

Formative Instructional and Assessment Tasks

Is Tim Incorrect? 5.NF.1-Task 1	
Domain	Numbers and Operations - Fractions
Cluster	Use equivalent fractions as a strategy to add and subtract fractions.
Standard(s)	5.NF.1: Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators.
Materials	Paper and pencil Optional: fraction bars or pattern blocks
Task	Tim added $\frac{3}{6}$ and $\frac{1}{2}$ and wrote an answer of $\frac{4}{12}$. Is Tim's solution correct? Explain why or why not using picture, numbers or words.

Rubric		
Level I	Level II	Level III
Student cannot complete task without assistance.	Student is independently able to give the correct answer but struggles to explain or model why Tim was incorrect.	Student is independently able to give the correct answer and explain/model why Tim was incorrect.

Standards for Mathematical Practice
1. Makes sense and perseveres in solving problems.
2. Reasons abstractly and quantitatively.
3. Constructs viable arguments and critiques the reasoning of others.
4. Models with mathematics.
5. Uses appropriate tools strategically.
6. Attends to precision.
7. Looks for and makes use of structure.
8. Looks for and expresses regularity in repeated reasoning.

This task was adapted from *Howard County Public Schools*

Formative Instructional and Assessment Tasks

Is Tim Incorrect?

Tim added $\frac{3}{6}$ and $\frac{1}{2}$ and wrote an answer of $\frac{4}{12}$.

Is Tim's solution correct? Explain why or why not using picture, numbers or words.

Formative Instructional and Assessment Tasks

Show 2 Ways 5.NF.1-Task 2	
Domain	Numbers and Operations – Fractions
Cluster	Use equivalent fractions as a strategy to add and subtract fractions.
Standard(s)	5.NF.1 Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators.
Materials	Paper and pencil Optional: fraction bars or pattern blocks
Task	Use 2 different strategies to solve this problem. $\frac{2}{23} + 1\frac{1}{2}$ Write a sentence explaining and comparing your 2 different strategies.

Rubric		
Level I	Level II	Level III
Limited Performance Student cannot complete task without assistance.	Not Yet Proficient Student is independently able to use 1 strategy to solve the problem OR the student uses 2 strategies but cannot accurately compare the 2 different strategies.	Proficient in Performance Student is independently able to use 2 different strategies to solve the problem AND the sentence clearly and accurately compares the 2 different strategies.

Standards for Mathematical Practice
1. Makes sense and perseveres in solving problems.
2. Reasons abstractly and quantitatively.
3. Constructs viable arguments and critiques the reasoning of others.
4. Models with mathematics.
5. Uses appropriate tools strategically.
6. Attends to precision.
7. Looks for and makes use of structure.
8. Looks for and expresses regularity in repeated reasoning.

This task was adapted from *Illustrative Mathematics*.

Formative Instructional and Assessment Tasks

Show 2 Ways

Use 2 different strategies to solve this problem.

$$2\frac{2}{3} + 1\frac{1}{2}$$

Write a sentence explaining and comparing your 2 different strategies.

Formative Instructional and Assessment Tasks

What Makes 1/5? 5.NF.1 - Task 3

Domain	Numbers and Operations - Fractions
Cluster	Use equivalent fractions as a strategy to add and subtract fractions.
Standard(s)	5.NF.1 Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators.
Materials	Paper and pencil Optional: fraction bars or pattern blocks
Task	Jenn subtracted 2 fractions with different denominators and came up with a difference of $\frac{1}{5}$? What could the 2 fractions have been? Explain your work using pictures, numbers, and/or words.

Rubric

Level I	Level II	Level III
Limited Performance	Not Yet Proficient	Proficient in Performance
Student cannot complete task without assistance.	Student is independently able to give the correct answer but unable to provide a clear and accurate explanation.	Solution: Any two fractions with a difference of $\frac{1}{5}$ AND an explanation that is clear and accurate.

Standards for Mathematical Practice

1. Makes sense and perseveres in solving problems.
2. Reasons abstractly and quantitatively.
3. Constructs viable arguments and critiques the reasoning of others.
4. Models with mathematics.
5. Uses appropriate tools strategically.
6. Attends to precision.
7. Looks for and makes use of structure.
8. Looks for and expresses regularity in repeated reasoning.

This task was adapted from *Howard County Public Schools*.

Formative Instructional and Assessment Tasks

What Makes $\frac{1}{5}$?

Jenn subtracted 2 fractions with different denominators and came up with a difference of $\frac{1}{5}$.

What could the 2 fractions have been? Explain your work using pictures, numbers, and/or words.

Formative Instructional and Assessment Tasks

Find the Common Denominator 5.NF.1 - Task 4	
Domain	Numbers and Operations - Fractions
Cluster	Use equivalent fractions as a strategy to add and subtract fractions.
Standard(s)	5.NF.1 Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators.
Materials	Paper and pencil Optional: fraction bars, pattern blocks, graph paper
Task	<ol style="list-style-type: none"> Find two different common denominators for $\frac{1}{3}$ and $\frac{3}{4}$ and create equivalent fractions with a common denominator. Use the two equivalent fractions to solve the problem: $\frac{3}{74} - \frac{1}{33}$ Write a sentence to explain how you know that you are correct.

Rubric		
Level I	Level II	Level III
Limited Performance The student is unable to complete the task without assistance.	Not Yet Proficient The student is independently able to correctly complete 2 of the 4 parts of the task.	Proficient in Performance The student is independently able to correctly solve Parts 1 and 2.

Level IV - Student is independently able to correctly complete all three parts of the task.

Standards for Mathematical Practice
1. Makes sense and perseveres in solving problems.
2. Reasons abstractly and quantitatively.
3. Constructs viable arguments and critiques the reasoning of others.
4. Models with mathematics.
5. Uses appropriate tools strategically.
6. Attends to precision.
7. Looks for and makes use of structure.
8. Looks for and expresses regularity in repeated reasoning.

This task was adapted from *Illustrative Mathematics*.

Formative Instructional and Assessment Tasks

Find the Common Denominator

1. Find two different common denominators for $\frac{1}{3}$ and $\frac{3}{4}$ and create equivalent fractions with a common denominator.

2. Use the two equivalent fractions to solve the problem:

$$7\frac{3}{4} - 3\frac{1}{3}$$

3. Write a sentence to explain how you know that you are correct.

Formative Instructional and Assessment Tasks

Baking Cookies 5.NF.2 - Task 1	
Domain	Numbers and Operations - Fractions
Cluster	Use equivalent fractions as a strategy to add and subtract fractions.
Standard(s)	5.NF.2: Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g. by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers.
Materials	Paper and pencil Optional: fraction bars or pattern blocks
Task	Joe and Grace are baking cookies. They need a total of 2 cups of sugar for the recipe. Joe has $\frac{1}{10}$ cups of sugar and Grace has $\frac{1}{4}$ of a cup of sugar. Without solving the problem, do they have enough sugar? Explain your thinking. Solve the problem using a model to justify your reasoning.

Rubric		
Level I	Level II	Level III
Limited Performance <ul style="list-style-type: none"> Student cannot complete task without assistance. 	Not Yet Proficient <ul style="list-style-type: none"> Student is independently able to correctly determine if there was enough sugar but struggled to explain their reasoning. Student struggled with modeling the solution to the problem. 	Proficient in Performance <ul style="list-style-type: none"> Student is independently able to correctly determine if there was enough sugar and explain their reasoning. Student independently modeled the solution to the problem.

Standards for Mathematical Practice
1. Makes sense and perseveres in solving problems.
2. Reasons abstractly and quantitatively.
3. Constructs viable arguments and critiques the reasoning of others.
4. Models with mathematics.
5. Uses appropriate tools strategically.
6. Attends to precision.
7. Looks for and makes use of structure.
8. Looks for and expresses regularity in repeated reasoning.

This task was adapted from *Howard County Public Schools*

Formative Instructional and Assessment Tasks

Baking Cookies

Joe and Grace are baking cookies. They need a total of 2 cups of sugar for the recipe.

Joe has $\frac{11}{10}$ cups of sugar and Grace has $\frac{3}{4}$ of a cup of sugar.

Without solving the problem, do they have enough sugar? Explain your thinking.

Solve the problem using a model to justify your reasoning.

Formative Instructional and Assessment Tasks

To Add or Not To Add? 5.NF.2 - Task 2	
Domain	Number and Operations-Fractions
Cluster	Use equivalent fractions as a strategy to add and subtract fractions.
Standard(s)	5.NF.2 Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. <i>For example, recognize an incorrect result $2/5 + 1/2 = 3/7$, by observing that $3/7 < 1/2$.</i>
Materials	Paper and pencil
Task	<p>For each of the following word problems, determine whether or not $(2/5 + 4/10)$ represents the problem. Explain your decision.</p> <p>A. A farmer planted $2/5$ of his 60 acres in beans and $4/10$ of his 60 acres in corn. What fraction of the 60 acres had been planted in beans or corn?</p> <p>B. Sue drank $2/5$ of her water bottle and Sally drank $4/10$ of her water bottle. How much water did both girls drink?</p> <p>C. Paul made 2 free throws out of 5 free throw attempts. Scott made 4 free throws out of 10 free throw attempts. What is the fraction of free throw attempts that the two boys make together?</p> <p>D. Jeff ran $2/5$ of a mile on Wednesday and $4/10$ of a mile on Friday. How far did he run on those two days?</p> <p>Solutions:</p> <p>A. Yes, $(2/5 + 4/10)$ represents the problem because the two fractions refer to the same whole. None of the land is planted with the both crops, so it is appropriate to add the fractions. $8/10$ of the 60 acres is planted in beans or corn.</p> <p>B. No, $(2/5 + 4/10)$ does not represent the problem. The fractions are of different bottles and are not part of the same whole.</p> <p>C. No, $(2/5 + 4/10)$ does not represent the problem. Paul made $2/5$ free throws and Scott made $4/10$ free throws, but the fractions are of a different number of throws. The total fraction of free throws would be the sum of the number made over the total number attempted or $6/15$).</p> <p>D. Yes, $(2/5 + 4/10)$ represents the problem. Jeff ran parts of a mile which are parts of the same whole, so adding the fractions is appropriate.</p> <p><i>Adapted from Illustrative Mathematics (www.illustrativemathematics.org)</i></p>

Formative Instructional and Assessment Tasks

Rubric		
Level I	Level II	Level III
<p>Limited Performance</p> <ul style="list-style-type: none"> • Student correctly identifies whether $(2/5 + 4/10)$ represents the 0-1 of the problems given. • Student is unable to provide appropriate and accurate justification for each problem. 	<p>Not Yet Proficient</p> <ul style="list-style-type: none"> • Student correctly identifies whether $(2/5 + 4/10)$ represents 2-3 of the problems given. • Student provides appropriate and accurate justification for each decision. 	<p>Proficient in Performance</p> <ul style="list-style-type: none"> • Student correctly identifies whether $(2/5 + 4/10)$ represents the ALL problems given. • Student provides appropriate and accurate justification for each decision.

Standards for Mathematical Practice
1. Makes sense and perseveres in solving problems.
2. Reasons abstractly and quantitatively.
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4. Models with mathematics.
5. Uses appropriate tools strategically.
6. Attends to precision.
7. Looks for and makes use of structure.
8. Looks for and expresses regularity in repeated reasoning.

Formative Instructional and Assessment Tasks To Add or Not To Add?

