NAEP Released Items Aligned to the Iowa Core

4.NF.1 Explain why a fraction a/b is equivalent to a fraction (n × a)/(n × 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.

Together, Sara and Brendan have 20 pencils. Sara says 1/4 of the pencils are hers. Brendan says 15 of the pencils belong to him. Explain how they both could be right. Use words or drawings.

2003-4-7-15

Source: National Assessment of Educational Progress, 2003, Grade 4 Mathematics Assessment.

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4.NF.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.

Which fraction has a value closest to $\frac{1}{2}$?

A. $\frac{5}{8}$

B. $\frac{1}{6}$

C. $\frac{2}{2}$

D. $\frac{1}{5}$

2009-4-10-15

Source: National Assessment of Educational Progress, 2009, Grade 4 Mathematics Assessment.

Students in Mrs. Johnson's class were asked to tell why $\frac{4}{5}$ is greater than $\frac{2}{3}$. Whose reason is best?

A. Kelly said, "Because 4 is greater than 2."

B. Keri said, "Because 5 is larger than 3."

C. Kim said, "Because $\frac{4}{5}$ is closer than $\frac{2}{3}$ to 1."

D. Kevin said, "Because 4 + 5 is more than 2 + 3."

1990-4-7-15

Source: National Assessment of Educational Progress, 1990, Grade 4 Mathematics Assessment.

Of the following, which is closest in value to 0.52?

A. 1/50
B. 1/5
C. 1/4
D. 1/3
E. 1/2

1992-8-5-21

Source: National Assessment of Educational Progress, 1992, Grade 8 Mathematics Assessment.

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

a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.
b. Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. Examples: 3/8 = 1/8 + 1/8 + 1/8 ; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8.
c. Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.
d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.

$$\frac{4}{6}-\frac{1}{6}=$$

A. 3

B. $\frac{3}{6}$

C. $\frac{3}{0}$

D. $\frac{5}{6}$

2005-4-12-2

Source: National Assessment of Educational Progress, 2005, Grade 4 Mathematics Assessment.

Luis had two apples and he cut each apple into fifths. How many pieces of apple did he have?

A. $\frac{2}{5}$

B. 2

C. 5

D. 10

2005-4-12-8

Source: National Assessment of Educational Progress, 2005, Grade 4 Mathematics Assessment.

Change the following mixed numeral to an improper fraction.

$2\frac{1}{8} =$ _____

2008-13-21-5

Source: National Assessment of Educational Progress, 2008, Age 13 Mathematics Assessment.

Write the following mixed numeral as an improper fraction.

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

2004-13-23-21

Source: National Assessment of Educational Progress, 2004, Age 13 Mathematics Assessment.

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

a. Understand a fraction a/b as a multiple of 1/b. For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4).
b. Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number. For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.)
c. Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?

If 1 1/3 cups of flour are needed for a batch of cookies, how many cups of flour will be needed for 3 batches?

A. 4 1/3
B. 4
C. 3
D. 2 2/3

1992-4-7-6
1992-8-7-6

Source: National Assessment of Educational Progress, 1992, Grade 4 and Grade 8 Mathematics Assessments.

Tracy said, "I can multiply 6 by another number and get an answer that is smaller than 6."

Pat said, "No, you can't. Multiplying 6 by another number always makes the answer 6 or larger."

Who is correct? Give a reason for your answer.

1992-8-14-2
1992-12-14-2

Source: National Assessment of Educational Progress, 1992, Grade 8 and Grade 12 Mathematics Assessments.

$$12 \times \frac{3}{4} =$$

2004-17-23-9

Source: National Assessment of Educational Progress, 2004, Age 17 Mathematics Assessment.

$$5 \times \frac{1}{6} =$$

2004-17-23-11

Source: National Assessment of Educational Progress, 2004, Age 17 Mathematics Assessment.

4.NF.5 Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.

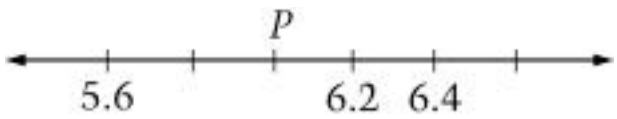
4.NF.6 Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram.

Which decimal represents the shaded part of the figure?

A. 0.5
B. 0.28
C. 0.2
D. 0.02

1990-4-7-18

Source: National Assessment of Educational Progress,1990, Grade 4 Mathematics Assessment.



On the number line above, what number would be located at point *P*?

2005-4-4-5
2005-8-4-5

Source: National Assessment of Educational Progress, 2005, Grade 4 and Grade 8 Mathematics Assessments.

Write as a decimal.

$\frac{136}{100} =$ _____

2008-13-21-7

Source: National Assessment of Educational Progress, 2008, Age 13 Mathematics Assessment.

4.NF.7 Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.