Card Game (IT)

Overview

Students will create 6-digit numbers by randomly selecting digits from a stack of cards. The goal of the game is to create the greatest or least value possible by deciding which place value each digit will represent. Students will compare the numbers they create with the numbers created by members of their team.

Standard

Generalize place value understanding for multi-digit whole numbers.

4.NBT.A.2 Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

Prior to the Task

Standards Preparation: The material in the chart below illustrates the standards and sample tasks that are prerequisites for student success with this task's standards.

Grade Level Standard	The Following Standards Will Prepare Them	Items to Check for Task Readiness	Sample Remediation Items
4.NBT.A.2	• 4.NBT.A.1	1. Compare 67,746 to 76,746 using >, =, or <. a. 67,746 < 76,746 2. http://www.illustrativemathematics.org/illustrations/459	• http://www.illustrativemathematics.org/illustrations/1809 • http://learnzillion.com/lessonsets/167-read-write-and-compare-multidigit-whole-numbers • http://learnzillion.com/lessonsets/2-understand-place-value-in-terms-of-word-forms

Task Setup:

- Create groups of two (preferred) or three students.
- Create a set of numeral cards with the digits 0-9 for each group. Copy the Numeral Cards page provided in this task on cardstock and cut the cards out, or use index cards and markers to create the numeral cards.
- Copy the Card Game Rules so that there is one copy for each group.
- Copy the Card Game Recording Sheet for each student to use during the task.

Task Description:

1. Begin by showing the class how the card game is played.
   a. Have each student draw six horizontal line segments to represent places in a 6-digit number on a sheet of paper (e.g., ___ ___ ___ ___ ___ ___).
   b. Have a stack of numeral cards in the front of the class. Select a student to come up to select a card and show it to the class.
   c. Have the student decide the place value in which the digit should be written to create a 6-digit number with the greatest value possible.
   d. Record the choice for placement on a copy of the Card Game Recording Sheet, which is projected for class viewing, or draw a copy of the six positions on the board. Tell the rest of the class to decide where they would place the digit and record it on their papers.
   e. Discuss with students that they have the opportunity to pass on a digit once in the game.
       i. Discuss with students when the pass may be useful and show them where to record a digit should they decide to use it as their pass.
       ii. Tell students that once they pass on using a digit in their number, they must use all other numbers that are selected until all 6 places in their number are filled.
   f. Continue to have different students choose a card and decide on the placement in the number until all 6 places have been filled.
2. Once the number has been created, ask the class if anyone created a different number than the number shown on the board. If so, have that student share the number with the class. Compare the two numbers. Have students explain how they know which number is greater.
3. Students will play three rounds in which they try to create a number with the greatest value possible. Then they will play three rounds in which they try to create a number with the least value possible.
4. Explain that after all students in the group have created a number, group members will compare and order their numbers.
   a. In the rounds in which two students are to create a number with the greatest value possible, the student with the greater value will earn 3 points; the student with the lesser value will earn 1 point. In groups of three, the student with a number that is neither the greatest nor the least will earn 2 points.
   b. In the rounds in which two students are to create a number with the least value possible, the student with the lesser value will earn 3 points; the student with the greater value will earn 1 point. In groups of three, the student with a number that is neither the least nor the greatest will earn 2 points.
   c. For ties, each person will be awarded 2 points.
5. After the students understand the rules of the game, have them get into groups (preferably pairs). Hand out all of the materials: a set of numeral cards (one per group), card game rules (one per group), and the recording sheets (one per student).
6. Monitor the groups to be sure the students are following the rules of the game and to answer any questions they have about the game. Remind students that once they have decided where to write the digit and a new card has been chosen, they cannot change the placement of the digits.
7. As students compare and order the numbers created by group members, listen to their explanations and justifications. Ask probing questions as needed to encourage precision in student discussions.

After the Task

Give each student a copy of the Card Game Reflection Sheet and allow time for them to answer the questions. After students have had the opportunity to reflect on the game, lead a whole-class discussion about the different strategies students used to create their numbers to earn the most points. Ask students if there is a way to guarantee that they will always create a number with the greatest or least value.

This game can be played throughout the year with variations on the rules.

- Give each group two sets of digits so that digits can appear in more than one place in the number created.
- Place restrictions on certain place values in different rounds. For example, tell students that when creating a number with the least possible value, the digit in the hundred thousands place must be greater than 5, or when creating a number with the greatest possible value, the digit in the ones place must be greater than 5.
- Have students add or subtract the numbers they create to earn additional points based on whether the sum or difference has the greatest or least value in the group.
- Change the number of digits in the number to be created.
- Remove the option to pass on a number, or add a second pass option.