- A. A farmer planted $\frac{2}{5}$ of his 60 acres in beans and $\frac{4}{10}$ of his 60 acres in corn. What fraction of the 60 acres had been planted in beans or corn?
- B. Sue drank $\frac{2}{5}$ of her water bottle and Sally drank $\frac{4}{10}$ of her water bottle. How much water did both girls drink?
- C. Paul made 2 free throws out of 5 free throw attempts. Scott made 4 free throws out of 10 free throw attempts. What is the fraction of free throw attempts that the two boys make together?
- D. Jeff ran $\frac{2}{5}$ of a mile on Wednesday and $\frac{4}{10}$ of a mile on Friday. How far did he run on those two days?

Formative Instructional and Assessment Tasks

Formative Instructional and Assessment Tasks

How Much Wood? 5.NF.2 - Task 3																			
Domain	Numbers and Operations - Fractions																		
Cluster	Use equivalent fractions as a strategy to add and subtract fractions.																		
Standard(s)	5.NF.2: Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g. by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers.																		
Materials	Paper and pencil Optional: fraction bars or pattern blocks																		
Task	<p>How Much Wood?</p> <p>Each of the Boy Scouts has 5 feet of wood.</p> <p>Part 1: For a project, they use a certain amount of wood. How much wood does each person have left?</p> <table border="1"> <thead> <tr> <th>Person</th> <th>Amount of Wood Used</th> <th>Amount of Wood Left</th> </tr> </thead> <tbody> <tr> <td>Blake</td> <td>2 and $\frac{1}{3}$ feet</td> <td></td> </tr> <tr> <td>Chris</td> <td>1 and $\frac{3}{4}$ feet</td> <td></td> </tr> <tr> <td>Deondre</td> <td>4 and $\frac{5}{6}$ feet</td> <td></td> </tr> <tr> <td>Hector</td> <td>3 and $\frac{2}{3}$ feet</td> <td></td> </tr> <tr> <td>Tyrone</td> <td>2 and $\frac{1}{2}$ feet</td> <td></td> </tr> </tbody> </table> <p>Part 2: How much wood did Blake, Deondre, Hector use? How much wood did Chris and Tyrone use?</p> <p>Part 3: Using your work from Part 2, how many feet of wood did all five boys use for their projects?</p> <p>Part 4: Write an explanation about how you solved Part 3.</p>	Person	Amount of Wood Used	Amount of Wood Left	Blake	2 and $\frac{1}{3}$ feet		Chris	1 and $\frac{3}{4}$ feet		Deondre	4 and $\frac{5}{6}$ feet		Hector	3 and $\frac{2}{3}$ feet		Tyrone	2 and $\frac{1}{2}$ feet	
Person	Amount of Wood Used	Amount of Wood Left																	
Blake	2 and $\frac{1}{3}$ feet																		
Chris	1 and $\frac{3}{4}$ feet																		
Deondre	4 and $\frac{5}{6}$ feet																		
Hector	3 and $\frac{2}{3}$ feet																		
Tyrone	2 and $\frac{1}{2}$ feet																		

Rubric		
Level I	Level II	Level III
<p>Limited Performance</p> <ul style="list-style-type: none"> Student is unable to solve any of the parts of the task. 	<p>Not Yet Proficient</p> <ul style="list-style-type: none"> Student correctly solves 2 of the 4 parts of the task correctly. 	<p>Proficient in Performance</p> <ul style="list-style-type: none"> Part 1: Correctly identifies how much wood each Boy Scout has left: Blake- 2 and $\frac{2}{3}$ feet, Chris- 3 and $\frac{1}{4}$ feet, Deondre- $\frac{1}{6}$ of a foot, Hector- 1 and $\frac{1}{3}$ feet, Tyrone- 2 and $\frac{1}{2}$ feet

Formative Instructional and Assessment Tasks

		<ul style="list-style-type: none">• Part 2: Blake, Deondre, and Hector- 10 and $\frac{5}{6}$ feet; Chris and Tyrone- 4 and $\frac{1}{4}$ feet• Part 3: Total- 15 and $\frac{1}{12}$ feet• Part 4: The explanation includes an accurate description of how the student added fractions to find the correct answer.
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Standards for Mathematical Practice

1. Makes sense and perseveres in solving problems.
2. Reasons abstractly and quantitatively.
3. Constructs viable arguments and critiques the reasoning of others.
4. Models with mathematics.
5. Uses appropriate tools strategically.
6. Attends to precision.
7. Looks for and makes use of structure.
8. Looks for and expresses regularity in repeated reasoning.

Formative Instructional and Assessment Tasks

How Much Wood?

Each of the Boy Scouts has 5 feet of wood.

Part 1: For a project, they use a certain amount of wood. How much wood does each person have left?

Person	Amount of Wood Used	Amount of Wood Left
Blake	2 and $\frac{1}{3}$ feet	
Chris	1 and $\frac{3}{4}$ feet	
Deondre	4 and $\frac{5}{6}$ feet	
Hector	3 and $\frac{2}{3}$ feet	
Tyrone	2 and $\frac{1}{2}$ feet	

Part 2:

How much wood did Blake, Deondre, Hector use?

How much wood did Chris and Tyrone use?

Part 3:

Using your work from Part 2, how many feet of wood did all five boys use for their projects?

Part 4:

Write an explanation about how you solved Part 3.

Formative Instructional and Assessment Tasks

How Much String? 5.NF.2 - Task 4																			
Domain	Numbers and Operations - Fractions																		
Cluster	Use equivalent fractions as a strategy to add and subtract fractions.																		
Standard(s)	5.NF.2: Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g. by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers.																		
Materials	Paper and pencil Optional: fraction bars or pattern blocks																		
Task	<p>How Much String?</p> <p>Each of the Girl Scouts has 4 and 1/2 feet of string.</p> <p>Part 1: For a project, they use a certain amount of string. How much wood does each person have left?</p> <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Person</th> <th>Amount of String Used</th> <th>Amount of String Left</th> </tr> </thead> <tbody> <tr> <td>Amelia</td> <td>1 and 2/3 feet</td> <td></td> </tr> <tr> <td>Briana</td> <td>3/4 of a foot</td> <td></td> </tr> <tr> <td>Catherine</td> <td>2 and 5/6 feet</td> <td></td> </tr> <tr> <td>Fiona</td> <td>3 and 2/3 feet</td> <td></td> </tr> <tr> <td>Kristy</td> <td>3 and 1/4 feet</td> <td></td> </tr> </tbody> </table> <p>Part 2: How much string did Amelia, Briana, and Fiona use? How much string did Catherine and Kristy use?</p> <p>Part 3: Using your work from Part 2, how many feet of string did all five girls use for their projects?</p> <p>Part 4: Write an explanation about how you solved Part 3.</p>	Person	Amount of String Used	Amount of String Left	Amelia	1 and 2/3 feet		Briana	3/4 of a foot		Catherine	2 and 5/6 feet		Fiona	3 and 2/3 feet		Kristy	3 and 1/4 feet	
Person	Amount of String Used	Amount of String Left																	
Amelia	1 and 2/3 feet																		
Briana	3/4 of a foot																		
Catherine	2 and 5/6 feet																		
Fiona	3 and 2/3 feet																		
Kristy	3 and 1/4 feet																		

Rubric		
Level I	Level II	Level III
Limited Performance <ul style="list-style-type: none"> Student is unable to solve any of the parts of the task. 	Not Yet Proficient <ul style="list-style-type: none"> Student correctly solves 2 of the 4 parts of the task correctly. 	Proficient in Performance <ul style="list-style-type: none"> Part 1: Correctly finds the amount of string left: Amelia- 2 and 5/6 feet, Briana- 3 and 3/4 feet, Catherine- 1 and 2/3 feet, Fiona- 5/6 of a foot, Kristy- 1 and 1/4 feet

Formative Instructional and Assessment Tasks

		<ul style="list-style-type: none"> • Part 2: Amelia, Briana, and Fiona- 7 and 7/12; Catherine and Kristy- 2 and 11/12 • Part 3: Total 10 and 6/12 or 10 ½ feet • Part 4: The explanation includes an accurate description of how the student added fractions to find the correct answer.
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Standards for Mathematical Practice
1. Makes sense and perseveres in solving problems.
2. Reasons abstractly and quantitatively.
3. Constructs viable arguments and critiques the reasoning of others.
4. Models with mathematics.
5. Uses appropriate tools strategically.
6. Attends to precision.
7. Looks for and makes use of structure.
8. Looks for and expresses regularity in repeated reasoning.

Formative Instructional and Assessment Tasks

How Much String?

Each of the Girl Scouts has 4 and $\frac{1}{2}$ feet of string.

Part 1: For a project, they use a certain amount of string. How much wood does each person have left?

Person	Amount of String Used	Amount of String Left
Amelia	1 and $\frac{2}{3}$ feet	
Briana	$\frac{3}{4}$ of a foot	
Catherine	2 and $\frac{5}{6}$ feet	
Fiona	3 and $\frac{2}{3}$ feet	
Kristy	3 and $\frac{1}{4}$ feet	

Part 2:

How much string did Amelia, Briana, and Fiona use?

How much string did Catherine and Kristy use?

Part 3:

Using your work from Part 2, how many feet of string did all five girls use for their projects?

Part 4:

Write an explanation about how you solved Part 3.

Formative Instructional and Assessment Tasks

Knot-Tying Project 5.NF.3 -Task 1	
Domain	Numbers and Operations - Fractions
Cluster	Apply and extend previous understandings of multiplication and division to multiply and divide fractions.
Standard(s)	5.NF.3 Interpret a fraction as division of the numerator by the denominator ($a/b=a\div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem.
Materials	Paper and pencil Optional: Counters, snap cubes, or lengths of string/yarn
Task	Mr. Clarke has a rope that is 11 inches long that he needs to cut into 6 equal parts to share with the 6 students in his after-school program for a knot-tying project. Draw a model to show how the rope can be equally shared. What fraction of the rope will each student receive? Write a sentence to explain how you know that you are correct.

Rubric		
Level I	Level II	Level III
Limited Performance <ul style="list-style-type: none"> Student can independently complete 1 of the 3 parts of the task. OR Student cannot complete task without assistance. 	Not Yet Proficient <ul style="list-style-type: none"> Student is independently able to complete parts 1 and 2 of the task, but may have difficulty explaining how division is used. 	Proficient in Performance <ul style="list-style-type: none"> Student is independently able to draw a model of the problem, name the fractional part received, and explain how division was used to solve the problem.

Standards for Mathematical Practice
1. Makes sense and perseveres in solving problems.
2. Reasons abstractly and quantitatively.
3. Constructs viable arguments and critiques the reasoning of others.
4. Models with mathematics.
5. Uses appropriate tools strategically.
6. Attends to precision.
7. Looks for and makes use of structure.
8. Looks for and expresses regularity in repeated reasoning.

This task was adapted from *Illustrative Mathematics*.

Formative Instructional and Assessment Tasks

Knot Tying Project

Mr. Clarke has a rope that is 11 inches long that he needs to cut into 6 equal parts to share with the 6 students in his after-school program for a knot-tying project. Draw a model to show how the rope can be equally shared.

What fraction of the rope will each student receive?

Write a sentence to explain how you know that you are correct.

