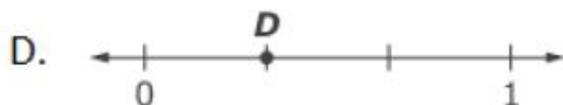
Response Type: Equation/Numeric

Question Type 2: The student is presented with a fractional number line with a point labeled on the number line.

Use this number line to answer the question that follows.



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



Rubric: (1 point) The student selects all number lines that show $\frac{1}{2}$ (e.g., A, B).

Response Type: Multiple Choice, multiple correct responses

Claim 1 3.NF.3b DOK Level 2

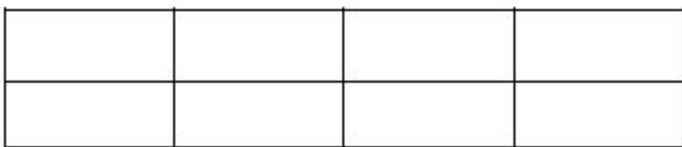
Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. b. Recognize and generate simple equivalent fractions, e.g., $\frac{1}{2} = \frac{2}{4}$, $\frac{4}{6} = \frac{2}{3}$. Explain why the fractions are equivalent, e.g., by using a visual fraction model.

Evidence Required

The student generates simple equivalent fractions using visual fraction models.

Question Type 1: The student is presented with a blank visual fraction model to generate an equivalent fraction.

Use this model to solve the problem.



Click parts of the model to shade $\frac{2}{4}$ of the whole model.

Rubric: (1 point) Student creates a fraction model equal to the given fraction (e.g., $\frac{4}{8}$).

Response Type: Hot Spot

Claim 1 3.NF.A.3c DOK 1

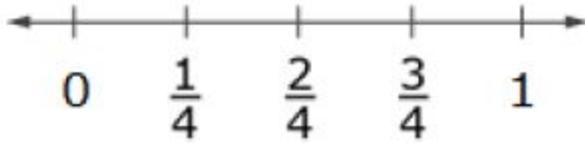
Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. Examples: Express 3 in the form $3 = \frac{3}{1}$; recognize that $\frac{6}{1} = 6$; locate $\frac{4}{4}$ and 1 at the same point of a number line diagram.

Evidence Required

The student expresses whole numbers as fractions and recognizes fractions equal to whole numbers.

Question Type 1: The student is presented with a visual fraction model with an equation using a whole number and a fraction. Either the numerator or the denominator is unknown and represented with a box.

1. Use the number line to help you complete the equation.



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

What numerator goes in the box () to make the equation true?

2. Use the number line to help you complete the equation.



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

Rubric: (1 point) The student enters the correct value (e.g., 4; 4).

Response Type: Equation/Numeric

3. The fraction model shows $\frac{1}{8}$ of the whole figure shaded.

What numerator goes in the box () to make the equation true?

$$\frac{\square}{8} = 1$$

Question Type 2: The student is presented with an equation using a whole number and a fraction. Either the numerator or the denominator is unknown and represented with a box.

1. What denominator goes in the box () to make the equation true?

$$2 = \frac{2}{\square}$$

2. What numerator goes in the box () to make the equation true?

$$\frac{\square}{1} = 2$$

Question Type 3: The student is presented with an equation where 1 is written as a fraction and numeral. Either the numerator or the denominator of the fraction for 1 is represented with a box.

1. What numerator goes in the box () to make the equation true?

$$\frac{\square}{2} = 1$$

2. What denominator goes in the box () to make the equation true?

$$1 = \frac{2}{\square}$$

Rubric: (1 point) The student enters the correct value (e.g., 8; 1; 2; 2; 2).

Response Type: Equation/Numeric

Claim 1 3.NF.A.3.d DOK 2

Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual fraction model.

Evidence Required

The student compares two fractions with the same numerator or the same denominator using the symbols $<$, $=$, or $>$.

Question Type 1: The student is presented with two pairs of fractions with the same numerators and/or same denominators and directed to compare them using ($<$, $>$, or $=$). Select the symbol ($<$, $>$, or $=$) that correctly compares each pair of numbers.

These pages were adapted from open source documents available on the Smarter Balanced Website: <http://www.smarterbalanced.org/assessments/development/> August 2016

	<	>	=
$\frac{5}{8} \square \frac{5}{6}$			
$\frac{3}{6} \square \frac{3}{8}$			

Rubric: (1 point) The student identifies the correct symbol to compare pairs of fractions (e.g., <, >).

Response Type: Matching Table

Question Type 2: The student is presented with an incomplete comparison of two fractions using the symbols < or > where either the numerator or denominator is the unknown.

Which number goes in the box to make the comparison true?

$$\frac{5}{8} > \frac{\square}{8}$$

- A. 3
- B. 5
- C. 7
- D. 9

Rubric: (1 point) The student selects the correct number (e.g., A).

Response Type: Multiple Choice, single correct response

Question Type 3: The student is presented with two or three comparisons of two fractions using the symbols <, >, or =.

Decide whether each comparison is true or false. Click True or False for each comparison.