Numeral Cards

5	0
6	1
7	2
8	3
9	4

Card Game Rules

1. Shuffle the numeral cards and place them in a pile.

2. Each person will choose a card from the pile. The person with the greatest number will go first. Reshuffle the cards. The person chosen to go first will choose a card from the pile and show it to the group.

3. Write the digit on the card in one of the blanks in the 6-digit number you are creating, or in the Pass box on the right.

4. Play continues with the person on the left. Continue playing until everyone has created a six-digit number.

5. After everyone has created his or her number, compare and order the numbers created in the group. Award points to each group member as shown below:

   a. For Rounds 1 through 3:

      i. 3 points for the greatest number

      ii. 2 points for the middle number

      iii. 1 point for the least number

   b. For Rounds 4 through 6:

      i. 3 points for the least number

      ii. 2 points for the middle number

      iii. 1 point for the greatest number

   c. For ties, each person gets 2 points.

6. Repeat steps 1 through 5 to play five more rounds. Use your recording sheet to find the goal for each round.

7. The winner is the person with the most points at the end of all six rounds.

Card Game Recording Sheet Round 1 through Round 3

Round 1 through Round 3—Try to create a number with the **greatest** possible value.

Round 1:

PASS

_____ _____ _____ **,** _____ _____ _____

Points for Round 1: _____

Round 2:

PASS

_____ _____ _____ **,** _____ _____ _____

Points for Round 2: _____

Round 3:

PASS

_____ _____ _____ **,** _____ _____ _____

Points for Round 3: _____

Card Game Recording Sheet Round 4 through Round 6

Round 4 through Round 6—Try to create a number with the **least** possible value.

Round 4:

_____ _____ _____ , _____ _____ _____

Points for Round 4: _____

Round 5:

_____ _____ _____ , _____ _____ _____

Points for Round 5: _____

Round 6:

_____ _____ _____ , _____ _____ _____

Points for Round 6: _____

TOTAL POINTS FOR GAME: _____

Card Game Reflection Sheet

Think about the game you just played. Answer the questions below.

1. Did you ever have the number with the least value during Rounds 1-3? How could you change the place value of one digit so that you could earn more points?

2. Did you ever have the number with the greatest value during Rounds 4-6? How could you have changed your number so that you could earn more points?

3. How did you decide where to place the digits during each round? What change did you make in your strategy as you continued to play the game?

4. If you were to play this game again, what might your strategy be? Explain your reasoning.

Event Signs (IT)

Overview

Students will explore multiplication of fractions by whole numbers and solve problems involving area.

Standards

Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.

4.NF.B.4 Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.
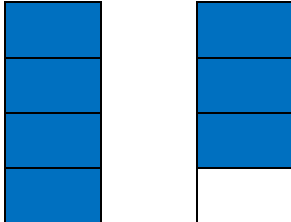
    a. Understand a fraction *a/b* as a multiple of 1/*b*. *For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4).*

    c. Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. *For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?*

Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.

4.MD.A.3 Apply the area and perimeter formulas for rectangles in real-world and mathematical problems. *For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor*.

Prior to the Task

Standards Preparation: The material in the chart below illustrates the standards and sample tasks that are prerequisites for student success with this task's standards.

Grade Level Standards	The Following Standards Will Prepare Them	Items to Check for Task Readiness	Sample Remediation Items
4.NF.B.4a	• 3.OA.A.1 • 3.NF.A.1 • 4.OA.A.2	1. The model below represents two chocolate bars. Each bar has been divided into four equal pieces. Write an equation using $\frac{1}{4}$ to represent the shaded portion of the model. a. $7 \times \frac{1}{4} = \frac{7}{4}$	• http://www.illustrativemathematics.org/illustrations/833 • http://www.illustrativemathematics.org/illustrations/263 • http://learnzillion.com/lessonsets/478-understand-multiplication-of-fractions-by-whole-numbers • http://learnzillion.com/lessons/1429-multiply-a-fraction-by-a-whole-number-using-visual-models-and-repeated-addition
4.NF.B.4c	• 3.OA.A.3	1. You have 4 pieces of $\frac{1}{3}$ of a chocolate bar.	• http://www.illustrativemathematics.org/illustrations/365