Formative Instructional and Assessment Tasks

Donation Boxes 5.NF.3 - Task 2	
Domain	Numbers and Operations - Fractions
Cluster	Apply and extend previous understandings of multiplication and division to multiply and divide fractions.
Standard(s)	5.NF.3: Interpret a fraction as division of the numerator by the denominator ($a/b=a\div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem.
Materials	Paper and pencil Optional: Counters, snap cubes, or lengths of string/yarn
Task	James was preparing boxes of school supplies to send to a school in another country. Thirty-two packs of paper were donated for the boxes. This paper had to be shared equally with the 6 boxes being prepared. Draw a model to show how James can divide the paper equally among the 6 boxes. What fractional part of the paper did James put in each box? Create a division equation and label what numbers represent the numerator and denominator in this problem.

Rubric		
Level I	Level II	Level III
Limited Performance <ul style="list-style-type: none"> Student can independently complete 1 of the 3 parts of the task. OR Student cannot complete task without assistance. 	Not Yet Proficient <ul style="list-style-type: none"> Student is independently able to complete 2 of the 3 parts of the task. 	Proficient in Performance <ul style="list-style-type: none"> Student is independently able to draw a model of the problem, name the fractional part received ($5\frac{2}{6}$ or $5\frac{1}{3}$), as well as create and label the equation correctly.

Standards for Mathematical Practice
1. Makes sense and perseveres in solving problems.
2. Reasons abstractly and quantitatively.
3. Constructs viable arguments and critiques the reasoning of others.
4. Models with mathematics.
5. Uses appropriate tools strategically.
6. Attends to precision.
7. Looks for and makes use of structure.
8. Looks for and expresses regularity in repeated reasoning.

This task was adapted from *Illustrative Mathematics*.

Formative Instructional and Assessment Tasks

Donation Boxes

James was preparing boxes of school supplies to send to a school in another country. Thirty-two packs of paper were donated for the boxes. This paper had to be shared equally with the 6 boxes being prepared.

Draw a model to show how James can divide the paper equally among the 6 boxes.

What fractional part of the paper did James put in each box?

Create a division equation and label what numbers represent the numerator and denominator in this problem.

Formative Instructional and Assessment Tasks

Candy Conundrum 5.NF.3 - Task 3	
Domain	Numbers and Operations - Fractions
Cluster	Apply and extend previous understandings of multiplication and division to multiply and divide fractions.
Standard(s)	5.NF.3: Interpret a fraction as division of the numerator by the denominator ($a/b=a\div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem.
Materials	Paper and pencil
Task	<p>Mrs. Pate’s 20 students all got A’s on their math test, so she bought chocolate bars to give them as a reward the next day. During the night, however, Mrs. Pate’s cat chewed up 5 of the bars. She didn’t have time to go to the store to buy more bars.</p> <p>Mrs. Pate put her students into groups of 4. She gave each group 3 chocolate bars and told them they had to find a way to share the 3 bars equally among 4 students.</p> <p>Draw a model to show how the students could have shared the bars. How much chocolate will each student get?</p>

Rubric		
Level I	Level II	Level III
<p>Limited Performance</p> <ul style="list-style-type: none"> Student is unable to solve the task without assistance. 	<p>Not Yet Proficient</p> <ul style="list-style-type: none"> Student draws a model that shows good reasoning about the task but may have some misconceptions. Student may identify how many “pieces” of chocolate each student gets, but does not clearly state that each student gets $\frac{3}{4}$ of a bar. 	<p>Proficient in Performance</p> <ul style="list-style-type: none"> Student draws a model to show the 3 bars divided equally among 4 students. There should be no leftover parts of the chocolate bars, and all students need to receive an equal share. Answers will vary. Student identifies that each student will get $\frac{3}{4}$ of a candy bar.

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6. Attends to precision.
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8. Looks for and expresses regularity in repeated reasoning.

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Formative Instructional and Assessment Tasks

Candy Conundrum

Mrs. Pate's 20 students all got A's on their math test, so she bought chocolate bars to give them as a reward the next day. During the night, however, Mrs. Pate's cat chewed up 5 of the bars. She didn't have time to go to the store to buy more bars.

Mrs. Pate put her students into groups of 4. She gave each group 3 chocolate bars and told them they had to find a way to share the 3 bars equally among 4 students.

Draw a model to show how the students could have shared the bars. How much chocolate will each student get?

Formative Instructional and Assessment Tasks

Basketball or Football? 5.NF.4-Task 1	
Domain	Numbers and Operations – Fractions
Cluster	Apply and extend previous understandings of multiplication and division to multiply and divide fractions.
Standard(s)	<p>5.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.</p> <p>a. Interpret the product $(a/b) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$. <i>For example, use a visual fraction model to show $(2/3) \times 4 = 8/3$, and create a story context for this equation. Do the same with $(2/3) \times (4/5) = 8/15$. (In general, $(a/b) \times (c/d) = ac/bd$.)</i></p> <p>Write and interpret numerical expressions.</p> <p>5.OA.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. <i>For example, express the calculation “add 8 and 7, then multiply by 2” as $2 \times (8 + 7)$. Recognize that $3 \times (18932 + 921)$ is three times as large as $18932 + 921$, without having to calculate the indicated sum or product.</i></p>
Materials	Paper and pencil Optional: fraction bars or pattern blocks
Task	<p>Of the $3/5$ students that participate in sports at Laughlin Middle School, one-half of them participate in basketball and one-fourth of them play football. For each sport, draw a model to find the fractional part of the students that participate in both sports.</p> <p>Write a sentence comparing the relationship between your answers. What relationship did the factors have that influence your products?</p>

Rubric		
Level I	Level II	Level III
<p>Limited Performance</p> <p>Student cannot complete task without assistance.</p>	<p>Not Yet Proficient</p> <p>Student independently gets the correct answer but cannot accurately explain the process OR the student shows appropriate steps but makes a calculation error.</p>	<p>Proficient in Performance</p> <p>Student is independently able to give the correct answer ($3/10$ and $3/20$) and clearly and accurately explains the relationship between the factors (one factor is constant and the other factor ($1/4$) is half of the other ($1/2$)).</p>

Formative Instructional and Assessment Tasks

Standards for Mathematical Practice

1. Makes sense and perseveres in solving problems.
- 2. Reasons abstractly and quantitatively.**
3. Constructs viable arguments and critiques the reasoning of others.
- 4. Models with mathematics.**
5. Uses appropriate tools strategically.
6. Attends to precision.
- 7. Looks for and makes use of structure.**
8. Looks for and expresses regularity in repeated reasoning.

This task was adapted from *Howard County Public Schools*

Formative Instructional and Assessment Tasks

Basketball or Football?

Of the $\frac{3}{5}$ students that participate in sports at Laughlin Middle School, one-half of them participate in basketball and one-fourth of them play football.

For each sport, draw a model to find the fractional part of the students that participate in both sports.

Write a sentence comparing the relationship between your answers. What relationship did the factors have that influence your products?

Formative Instructional and Assessment Tasks

Folded Paper Lengths 5.NF.4 Task 2	
Domain	Numbers and Operations - Fractions
Cluster	Use equivalent fractions as a strategy to add and subtract fractions.
Standard(s)	<p>5.NF.4: Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.</p> <p>5.NF.4a. Interpret the product $(a/b) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$. For example, use a visual fraction model to show $(2/3) \times 4 = 8/3$, and create a story context for this equation. Do the same with $(2/3) \times (4/5) = 8/15$. (In general, $(a/b) \times (c/d) = ac/bd$.)</p>
Materials	Paper and pencil, Scissors, Student Activity Page Optional: fraction bars
Task	<ol style="list-style-type: none"> 1. Label each section of your number line with $1/4$, $2/4$, $3/4$, 1 2. Measure and cut a length of paper that is as long as the $3/4$ mark. Fold the length of paper in half. 3. Write an equation to determine the length of $1/2$ of your paper. Solve the equation. 4. Fold it again. Write an equation to find the length of each new section. Solve.

Rubric		
Level I	Level II	Level III
<ul style="list-style-type: none"> • Student cannot complete task without assistance. <p><i>Note: May need to use fraction bars for student to see what is happening each time the paper is folded.</i></p>	<ul style="list-style-type: none"> • Student may struggle with the understanding of the fractions needed to multiply by for each section and may need assistance to complete. <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • Student may only accurately complete parts 3 or 4. 	<ul style="list-style-type: none"> • Student independently determines the equation for part 3 to be $3/4 \times 1/2$ and the length of the new section length is $3/8$. • Student independently determines the equation for part 4 is $3/4 \times 1/4$ and the length of each section is $3/16$.

Standards for Mathematical Practice
1. Makes sense and perseveres in solving problems.
2. Reasons abstractly and quantitatively.
3. Constructs viable arguments and critiques the reasoning of others.
4. Models with mathematics.
5. Uses appropriate tools strategically.
6. Attends to precision.
7. Looks for and makes use of structure.
8. Looks for and expresses regularity in repeated reasoning.

This task was adapted from *Illustrative Mathematics*.

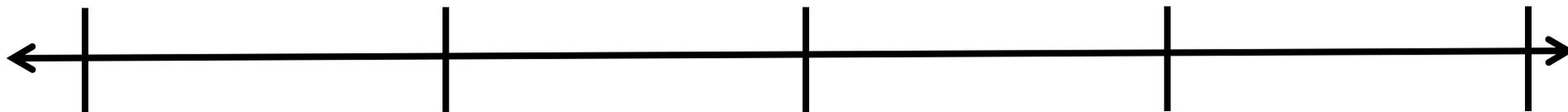
Formative Instructional and Assessment Tasks

Folded Paper Lengths

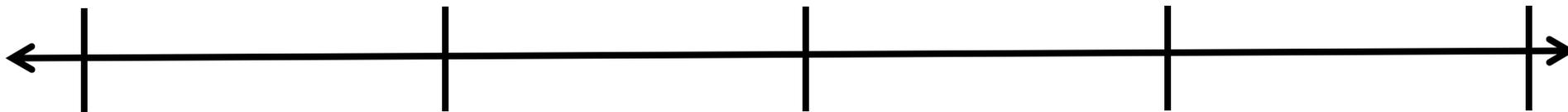
1. Label each section of your number line with $\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$, 1
2. Measure and cut a length of paper that is as long as the $\frac{3}{4}$ mark. Fold the length of paper in half.
3. Write an equation to determine the length of $\frac{1}{2}$ of your paper. Solve the equation.
4. Fold it again. Write an equation to find the length of each new section. Solve

Formative Instructional and Assessment Tasks

Activity Page for 5.NF.4a – Task 2



Activity Page for 5.NF.4a – Task 2



Formative Instructional and Assessment Tasks

Model That Area 5.NF.4 Task 3

Domain	Numbers and Operations - Fractions
Cluster	Use equivalent fractions as a strategy to add and subtract fractions.
Standard(s)	<p>5.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.</p> <p>5.NF.4.b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.</p>
Materials	<p>Paper and pencil, scissors, Student Black Line Master (Recommended that you print them on transparency sheets and cut out individual squares.)</p> <p>Optional: Grid paper to draw the models instead of using Black Line Master's</p>
Task	<p>Give the students a copy of the Student Task Sheet. (Note: A set of transparency squares from the black line master can be given to the students to model the problem or you may just have the students draw the model.)</p> <p>Students should choose 2 of the models from the sheet below Write a multiplication equation that represents each model Turn one model so that it is partitioned vertically and one model is partitioned horizontally. Lay one transparent model on top of the other model. Use the models to find the product of the two fractions.</p> <p>Students should write to explain how models were used to solve the equation.</p> <p>Example:</p>