	True	False
$\frac{3}{4} < \frac{1}{4}$		
$\frac{2}{4} < \frac{2}{3}$		

Rubric: (1 point) The student answers correctly, identifying each as True or False (e.g., F, T).
Response Type: Matching Tables

3. Mary has 27 blocks. She can put 9 blocks in each bag.

How many bags does she need for all 27 blocks?

Rubric: (1 point) The student enters the correct solution (e.g., 27; 9; 3).
Response Type: Equation/Numeric

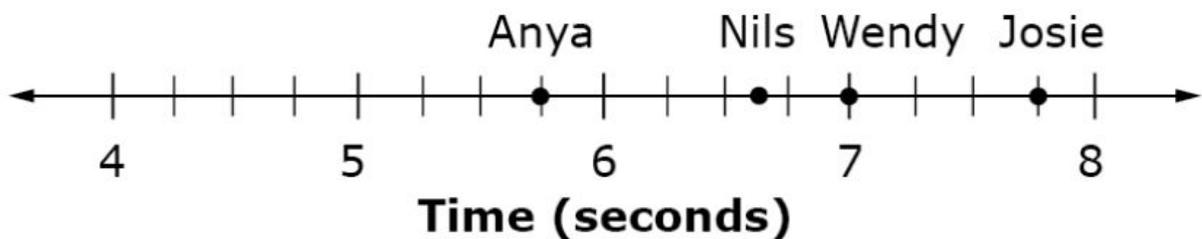
Claim 2 Problem Solving Question Banks

[Claim Descriptors and Targets](#)

Students can solve a range of complex well-posed problems in pure and applied mathematics, making productive use of knowledge and problem-solving strategies

Example 1

Three friends ran a race. The points on the number line represent the race times, in seconds, for each friend.



Who had the shortest time?

- A. Anya
- B. Nils
- C. Wendy
- D. Josie

Rubric: (1 point) The student selects the correct option (A).
Response Type: Multiple choice, single correct response

Claim 3 Communicating Reasoning Question Banks
[Claim Descriptors and Targets](#)

Students can clearly and precisely construct viable arguments to support their own reasoning and to critique the reasoning of others.

Example 1

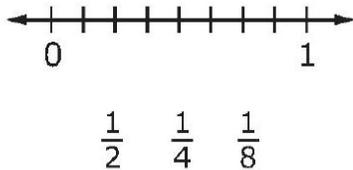
Robert said, “When comparing two fraction with a numerator of 1, the fraction with the bigger denominator is always greater.”

Part A

Drag each fraction to the correct location on the number line.

Part B

Is Robert’s statement true? Click Yes or No.



Is Robert’s statement true?

Click Yes or No.

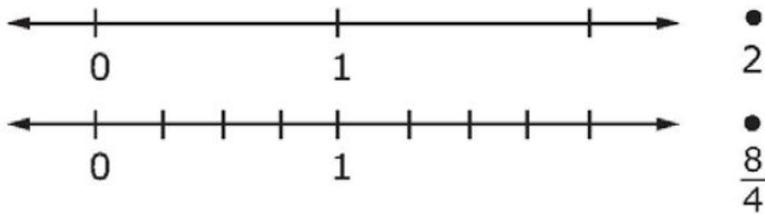
Interaction: The student drags fractions from the single-use palette to the number line and clicks on “Yes” or “No.”

Rubric: (2 points) The student places all three fractions in the correct locations and answers “No.” (1 point) The student either places all the fractions in the correct locations and answers “Yes”; or places all fractions in the correct order but misses the correct location for one or more fractions and answers “No.”

Response Type: Drag and Drop and Hot Spot

Example 2

Compare $\frac{8}{4}$ and 2.



Part A

Plot each number on a number line.

Part B

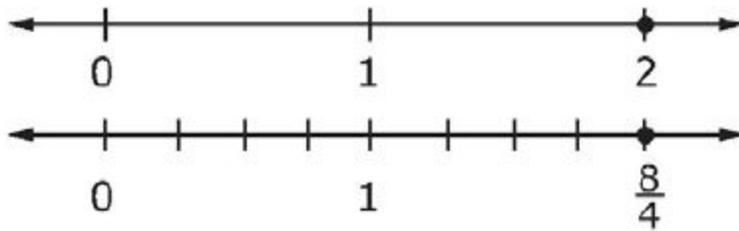
$\frac{8}{4}$ [drop-down choices: <, =, >] 2

Compare $\frac{8}{4}$ and 2.

Part A
Plot each number on a number line.

Part B
 $\frac{8}{4}$ [drop-down choices: <, =, >] 2

Rubric: (1 point) The student plots the points correctly (see below) and selects the correct comparison (=).



Response Type: Drop-down Menu, Graphing

Example 3

Part A

Which comparison between $\frac{1}{5}$ and $\frac{1}{8}$ is correct?

- A. $\frac{1}{5} < \frac{1}{8}$
- B. $\frac{1}{5} > \frac{1}{8}$
- C. $\frac{1}{5} = \frac{1}{8}$

Part B

Choose a picture that supports your answer to *Part A*.

- D.
- E.
- F.

Rubric: (1 point) The student selects the correct comparison and the correct picture (B, F).
 Response Type: Drop-down Menu and Multiple Choice, single correct response