Grade Level Standards	The Following Standards Will Prepare Them	Items to Check for Task Readiness	Sample Remediation Items
		How many chocolate bars do you have? a. $\frac{4}{3}$ or $1\frac{1}{3}$ chocolate bars 2. http://www.illustrativemathematics.org/illustrations/857	• http://learnzillion.com/lessonsets/429-solve-word-problems-involving-multiplication-of-fractions-by-whole-numbers • http://learnzillion.com/lessons/1430-word-problems-involving-multiplying-a-fraction-by-a-whole-number • http://learnzillion.com/lessons/126-multiply-fractions-by-whole-numbers-using-models
4.MD.A.3	• 3.OA.A.4 • 3.MD.C.7b • 3.MD.D.8	1. A rectangle is 2 feet wide by 3 feet tall. What is the area of the rectangle? a. $2 \times 3 = 6$ square feet 2. http://www.illustrativemathematics.org/illustrations/876	• http://www.illustrativemathematics.org/illustrations/1814 • http://learnzillion.com/lessonsets/729-applying-formulas-for-rectangle-area-and-perimeter • http://learnzillion.com/lessonsets/380-apply-formulas-for-area-and-perimeter

Materials Needed:

Each student will need a blank sheet of paper, 2 markers or colored pencils, a ruler, and scissors.

During the Task

- Students may need help using their rulers. Remind them to measure from the edge of their papers.
- Remind students that there is no correct size for the final sign as long as the side lengths are whole numbers.
- Students may work in groups to complete this task.
- Students may be provided with pieces of paper cut into $\frac{1}{2}$-inch x 1-inch strips to place along the edges of the paper instead of coloring.
- In problem 5, students may find the dimensions of the blank space by subtracting the length of the rectangles (1 inch) from each side, then multiplying (11 − 1 = 10 and 8 − 1 = 7, 10 x 7 = 70 in^2). Have students relate this method to using the width of the rectangles (1/2-inch) to find the dimensions of the blank space (see the exemplar response).

After the Task

Have students provide different dimensions for their signs and calculate the areas of their signs.

Student Instructional Task

Your class is in charge of advertising for an upcoming school event. You will be making signs to hang around school. Use a blank sheet of paper to complete the following.

1. Measure each side of the paper. Record the measurements. Remember to include the units with your measurement.

    Shorter side: _____

    Longer side: _____

2. On the shorter side of the paper, from the left edge of the paper, draw 1-inch vertical segments at $\frac{1}{2}$ inch intervals until you reach the right edge of the paper. Draw a horizontal line connecting the top of each 1-inch vertical segment to create a series of rectangles along the shorter side of the paper. Color the rectangles in alternating colors.

    a. What is the area of one of the rectangles you drew? Write a multiplication equation to represent the area.

    b. What is the total area of the rectangles drawn along the shorter side of the paper? Write a multiplication equation to represent the total area.

3. Turn the paper so the rectangles you drew in part 2 are on the right side of the paper. On the longer side of the paper, from the left edge of the paper, draw 1-inch vertical segments at $\frac{1}{2}$-inch intervals until you reach the rectangles on the right side of the paper. Draw a horizontal line connecting the top of each 1-inch vertical segment to create a series of rectangles along the longer side of the paper. Color the rectangles in alternating colors. What is the total area of the rectangles you drew along the longer side of the paper? Do not include the rectangles you drew in part 2. Write a multiplication equation to represent the area.

4. Trim your paper so that both sides are whole numbers. The area of your sign should be less than 90 square inches (or 602 square centimeters). What are the dimensions of your sign? What is the total area of your sign? Show your work.

5. The blank white space on the sign is where you will include information about the school event. What is the area of the blank white space? Write a multiplication equation to show that area.

6. You are going to hang a sign by the door of each classroom at your school. What will be the total area of all of the signs?

Instructional Task Exemplar Response

Your class is in charge of advertising for an upcoming school event. You will be making signs to hang around school. Use a blank sheet of paper to complete the following.