Formative Instructional and Assessment Tasks

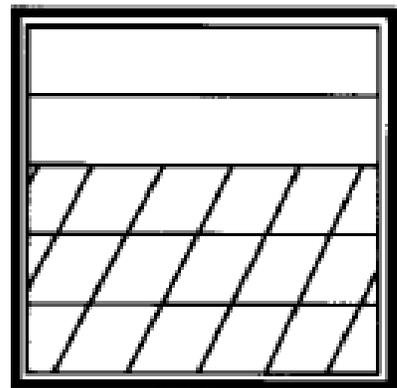
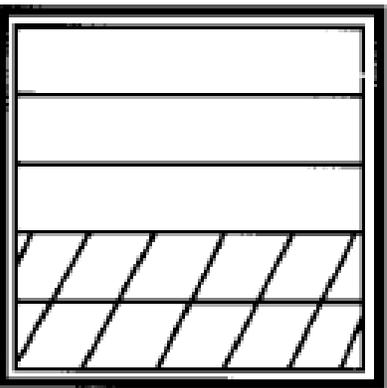
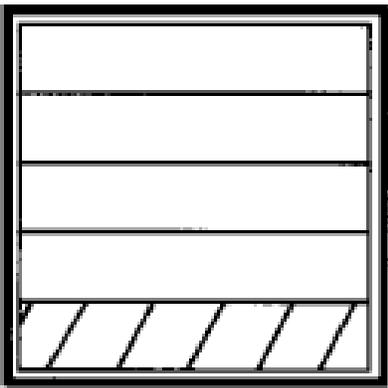
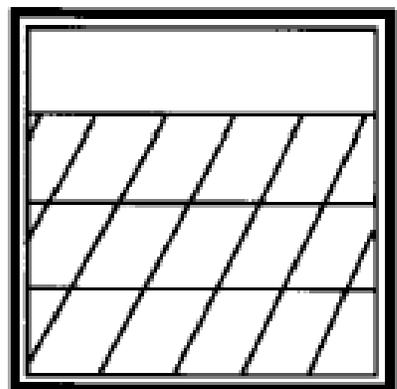
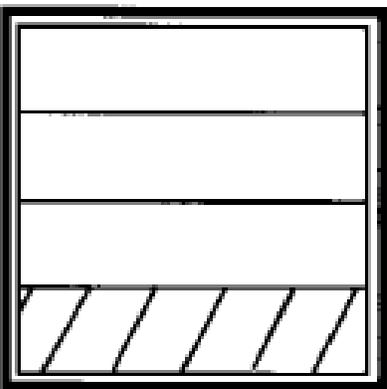
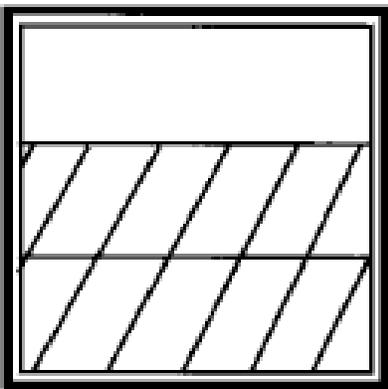
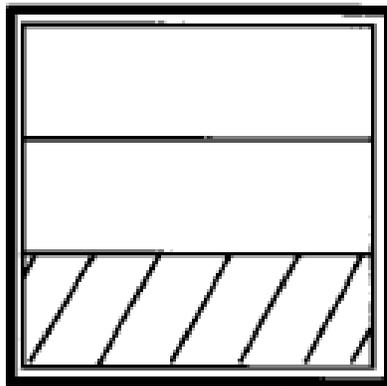
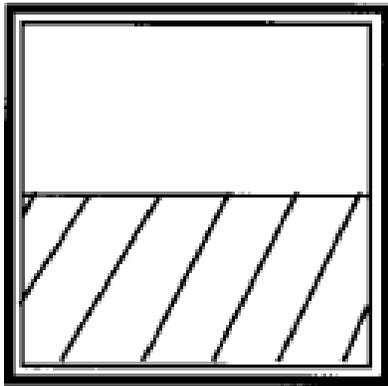
Rubric		
Level I	Level II	Level III
<ul style="list-style-type: none"> • Student struggles to model each problem. • Student cannot complete task without assistance. 	<ul style="list-style-type: none"> • Student independently correctly models each problem given using the transparency squares. • Student struggles to correctly show the area on their model that is the answer to the problem. 	<ul style="list-style-type: none"> • Student independently correctly models each problem given. • Student is independently correctly shows the area on their model that is the answer to the problem.

Standards for Mathematical Practice
1. Makes sense and perseveres in solving problems.
2. Reasons abstractly and quantitatively.
3. Constructs viable arguments and critiques the reasoning of others.
4. Models with mathematics.
5. Uses appropriate tools strategically.
6. Attends to precision.
7. Looks for and makes use of structure.
8. Looks for and expresses regularity in repeated reasoning.

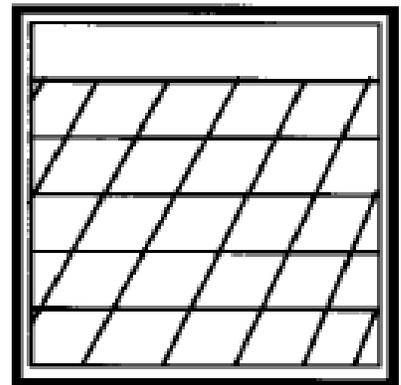
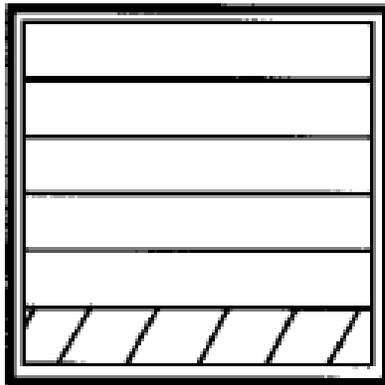
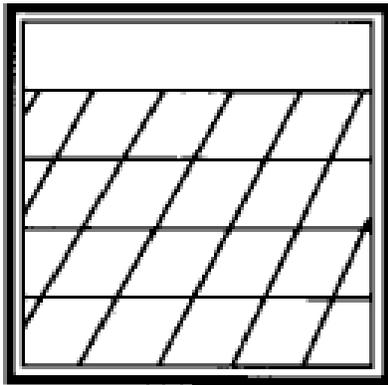
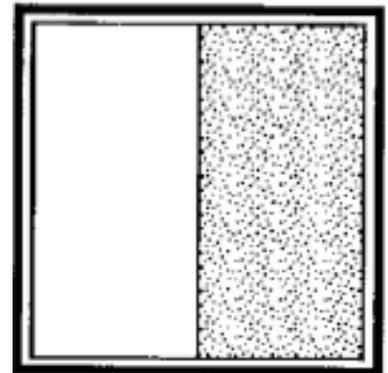
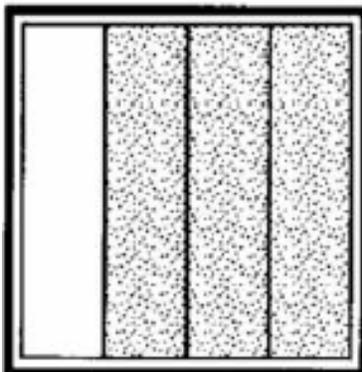
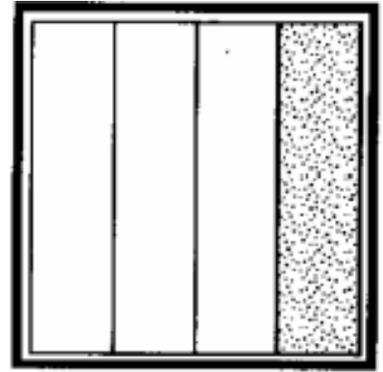
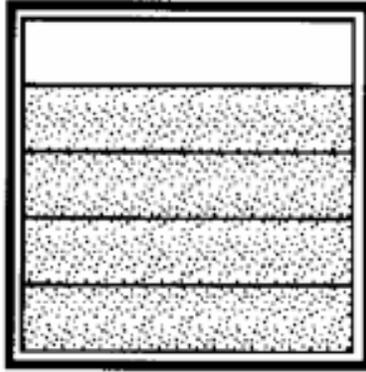
This task was adapted from *Illustrative Mathematics*.

Formative Instructional and Assessment Tasks

5.NF.4b - Task 1 – Student Black Line Master



Formative Instructional and Assessment Tasks



Formative Instructional and Assessment Tasks

Fundraiser Brownies 5.NF.4 - Task 4	
Domain	Numbers and Operations - Fractions
Cluster	Use equivalent fractions as a strategy to add and subtract fractions.
Standard(s)	5.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.
Materials	Paper and pencil
Task	<p>Mrs. Reid told the 5th grade students at Jackson Elementary School that she would bring them brownies if they handed in all of the fundraiser money on time. There are four 5th grade classes at the school. Mrs. Reid made 12 pans of brownies in preparation for the due date. If the brownies are shared equally among the classes, how many pans will each class get?</p> <p>On the day of the fundraiser, only $\frac{3}{4}$ of the classes handed in their money on time. How many pans of brownies will Mrs. Reid need to bring to school?</p> <p>Draw a diagram to show your thinking.</p>

Rubric		
Level I	Level II	Level III
<p>Limited Performance</p> <ul style="list-style-type: none"> Student is unable to solve the task without assistance. 	<p>Not Yet Proficient</p> <ul style="list-style-type: none"> Student draws a diagram for the task and identifies that Mrs. Reid will need to bring 9 pans of brownies. However, the student's work is unclear or confusing and doesn't display a clear understanding of the concepts. 	<p>Proficient in Performance</p> <ul style="list-style-type: none"> Student determines that if all 4 classes meet the goal, each class will receive 3 pans of brownies. Student identifies that since 3 out of 4 of the classes met the goal, Mrs. Reid will have to bring 3×3, or 9, pans of brownies to school. Student draws a diagram that shows a clear understanding of the task and the concepts.

Standards for Mathematical Practice
1. Makes sense and perseveres in solving problems.
2. Reasons abstractly and quantitatively.
3. Constructs viable arguments and critiques the reasoning of others.
4. Models with mathematics.
5. Uses appropriate tools strategically.
6. Attends to precision.
7. Looks for and makes use of structure.
8. Looks for and expresses regularity in repeated reasoning.

Formative Instructional and Assessment Tasks

Fundraiser Brownies

Mrs. Reid told the 5th grade students at Jackson Elementary School that she would bring them brownies if they handed in all of the fundraiser money on time. There are four 5th grade classes at the school. Mrs. Reid made 12 pans of brownies in preparation for the due date.

If the brownies are shared equally among the classes, how many pans will each class get?

On the day of the fundraiser, only $\frac{3}{4}$ of the classes handed in their money on time. How many pans of brownies will Mrs. Reid need to bring to school?

Draw a diagram to show your thinking.

Formative Instructional and Assessment Tasks

Comparing Times in the Mile Run 5.NF.5 – Task 1	
Domain	Number and Operations - Fractions
Cluster	Apply and extend previous understandings of multiplication and division to multiply and divide fractions.
Standard(s)	<p>5.NF.5 Interpret multiplication as scaling (resizing), by:</p> <p>a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.</p> <p>b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.</p> <p>Additional Standard:</p> <p>5.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.</p> <p>a. Interpret the product $(a/b) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$. <i>For example, use a visual fraction model to show $(2/3) \times 4 = 8/3$, and create a story context for this equation. Do the same with $(2/3) \times (4/5) = 8/15$. (In general, $(a/b) \times (c/d) = ac/bd$.)</i></p>
Materials	Task handout
Task	<p>Four students run a mile in P.E. class. Each student's mile time is listed below.</p> <ul style="list-style-type: none"> • Samantha: 7 and 1/2 minutes • Tom: 3/4 times Samantha's time • Allison: 1 and 2/5 times Samantha's time • Nancy: 1 and 1/2 times Samantha's time • Mary: 5/6 times Samantha's time • Bobby: 1 and 2/3 times Samantha's time <p>Part 1: Which students ran faster than Samantha? How do you know?</p> <p>Part 2: Without calculating, list the students in order from the fastest to the slowest. Write an explanation about how you found the order of the students.</p> <p>Part 3: Find the actual times of each students as fractions of a minute. Compare your answers to Part 1. Do they match?</p>

Formative Instructional and Assessment Tasks

Rubric		
Level I	Level II	Level III
<ul style="list-style-type: none"> Student uses inappropriate solution strategy and does not get the correct answer. 	<p>Not Yet Proficient</p> <ul style="list-style-type: none"> Finds the correct answer, but there may be inaccuracies or incomplete justification of solution <p style="text-align: center;"><u><i>OR</i></u></p> <ul style="list-style-type: none"> Uses partially correct strategy, but gets the wrong answer. 	<p>Proficient in Performance</p> <ul style="list-style-type: none"> Accurately solves problem; Part 1: Tom and Mary are faster. Allison, Nancy, and Bob are slower. Explanation should discuss that when the class had a fraction greater than 1 then they were slower and if the fraction is less than 1 they were faster. Part 2: Tom, Mary, Samantha, Allison, Nancy, Bob. Explanation should discuss comparing the factors for each of the students. Part 3: Tom: 4 1/2 minutes; Allison: 9 minutes; Nancy: 11 and 1/4 minutes; Mary: 6 and 3/12 or 6 1/4 minutes; Bobby: 12 and 3/6 or 12 and 1/2 minutes. Explanation discusses multiplying fractions. Use appropriate equations to justify the solution.

*Level IV: student uses multiple models to support their reasoning (i.e., equations, arrays, etc.). Student also notices additional patterns.

Standards for Mathematical Practice
1. Makes sense and perseveres in solving problems.
2. Reasons abstractly and quantitatively.
3. Constructs viable arguments and critiques the reasoning of others.
4. Models with mathematics.
5. Uses appropriate tools strategically.
6. Attends to precision.
7. Looks for and makes use of structure.
8. Looks for and expresses regularity in repeated reasoning.

Formative Instructional and Assessment Tasks

Comparing Times in the Mile Run

Four students run a mile in P.E. class.

Each student's mile time is listed below.

- Samantha: 7 and $\frac{1}{2}$ minutes
- Tom: $\frac{3}{4}$ times Samantha's time
- Allison: 1 and $\frac{2}{5}$ times Samantha's time
- Nancy: 1 and $\frac{1}{2}$ times Samantha's time
- Mary: $\frac{5}{6}$ times Samantha's time
- Bobby: 1 and $\frac{2}{3}$ times Samantha's time

Part 1:

Which students ran faster than Samantha? How do you know?

Which students ran slower than Samantha? How do you know?

Part 2:

Without calculating, list the students in order from the fastest to the slowest. Write an explanation about how you found the order of the students.

Part 3:

Find the actual times of each student as fractions of a minute. Compare your answers to Part 1. Do they match?

Formative Instructional and Assessment Tasks

Who Has More Box Tops? 5.NF.5 – Task 2	
Domain	Number and Operations - Fractions
Cluster	Apply and extend previous understandings of multiplication and division to multiply and divide fractions.
Standard(s)	<p>5.NF.5 Interpret multiplication as scaling (resizing), by:</p> <p>a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.</p> <p>b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.</p> <p>Additional Standard:</p> <p>5.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.</p> <p>a. Interpret the product $(a/b) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$. <i>For example, use a visual fraction model to show $(2/3) \times 4 = 8/3$, and create a story context for this equation. Do the same with $(2/3) \times (4/5) = 8/15$. (In general, $(a/b) \times (c/d) = ac/bd$.)</i></p>
Materials	Task handout
Task	<p style="text-align: center;">Who has More Box Tops?</p> <p>The four Fifth Grade classes at Smith Elementary School are having a competition to collect Box Tops. Below is the information about the number of Box Tops that each class has collected.</p> <ul style="list-style-type: none"> • Mrs. Jacoby’s class: 240 box tops • Mrs. Albert’s class: $2/3$ as much as Mrs. Jacoby’s class • Mrs. Thomas’ class: 1 and $1/3$ as much as Mrs. Jacoby’s class • Mr. Williams’ class: 1 and $2/3$ as much as Mrs. Jacoby’s class • Mrs. Yount’s class: $5/6$ as much as Mrs. Jacoby’s class. <p>Part 1: Which class collected more Box Tops than Mrs. Jacoby’s class? How do you know? Which class collected fewer Box Tops than Mrs. Jacoby’s class? How do you know?</p> <p>Part 2: Without calculating, list the classes in descending order in terms of the number of box tops. Write an explanation about how you found the order of the classes.</p> <p>Part 3: Find the actual number of box tops for each class. Write an explanation about how you found your answers.</p>

Formative Instructional and Assessment Tasks

Rubric		
Level I	Level II	Level III
<ul style="list-style-type: none"> Student uses inappropriate solution strategy and does not get the correct answer. 	<p>Not Yet Proficient</p> <ul style="list-style-type: none"> Finds the correct answer, but there may be inaccuracies or incomplete justification of solution <p style="text-align: center;"><u>OR</u></p> <ul style="list-style-type: none"> Uses partially correct strategy, but gets the wrong answer. 	<p>Proficient in Performance</p> <ul style="list-style-type: none"> Accurately solves problem Part 1: Mr. Thomas' and Mrs. Williams' class had more box tops. Mrs. Albert's and Mrs. Yount's class had fewer box tops. Explanation should discuss that when the class had a fraction greater than 1 then they had more box tops and if the fraction is less than 1 they had fewer box tops. Part 2: Mrs. Williams, Mrs. Thomas, Mrs. Jacoby, Mrs. Yount, Mrs. Albert. Discussion should include comparing the value of the fractions for each class. Part 3: Albert: 160; Thomas: 320; Williams: 400; Yount: 200. Explanation should include that they multiplied 240 by their fraction. Use appropriate equations to justify the solution.

*Level IV: student uses multiple models to support their reasoning (i.e., equations, arrays, etc.). Student also notices additional patterns.

Standards for Mathematical Practice
1. Makes sense and perseveres in solving problems.
2. Reasons abstractly and quantitatively.
3. Constructs viable arguments and critiques the reasoning of others.
4. Models with mathematics.
5. Uses appropriate tools strategically.
6. Attends to precision.
7. Looks for and makes use of structure.
8. Looks for and expresses regularity in repeated reasoning.

Formative Instructional and Assessment Tasks

Who has More Box Tops?

The four Fifth Grade classes at Smith Elementary School are having a competition to collect Box Tops. Below is the information about the number of Box Tops that each class has collected.

- Mrs. Jacoby's class: 240 box tops
- Mrs. Albert's class: $\frac{2}{3}$ as much as Mrs. Jacoby's class
- Mrs. Thomas' class: $1\frac{1}{3}$ as much as Mrs. Jacoby's class
- Mr. Williams' class: $1\frac{2}{3}$ as much as Mrs. Jacoby's class
- Mrs. Yount's class: $\frac{5}{6}$ as much as Mrs. Jacoby's class.

Part 1:

Which class collected more Box Tops than Mrs. Jacoby's class? How do you know?

Without calculating, list the classes in descending order in terms of the number of box tops.

Write an explanation about how you found the order of the classes.

Part 2:

Find the actual number of box tops for each class.

Write an explanation about how you found your answers.

Formative Instructional and Assessment Tasks

Which Room is Larger? 5.NF.5 – Task 3																			
Domain	Number and Operations - Fractions																		
Cluster	Apply and extend previous understandings of multiplication and division to multiply and divide fractions.																		
Standard(s)	<p>5.NF.5 Interpret multiplication as scaling (resizing), by:</p> <p>a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.</p> <p>b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.</p> <p>Additional Standard:</p> <p>5.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.</p> <p>b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.</p>																		
Materials	Task handout, Graph paper (optional)																		
Task	<p style="text-align: center;">Which Room is Larger?</p> <p>Newfield Elementary School is a brand new school. When the fifth grade teachers first see the school, they talk about which rooms are larger.</p> <p>The dimensions of the rooms are below:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Rooms</th> <th>Length</th> <th>Width</th> </tr> </thead> <tbody> <tr> <td>Room A</td> <td>40 feet</td> <td>15 and 1/3 yards</td> </tr> <tr> <td>Room B</td> <td>3/4 the length of Room A</td> <td>15 and 1/3 yards</td> </tr> <tr> <td>Room C</td> <td>1 and 3/16 the length of Room A</td> <td>15 and 1/3 yards</td> </tr> <tr> <td>Room D</td> <td>1 and 1/8 the length of Room A</td> <td>15 and 1/3 yards</td> </tr> <tr> <td>Room E</td> <td>7/8 the length of Room A</td> <td>15 and 1/3 yards</td> </tr> </tbody> </table> <p>Part 1: Which rooms are larger than Room A? Which rooms are smaller than Room A? How do you know?</p> <p>Part 2: Without calculating, order the rooms in ascending order in terms of size. Write an explanation about how you determined the order of the rooms.</p> <p>Part 3: Find the area of each of the rooms. Does your order now match the order above? Write an explanation about how you calculated the size of the rooms.</p>	Rooms	Length	Width	Room A	40 feet	15 and 1/3 yards	Room B	3/4 the length of Room A	15 and 1/3 yards	Room C	1 and 3/16 the length of Room A	15 and 1/3 yards	Room D	1 and 1/8 the length of Room A	15 and 1/3 yards	Room E	7/8 the length of Room A	15 and 1/3 yards
Rooms	Length	Width																	
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Room B	3/4 the length of Room A	15 and 1/3 yards																	
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Room D	1 and 1/8 the length of Room A	15 and 1/3 yards																	
Room E	7/8 the length of Room A	15 and 1/3 yards																	

Formative Instructional and Assessment Tasks

Rubric		
Level I	Level II	Level III
<ul style="list-style-type: none"> Student uses inappropriate solution strategy and does not get the correct answer. 	<p>Not Yet Proficient</p> <ul style="list-style-type: none"> Finds the correct answer, but there may be inaccuracies or incomplete justification of solution <i>OR</i> Uses partially correct strategy, but gets the wrong answer. 	<p>Proficient in Performance</p> <ul style="list-style-type: none"> Accurately solves problem Part 1: Rooms B and E are smaller. Rooms C and D are larger. Explanation should discuss that when the comparison fraction in the Length column was greater than 1 then the room was larger and if the fraction is less than 1 the room was smaller. Part 2: Room B, Room E, Room A, Room D, Room C. Explanation should include that fractions were compared in order to determine the order of the rooms. Part 3: Room A: 613 and $\frac{1}{3}$ yards; Room B: 460 yards; Room C: 728 and $\frac{1}{3}$ yards; Room D: 680 yards; Room E: 536 and $\frac{2}{3}$ yards. Explanation discusses multiplying the fractions. Use appropriate equations to justify the solution

*Level IV: student uses multiple models to support their reasoning (i.e., equations, arrays, etc.). Student also notices additional patterns.