1. Measure each side of the paper. Record the measurements. Remember to include the units with your measurement.

   Shorter side: $8\frac{1}{2}$ *inches* <u>*(or 21.5 cm)*</u>

   Longer side: <u>*11 inches (or 28 cm)*</u>

2. On the shorter side of the paper, from the left edge of the paper, draw 1-inch vertical segments at $\frac{1}{2}$ inch intervals until you reach the right edge of the paper. Draw a horizontal line connecting the top of each 1-inch vertical segment to create a series of rectangles along the shorter side of the paper. Color the rectangles in alternating colors.
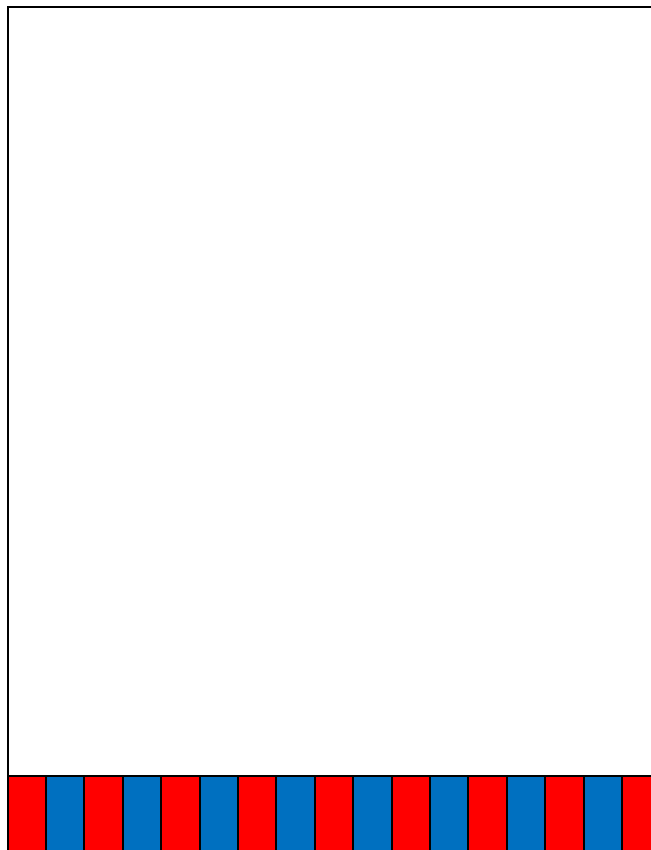
a. What is the area of one of the rectangles you drew? Write a multiplication equation to represent the area.

$$\frac{1}{2} in \times 1 \, in = \frac{1}{2} in^2$$

b. What is the total area of the rectangles drawn along the shorter side of the paper? Write a multiplication equation to represent the area.

Each rectangle has the same measurements, so each rectangle has the same area. There are 17 rectangles.

$$17 \times \frac{1}{2} \, in^2 = \frac{17}{2} \, in^2$$

The total area of all rectangles is $\frac{17}{2} \, in^2$.

3. Turn the paper so the rectangles you drew in part 2 are on the right side of the paper. On the longer side of the paper, from the left edge of the paper, draw 1-inch vertical segments at $\frac{1}{2}$-inch intervals until you reach the rectangles on the right side of the paper. Draw a horizontal line connecting the top of each 1-inch vertical segment to create a series of rectangles along the longer side of the paper. Color the rectangles in alternating colors. What is the total area of the rectangles you drew along the longer side of the paper? Do not include the rectangles you drew in part 2. Write a multiplication equation to represent the area.
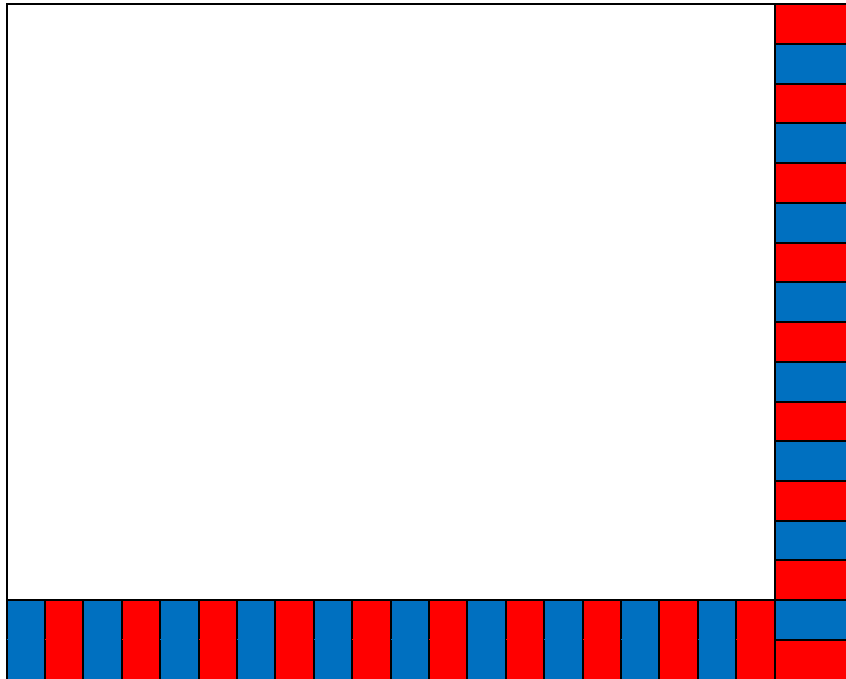
The area of the rectangles drawn on the longer side is $20 \times \frac{1}{2} in^2 = \frac{20}{2} in^2$ or 10 in².