Standards for Mathematical Practice

1. Makes sense and perseveres in solving problems.
2. Reasons abstractly and quantitatively.
3. Constructs viable arguments and critiques the reasoning of others.
4. Models with mathematics.
5. Uses appropriate tools strategically.
6. Attends to precision.
7. Looks for and makes use of structure.
8. Looks for and expresses regularity in repeated reasoning.

Formative Instructional and Assessment Tasks

Which Room is Larger?

Newfield Elementary School is a brand new school. When the fifth grade teachers first see the school, they talk about which rooms are larger.

The dimensions of the rooms are below:

Rooms	Length	Width
Room A	40 feet	15 and $\frac{1}{3}$ yards
Room B	$\frac{3}{4}$ the length of Room A	15 and $\frac{1}{3}$ yards
Room C	1 and $\frac{3}{16}$ the length of Room A	15 and $\frac{1}{3}$ yards
Room D	1 and $\frac{1}{8}$ the length of Room A	15 and $\frac{1}{3}$ yards
Room E	$\frac{7}{8}$ the length of Room A	15 and $\frac{1}{3}$ yards

Part 1:

Which rooms are larger than Room A?

Which rooms are smaller than Room A?

Without calculating, order the rooms in ascending order in terms of size.

Write an explanation about how you determined the order of the rooms.

Part 2:

Find the area of each of the rooms.

Does your order now match the order above?

Write an explanation about how you calculated the size of the rooms.

Formative Instructional and Assessment Tasks

Birthday Cake 5.NF.5 – Task 4	
Domain	Number and Operations - Fractions
Cluster	Apply and extend previous understandings of multiplication and division to multiply and divide fractions.
Standard(s)	<p>5.NF.5 Interpret multiplication as scaling (resizing), by:</p> <p>a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.</p> <p>b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.</p> <p>Additional Standard:</p> <p>5.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.</p> <p>b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.</p>
Materials	Task handout, graph paper
Task	<p style="text-align: center;">Birthday Cake</p> <p>Birthday Cakes are for sale at the bake shop. The price depends on the size of the cake.</p> <p>Part 1: The vanilla cake is 12 inches wide, 9 inches long and 5 and 1/2 inches high. Calculate the volume of the vanilla cake.</p> <p>Part 2: The store's strawberry cake is $7/6$ the width of the vanilla cake. Without calculating, how does the size of the strawberry cake compare to the size of the vanilla cake? How do you know? Calculate the volume of the strawberry cake.</p> <p>Part 3: The store's chocolate cake is $1/3$ the width of the vanilla cake, but its length is triple the height. Without calculating, how does the size of the chocolate cake compare to the size of the vanilla cake? How do you know? Calculate the volume of the chocolate cake.</p> <p>Part 4 (Extension): If the price of the cake is \$1.25 per cubic inch what are the prices are the various cakes?</p>

Formative Instructional and Assessment Tasks

Rubric		
Level I	Level II	Level III
<ul style="list-style-type: none"> Student uses inappropriate solution strategy and does not get the correct answer. 	<p>Not Yet Proficient</p> <ul style="list-style-type: none"> Finds the correct answer, but there may be inaccuracies or incomplete justification of solution <p style="text-align: center;"><u>OR</u></p> <ul style="list-style-type: none"> Uses partially correct strategy, but gets the wrong answer. 	<p>Proficient in Performance</p> <ul style="list-style-type: none"> Accurately solves problem Part 1: 594 cubic inches. Part 2: The strawberry cake will be larger since $\frac{7}{6}$ is larger than 1. The volume is 693 cubic inches. Part 3: The chocolate cake is the same size as the vanilla cake. The width is $\frac{1}{3}$ and the length is tripled so the volume will be the same. The volume is 594 inches. Part 4: The cost of the vanilla cake is \$742.50. The cost of the strawberry cake is \$866.25. The cost of the chocolate cake is \$742.50. Use appropriate equations to justify the solution

*Level IV: student uses multiple models to support their reasoning (i.e., equations, arrays, etc.). Student also notices additional patterns.

Standards for Mathematical Practice
1. Makes sense and perseveres in solving problems.
2. Reasons abstractly and quantitatively.
3. Constructs viable arguments and critiques the reasoning of others.
4. Models with mathematics.
5. Uses appropriate tools strategically.
6. Attends to precision.
7. Looks for and makes use of structure.
8. Looks for and expresses regularity in repeated reasoning.

Formative Instructional and Assessment Tasks

Birthday Cake

Birthday Cakes are for sale at the bake shop. The price depends on the size of the cake.

Part 1:

The vanilla cake is 12 inches wide, 9 inches long and 5 and $\frac{1}{2}$ inches high. Calculate the volume of the vanilla cake.

Part 2:

The store's strawberry cake is $\frac{7}{6}$ the width of the vanilla cake.

Without calculating, how does the size of the strawberry cake compare to the size of the vanilla cake? How do you know?

Calculate the volume of the strawberry cake.

Part 3:

The store's chocolate cake is $\frac{1}{3}$ the width of the vanilla cake, but its length is triple the height.

Without calculating, how does the size of the chocolate cake compare to the size of the vanilla cake? How do you know?

Calculate the volume of the chocolate cake.

Part 4 (Extension):

If the price of the cake is \$1.25 per cubic inch what are the prices are the various cakes?

Formative Instructional and Assessment Tasks

Multiplying Fractions with Color Tiles 5.NF.6 - Task 1	
Domain	Numbers and Operations - Fractions
Cluster	Use equivalent fractions as a strategy to add and subtract fractions.
Standard(s)	5.NF.6 Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.
Materials	Paper and pencil 1 inch grid paper and color tiles
Task	<p>Part 1: Have students cut a 4x4 inch grid and solve the problem below. Cover $\frac{3}{4}$ of the grid with one color of the tiles. Cover $\frac{1}{2}$ of the covered area with another color of the tiles. Write an equation to show how much of your model is covered by both colors of tiles.</p> <p>Part 2: Have students cut a 6x6 inch grid and solve the problem below. Cover $\frac{2}{3}$ of the grid with one color of the tiles. Cover $\frac{1}{4}$ of the covered area with another color of the tiles. Write an equation to show how much of your model is covered by both colors of tiles.</p> <p>Part 3: What relationship do you notice between the numerators in your two factors and your product? What relationship do you notice between the denominators?</p>

Rubric		
Level I	Level II	Level III
<p>Limited Performance</p> <ul style="list-style-type: none"> Student cannot complete task without assistance. 	<p>Not Yet Proficient</p> <ul style="list-style-type: none"> Student is independently able to correctly complete 1 of the 2 models. Student struggles to write an equation for each model. 	<p>Proficient in Performance</p> <ul style="list-style-type: none"> Student independently correctly completes both models. Student independently writes an equation for each model. Student independently describes that the numerators get multiplied together to find the product and that the same happens to the denominators.

Formative Instructional and Assessment Tasks

Standards for Mathematical Practice

1. **Makes sense and perseveres in solving problems.**
2. **Reasons abstractly and quantitatively.**
3. Constructs viable arguments and critiques the reasoning of others.
4. **Models with mathematics.**
5. **Uses appropriate tools strategically.**
6. **Attends to precision.**
7. **Looks for and makes use of structure.**
8. Looks for and expresses regularity in repeated reasoning.

This task was adapted from *NYC Public Schools*.

Formative Instructional and Assessment Tasks

Multiplying Fractions with Color Tiles

Part 1:

Have students cut a 4x4 inch grid and solve the problem below.

Cover $\frac{3}{4}$ of the grid with one color of the tiles.

Cover $\frac{1}{2}$ of the covered area with another color of the tiles.

Write an equation to show how much of your model is covered by both colors of tiles.

Part 2:

Have students cut a 6x6 inch grid and solve the problem below.

Cover $\frac{2}{3}$ of the grid with one color of the tiles.

Cover $\frac{1}{4}$ of the covered area with another color of the tiles.

Write an equation to show how much of your model is covered by both colors of tiles.

Part 3:

What relationship do you notice between the numerators in your two factors and your product? What relationship do you notice between the denominators?

Formative Instructional and Assessment Tasks

Bird Feeder Fractions 5.NF.6 - Task 2	
Domain	Numbers and Operations - Fractions
Cluster	Use equivalent fractions as a strategy to add and subtract fractions.
Standard(s)	5.NF.6. Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.
Materials	Paper and pencil Optional: Color tiles, fraction bars
Task	<p>Solve the problems below. Use models and equations to show your answers.</p> <ol style="list-style-type: none"> Desiree has $3\frac{1}{2}$ bags of bird seed to fill the bird feeders. Each bag weighs $\frac{3}{4}$ of a pound. How many pounds of birdseed does Desiree have? If Desiree needs double the amount of bird seed how many bags should she buy? Brooks used $\frac{2}{3}$ of a can of paint to paint the bird feeder. A full can of paint contains $\frac{7}{8}$ of a gallon. How much paint did Brooks use? If Brooks painted more and only had $\frac{1}{12}$ of a can of paint left what fraction of the can of paint did he use? Write about a strategy that you used to solve the tasks.

Rubric		
Level I	Level II	Level III
Limited Performance <ul style="list-style-type: none"> Student cannot complete task without assistance. 	Not Yet Proficient <ul style="list-style-type: none"> Student independently correctly completes 1 of the 2 models. Student independently correctly completes 1 of the 2 equations. 	Proficient in Performance <ul style="list-style-type: none"> Student independently correctly completes both tasks. Student independently writes an equation for each model. Student writes a clear and appropriate strategy for multiplying fractions.

Standards for Mathematical Practice
1. Makes sense and perseveres in solving problems.
2. Reasons abstractly and quantitatively.
3. Constructs viable arguments and critiques the reasoning of others.
4. Models with mathematics.
5. Uses appropriate tools strategically.
6. Attends to precision.
7. Looks for and makes use of structure.
8. Looks for and expresses regularity in repeated reasoning.

This task was adapted from *NYC Public Schools*.

Formative Instructional and Assessment Tasks

Bird Feeder Fractions

Solve the problems below. Use models and equations to show your answers.

1. Desiree has $3\frac{1}{2}$ bags of bird seed to fill the bird feeders. Each bag weighs $\frac{3}{4}$ of a pound. How many pounds of birdseed does Desiree have? If Desiree needs double the amount of bird seed how many bags should she buy?

2. Brooks used $\frac{2}{3}$ of a can of paint to paint the bird feeder. A full can of paint contains $\frac{7}{8}$ of a gallon. How much paint did Brooks use? If Brooks painted more and only had $\frac{1}{12}$ of a can of paint left what fraction of the can of paint did he use?

3. Write about a strategy that you used to solve the tasks.

Formative Instructional and Assessment Tasks

Sloan's Coins 5.NF.7 - Task 1	
Domain	Numbers and Operations - Fractions
Cluster	Apply and extend previous understandings of multiplication and division to multiply and divide fractions.
Standard(s)	5.NF.7 Apply and extend previous understandings of division to divide unit fraction by whole numbers and whole numbers by unit fractions. (Note: Students able to multiply fractions in general can develop strategies to divide fractions in general, by reasoning about the relationship between multiplication and division. But division of a fraction by a fraction is not a requirement of this grade.)
Materials	Paper and pencil
Task	Sloan has begun saving half dollar coins. She has \$6.00 worth of coins. How many half dollar coins does Sloan have? Draw a model to support your solution. Write an equation for this problem.

Rubric		
Level I	Level II	Level III
<p>Limited Performance</p> <ul style="list-style-type: none"> Student is unable to solve the task or draw a diagram without assistance. 	<p>Not Yet Proficient</p> <ul style="list-style-type: none"> Student draws a model for the context. Student may initially decide Sloan has 3 half dollars and may need some assistance in using their model to see that Sloan has 12. Student is unable to generate an equation for the problem. 	<p>Proficient in Performance</p> <ul style="list-style-type: none"> Student draws a model to examine show the context. Student identifies that Sloan has 12 half dollar coins. Student writes one of the following equations: $6 \times 2 = 12$ $6 \div \frac{1}{2} = 12$ Teacher Note: These two equations are equivalent. After all students have had time to work on the task, it may be appropriate to discuss both equations so that students who didn't recognize the division context will begin to see the connection.

Formative Instructional and Assessment Tasks

Standards for Mathematical Practice

1. Makes sense and perseveres in solving problems.
- 2. Reasons abstractly and quantitatively.**
3. Constructs viable arguments and critiques the reasoning of others.
- 4. Models with mathematics.**
5. Uses appropriate tools strategically.
6. Attends to precision.
- 7. Looks for and makes use of structure.**
8. Looks for and expresses regularity in repeated reasoning.

This task was adapted from *Illustrative Mathematics*.

Formative Instructional and Assessment Tasks

Sloan's Coins

Sloan has begun saving half dollar coins. She has \$6.00 worth of coins.

How many half dollar coins does Sloan have?

Draw a model to support your solution. Write an equation for this problem.

Formative Instructional and Assessment Tasks

Sullivan’s Bakery 5.NF.7 - Task 2	
Domain	Numbers and Operations - Fractions
Cluster	Apply and extend previous understandings of multiplication and division to multiply and divide fractions.
Standard(s)	5.NF.7 Apply and extend previous understandings of division to divide unit fraction by whole numbers and whole numbers by unit fractions. (Note: Students able to multiply fractions in general can develop strategies to divide fractions in general, by reasoning about the relationship between multiplication and division. But division of a fraction by a fraction is not a requirement of this grade.)
Materials	Paper and pencil
Task	<p>Mrs. Sullivan owns a bakery. One of her customers cancelled their cake order after the cake was already made. Mrs. Sullivan gave half of the cake to her employees to eat. She brought the other half home for her family to eat. If there are 5 members of the Sullivan family, and they share the cake equally, how much of the original cake will each family member get to eat?</p> <p>Draw a model and write an equation to show your work.</p>

Rubric		
Level I	Level II	Level III
<p>Limited Performance</p> <ul style="list-style-type: none"> • Student is unable to draw a model or generate an equation. 	<p>Not Yet Proficient</p> <ul style="list-style-type: none"> • Student draws a model for the problem but is unable to write a correct equation. 	<p>Proficient in Performance</p> <ul style="list-style-type: none"> • Student draws an accurate model to show how much cake each member of the family will get. • Student writes an equation for the problem: $\frac{1}{2} \div 5 = 1/10$.

Standards for Mathematical Practice
1. Makes sense and perseveres in solving problems.
2. Reasons abstractly and quantitatively.
3. Constructs viable arguments and critiques the reasoning of others.
4. Models with mathematics.
5. Uses appropriate tools strategically.
6. Attends to precision.
7. Looks for and makes use of structure.
8. Looks for and expresses regularity in repeated reasoning.

Formative Instructional and Assessment Tasks

Sullivan's Bakery

Mrs. Sullivan owns a bakery. One of her customers cancelled their cake order after the cake was already made. Mrs. Sullivan gave half of the cake to her employees to eat. She brought the other half home for her family to eat. If there are 5 members of the Sullivan family, and they share the cake equally, how much of the original cake will each family member get to eat?

Draw a model and write an equation to show your work.

Formative Instructional and Assessment Tasks

Mackenzie's Sugar 5.NF.7 - Task 3	
Domain	Numbers and Operations - Fractions
Cluster	Apply and extend previous understandings of multiplication and division to multiply and divide fractions.
Standard(s)	5.NF.7 Apply and extend previous understandings of division to divide unit fraction by whole numbers and whole numbers by unit fractions. (Note: Students able to multiply fractions in general can develop strategies to divide fractions in general, by reasoning about the relationship between multiplication and division. But division of a fraction by a fraction is not a requirement of this grade.)
Materials	Paper and pencil
Task	Mackenzie used 2 cups of sugar to make cookies. 2 cups is $\frac{1}{3}$ of all the sugar she had. How much sugar did Mackenzie have before she made cookies? Draw a model and write an expression to support your reasoning.

Rubric		
Level I	Level II	Level III
<p>Limited Performance</p> <ul style="list-style-type: none"> Student is unable to solve the task without assistance. 	<p>Not Yet Proficient</p> <ul style="list-style-type: none"> Student draws a model for the context. Student identifies that before making cookies, Mackenzie had 6 cups of sugar. Student is unable to generate an equation for the context. 	<p>Proficient in Performance</p> <ul style="list-style-type: none"> Student draws a model for the context. Student identifies that before making cookies, Mackenzie had 6 cups of sugar. Student write an equation for the problem: $2 \div \frac{1}{3} = 6$ $2 \times 3 = 6$ Teacher Note: These two equations are equivalent. After all students have had time to work on the task, it may be appropriate to discuss both equations so that students who didn't recognize the division context will begin to see the connection.

Formative Instructional and Assessment Tasks

Standards for Mathematical Practice

1. Makes sense and perseveres in solving problems.
- 2. Reasons abstractly and quantitatively.**
3. Constructs viable arguments and critiques the reasoning of others.
- 4. Models with mathematics.**
5. Uses appropriate tools strategically.
6. Attends to precision.
- 7. Looks for and makes use of structure.**
8. Looks for and expresses regularity in repeated reasoning.

Formative Instructional and Assessment Tasks

Mackenzie's Sugar

Mackenzie used 2 cups of sugar to make cookies. 2 cups is $\frac{1}{3}$ of all the sugar she had. How much sugar did Mackenzie have before she made cookies?

Draw a model and write an expression to support your reasoning.

Formative Instructional and Assessment Tasks

Writing a Division Story 5.NF.7 – Task 4	
Domain	Number and Operations - Fractions
Cluster	Apply and extend previous understandings of multiplication and division to multiply and divide fractions.
Standard(s)	<p>5.NF.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.¹</p> <p>a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. <i>For example, create a story context for $(1/3) \div 4$, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $(1/3) \div 4 = 1/12$ because $(1/12) \times 4 = 1/3$.</i></p> <p>¹Students able to multiply fractions in general can develop strategies to divide fractions in general, by reasoning about the relationship between multiplication and division. But division of a fraction by a fraction is not a requirement at this grade.</p>
Materials	Task handout
Task	<p style="text-align: center;">Writing a Division Story</p> <p>Part 1: Solve the problem $1/2$ divided by 4 using both a visual fraction model and a number line in the space below.</p> <p>Part 2: Write a word problem that matches the problem above.</p>

Rubric		
Level I	Level II	Level III
<ul style="list-style-type: none"> Student uses inappropriate solution strategy and does not get the correct answer. 	<p>Not Yet Proficient</p> <ul style="list-style-type: none"> Finds the correct answer, but there may be inaccuracies or incomplete justification of solution <p style="text-align: center;"><u>OR</u></p> <ul style="list-style-type: none"> Uses partially correct strategy, but gets the wrong answer. 	<p>Proficient in Performance</p> <ul style="list-style-type: none"> Accurately solves problem Part 1: $1/8$. Both the area model and the number line model clearly show the problem. Part 2: The problem accurately matches $1/2$ divided by 4. Use appropriate equations to justify the solution.

Standards for Mathematical Practice
1. Makes sense and perseveres in solving problems.
2. Reasons abstractly and quantitatively.
3. Constructs viable arguments and critiques the reasoning of others.
4. Models with mathematics.
5. Uses appropriate tools strategically.
6. Attends to precision.
7. Looks for and makes use of structure.
8. Looks for and expresses regularity in repeated reasoning.

Formative Instructional and Assessment Tasks

Writing a Division Story

Part 1:

Solve the problem $\frac{1}{2}$ divided by 4 using both a visual fraction model and a number line in the space below.

Part 2:

Write a word problem that matches the problem above.

Formative Instructional and Assessment Tasks

Creating Stories 5.NF.7 – Task 5

Domain	Number and Operations - Fractions
Cluster	Apply and extend previous understandings of multiplication and division to multiply and divide fractions.
Standard(s)	<p>5.NF.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.¹</p> <p>a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. <i>For example, create a story context for $(1/3) \div 4$, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $(1/3) \div 4 = 1/12$ because $(1/12) \times 4 = 1/3$.</i></p> <p>¹Students able to multiply fractions in general can develop strategies to divide fractions in general, by reasoning about the relationship between multiplication and division. But division of a fraction by a fraction is not a requirement at this grade.</p>
Materials	Task handout
Task	<p style="text-align: center;">Creating Stories</p> <p>In class, Sarah and Tony are talking about the difference between “$1/3$ times 6” compared to “$1/3$ divided by 6.”</p> <p>Their teacher asks them to draw a picture and to write a story problem for each expression. What would Sarah and Tony’s work look like?</p> <p>Write a sentence explaining how your pictures are different.</p>

Rubric

Level I	Level II	Level III
<ul style="list-style-type: none"> Student uses inappropriate solution strategy and does not get the correct answer. 	<p>Not Yet Proficient</p> <ul style="list-style-type: none"> Finds the correct answer, but there may be inaccuracies or incomplete justification of solution <p style="text-align: center;"><u>OR</u></p> <ul style="list-style-type: none"> Uses partially correct strategy, but gets the wrong answer. 	<p>Proficient in Performance</p> <ul style="list-style-type: none"> Accurately solves problem Part 1: There are correct pictures showing $1/3 \times 6 = 2$ and $1/3$ divided by $6 = 1/18$. The story problems each match the expressions. There is a sentence explaining how the 2 pictures are different.

Standards for Mathematical Practice

1. Makes sense and perseveres in solving problems.
2. Reasons abstractly and quantitatively.
3. Constructs viable arguments and critiques the reasoning of others.
4. Models with mathematics.
5. Uses appropriate tools strategically.
6. Attends to precision.
7. Looks for and makes use of structure.
8. Looks for and expresses regularity in repeated reasoning.

Formative Instructional and Assessment Tasks

Creating Stories

In class, Sarah and Tony are talking about the difference between “ $\frac{1}{3}$ times 6” compared to “ $\frac{1}{3}$ divided by 6.”

Their teacher asks them to draw a picture and to write a story problem for each expression.

What would Sarah and Tony’s work look like?

Write a sentence explaining how your pictures are different.

Formative Instructional and Assessment Tasks

What is Being Modeled? 5.NF.7 – Task 6	
Domain	Number and Operations - Fractions
Cluster	Apply and extend previous understandings of multiplication and division to multiply and divide fractions.
Standard(s)	<p>5.NF.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.¹</p> <p>a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. <i>For example, create a story context for $(1/3) \div 4$, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $(1/3) \div 4 = 1/12$ because $(1/12) \times 4 = 1/3$.</i></p> <p><small>¹Students able to multiply fractions in general can develop strategies to divide fractions in general, by reasoning about the relationship between multiplication and division. But division of a fraction by a fraction is not a requirement at this grade.</small></p>
Materials	Task handout
Task	<p style="text-align: center;">What is Being Modeled?</p> <p>Part 1: For each of the pictures in the <i>task handout</i> write the equation and a story problem to match the picture.</p> <p>Part 2: Choose one of the problems above. Describe how you used the visual fraction model to identify the equation.</p>

Rubric		
Level I	Level II	Level III
<ul style="list-style-type: none"> Student uses inappropriate solution strategy and does not get the correct answer. 	<p>Not Yet Proficient</p> <ul style="list-style-type: none"> Correct equations but the story problems do not match <u>OR</u> Correct story problems but incorrect equations <u>OR</u> Equations and story problems are correct, but the explanation is not correct. 	<p>Proficient in Performance</p> <ul style="list-style-type: none"> Accurately solves problem Part 1: Equations: $1/2$ divided by $6 = 1/12$; $1/3$ divided by $2 = 1/6$; $1/4$ divided by $4 = 1/16$. The story problems match the equation. Part 2: There is a clear explanation about how the student used the visual fraction model to write an equation.

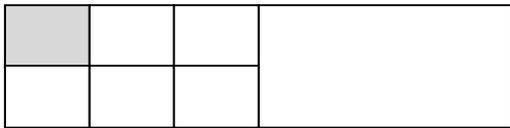
Standards for Mathematical Practice
1. Makes sense and perseveres in solving problems.
2. Reasons abstractly and quantitatively.
3. Constructs viable arguments and critiques the reasoning of others.
4. Models with mathematics.
5. Uses appropriate tools strategically.
6. Attends to precision.
7. Looks for and makes use of structure.
8. Looks for and expresses regularity in repeated reasoning.

Formative Instructional and Assessment Tasks

What is Being Modeled?

Part 1:

For each of the pictures below write the equation and a story problem to match the picture. The shaded part of each model represents the answer.



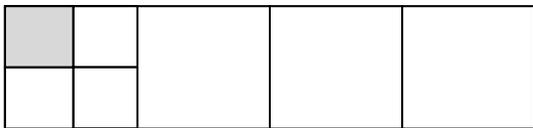
Equation:

Story Problem:



Equation:

Story Problem:



Equation:

Story Problem:

Part 2:

Choose one of the problems above. Describe how you used the visual fraction model to identify the equation.

Formative Instructional and Assessment Tasks

What is Being Modeled? II 5.NF.7 – Task 7	
Domain	Number and Operations – Fractions
Cluster	Apply and extend previous understandings of multiplication and division to multiply and divide fractions.
Standard(s)	<p>5.NF.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.¹</p> <p>a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. <i>For example, create a story context for $(1/3) \div 4$, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $(1/3) \div 4 = 1/12$ because $(1/12) \times 4 = 1/3$.</i></p> <p>¹Students able to multiply fractions in general can develop strategies to divide fractions in general, by reasoning about the relationship between multiplication and division. But division of a fraction by a fraction is not a requirement at this grade.</p>
Materials	Task handout
Task	<p style="text-align: center;">What is Being Modeled? II</p> <p>Part 1: For each of the pictures on <i>task handout</i> write the equation and a story problem to match the picture.</p> <p>Part 2: Choose one of the problems above. Describe how you used the visual fraction model to identify the equation.</p>

Rubric		
Level I	Level II	Level III
<ul style="list-style-type: none"> Student uses inappropriate solution strategy and does not get the correct answer. 	<p>Not Yet Proficient</p> <ul style="list-style-type: none"> Correct equations but the story problems do not match <ul style="list-style-type: none"> <u>OR</u> Correct story problems but incorrect equations <ul style="list-style-type: none"> <u>OR</u> Equations and story problems are correct, but the explanation is not correct. 	<p>Proficient in Performance</p> <ul style="list-style-type: none"> Accurately solves problem Part 1: Equations: $1/6$ divided by 4; $1/5$ divided by 3; $1/4$ divided by 16. The story problems match the equation. Part 2: There is a clear explanation about how the student used the visual fraction model to write an equation..

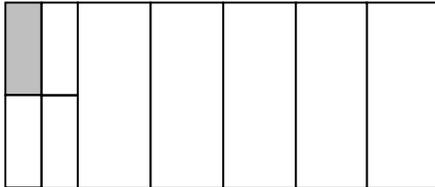
Standards for Mathematical Practice
1. Makes sense and perseveres in solving problems.
2. Reasons abstractly and quantitatively.
3. Constructs viable arguments and critiques the reasoning of others.
4. Models with mathematics.
5. Uses appropriate tools strategically.
6. Attends to precision.
7. Looks for and makes use of structure.
8. Looks for and expresses regularity in repeated reasoning.

Formative Instructional and Assessment Tasks

What is Being Modeled?

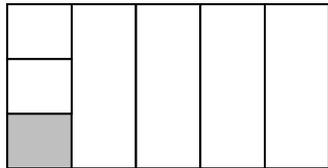
Part 1:

For each of the pictures below write the equation and a story problem to match the picture. The shaded part of each model represents the answer.



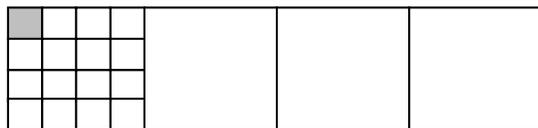
Equation:

Story Problem:



Equation:

Story Problem:



Equation:

Story Problem:

Part 2:

Choose one of the problems above. Describe how you used the visual fraction model to identify the equation.

Formative Instructional and Assessment Tasks

How Many Cookies? 5.NF.7 –Task 8	
Domain	Number and Operations - Fractions
Cluster	Apply and extend previous understandings of multiplication and division to multiply and divide fractions.
Standard(s)	<p>5.NF.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.¹</p> <p>c. Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. <i>For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?</i></p> <p>¹Students able to multiply fractions in general can develop strategies to divide fractions in general, by reasoning about the relationship between multiplication and division. But division of a fraction by a fraction is not a requirement at this grade.</p>
Materials	Task handout
Task	<p style="text-align: center;">How Many Cookies?</p> <p>For one dozen cookies you need to use $\frac{1}{2}$ of a cup of sugar. You have 4 cups of sugar. You have plenty of all of the other ingredients.</p> <p>Part 1: How many dozens of cookies can you make? Draw a visual fraction model and write an equation that matches this task.</p> <p>Part 2: Write a similar problem that matches “3 divided by $\frac{1}{3}$.”</p> <p>Part 3: Solve your new problem by drawing a visual fraction model and writing an equation.</p>

Rubric		
Level I	Level II	Level III
<ul style="list-style-type: none"> Student uses inappropriate solution strategy and does not get the correct answer. 	<p>Not Yet Proficient</p> <ul style="list-style-type: none"> Finds the correct answer, but there may be inaccuracies or incomplete justification of solution <p style="text-align: center;"><u>OR</u></p> <ul style="list-style-type: none"> Uses partially correct strategy, but gets the wrong answer. 	<p>Proficient in Performance</p> <ul style="list-style-type: none"> Accurately solves problem Part 1: You can make 8 dozen cookies. The visual fraction model and equation are correct. Part 2: The problem involves having 3 units of something and dividing them into portions that are $\frac{1}{3}$ of a unit. Part 3: 3 divided by $\frac{1}{3}$ equals 9. The visual fraction model and equation are correct.

Formative Instructional and Assessment Tasks

Standards for Mathematical Practice
1. Makes sense and perseveres in solving problems.
2. Reasons abstractly and quantitatively.
3. Constructs viable arguments and critiques the reasoning of others.
4. Models with mathematics.
5. Uses appropriate tools strategically.
6. Attends to precision.
7. Looks for and makes use of structure.
8. Looks for and expresses regularity in repeated reasoning.

Formative Instructional and Assessment Tasks

How Many Cookies?

For one dozen cookies you need to use $\frac{1}{2}$ of a cup of sugar. You have 4 cups of sugar. You have plenty of all of the other ingredients.

Part 1

How many dozens of cookies can you make? Draw a visual fraction model and write an equation that matches this task.

Part 2:

Write a similar problem that matches “3 divided by $\frac{1}{3}$.”

Part 3:

Solve your new problem by drawing a visual fraction model and writing an equation.

Formative Instructional and Assessment Tasks

How Many Clear Beads? 5.NF.7 – Task 9	
Domain	Number and Operations - Fractions
Cluster	Apply and extend previous understandings of multiplication and division to multiply and divide fractions.
Standard(s)	<p>5.NF.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.¹</p> <p>c. Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. <i>For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?</i></p> <p>¹Students able to multiply fractions in general can develop strategies to divide fractions in general, by reasoning about the relationship between multiplication and division. But division of a fraction by a fraction is not a requirement at this grade.</p>
Materials	Task Handout
Task	<p style="text-align: center;">How Many Clear Beads?</p> <p>Part 1: While making a bracelet, Rosa put a clear bead in the necklace every $\frac{1}{6}$ of a foot. How many clear beads will Rosa use if she made a necklace that was...</p> <p>a) 1 foot long? b) 2 feet long? c) 3 feet long?</p> <p>In order to find your answers, create a visual fraction model and write an equation for each task.</p> <p>Part 2: What relationship do you notice between your three answers that you found?</p> <p>Part 3: If Rosa only had 30 clear beads what is the longest necklace that she could make? Write a sentence explaining how you know that you are correct.</p>

Rubric		
Level I	Level II	Level III
<ul style="list-style-type: none"> Student uses inappropriate solution strategy and does not get the correct answer. 	<p>Not Yet Proficient</p> <ul style="list-style-type: none"> Finds the correct answer, but there may be inaccuracies or incomplete justification of solution <p style="text-align: center;"><u>OR</u></p> <ul style="list-style-type: none"> Uses partially correct strategy, but gets the wrong answer. 	<p>Proficient in Performance</p> <ul style="list-style-type: none"> Accurately solves problem Part 1: 6 clear beads, 12 clear beads, 18 clear beads. The visual fraction model and the equations are correct. Part 2: Each answer is 6 more beads greater than the answer before. Part 3: If Rosa only had 30 clear beads, the longest bracelet she could make is 5 feet. $30 \times \frac{1}{6} = 5$.

Formative Instructional and Assessment Tasks

Standards for Mathematical Practice
1. Makes sense and perseveres in solving problems.
2. Reasons abstractly and quantitatively.
3. Constructs viable arguments and critiques the reasoning of others.
4. Models with mathematics.
5. Uses appropriate tools strategically.
6. Attends to precision.
7. Looks for and makes use of structure.
8. Looks for and expresses regularity in repeated reasoning.

Formative Instructional and Assessment Tasks

How Many Clear Beads?

Part 1:

While making a bracelet, Rosa put a clear bead in the necklace every $\frac{1}{6}$ of a foot. How many clear beads will Rosa use if she made a necklace that was...

- a) 1 foot long?
- b) 2 feet long?
- c) 3 feet long?

In order to find your answers, create a visual fraction model and write an equation for each task.

Part 2:

What relationship do you notice between your three answers that you found?

Part 3:

If Rosa only had 30 clear beads what is the longest necklace that she could make? Write a sentence explaining how you know that you are correct.