4. Trim your paper so that both sides are whole numbers. The area of your sign should be less than 90 square inches (or 602 square centimeters). What are the dimensions of your sign? What is the total area of your sign? Show your work.
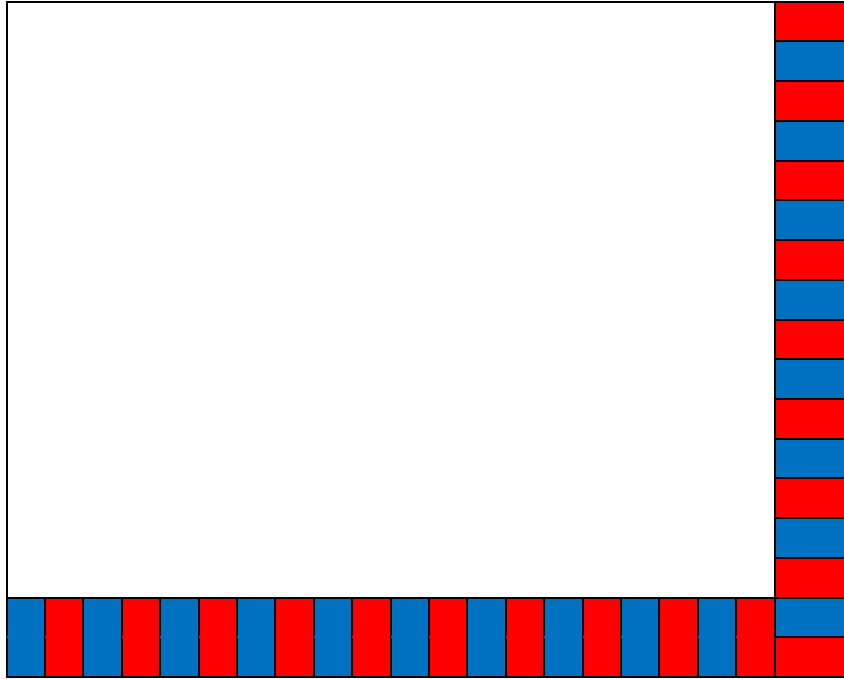
Answers will vary. Students may choose to make signs using any whole number side length.

Sample response:

I cut $\frac{1}{2}$ inch off of the short side of the paper. My dimensions for my sign are 8 inches by 11 inches.

$$Area = length \times width$$
$$Area = 8 \times 11$$
$$Area = 88 \ square \ inches$$

5. The blank white space on the sign is where you will include information about the school event. What is the area of the blank white space? Write a multiplication equation to show that area.

Answers will depend on the size of the student's sign. Sample response:

The long side of the white space is $20 \times \frac{1}{2}$ in or 10 in long. Since I cut $\frac{1}{2}$ inch off of the short side, the length of the short side of the white space is $14 \times \frac{1}{2}$ in or 7 in. The area of the white space is 10 in x 7 in = 70 in².

6. You are going to hang a sign by the door of each classroom at your school. What will be the total area of all of the signs?

Answers will depend on the number of classrooms at your school and the size of the student's sign. Sample response:

There are 15 classrooms at my school. $88 \times 15 = 1320 \; square \; inches$

The total area of all signs will be 1320 square inches.

Teacher Appreciation Week (IT)

Overview

Students will apply their understanding of multiplication of a fraction by a whole number by finding how many brownies were originally on a tray before some of them were eaten by a group of teachers. Students should know the process of multiplying a fraction by a whole number prior to starting a task.

Standard

Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.

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

   c. Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. *For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?*

Prior to the Task

Standards Preparation: The material in the chart below illustrates the standards and sample tasks that are prerequisites for student success with this task's standards.

Grade Level Standard	The Following Standards Will Prepare Them	Items to Check for Task Readiness	Sample Remediation Items

4.NF.B.4c	• 3.OA.A.3	1. A recipe for banana nut bread calls for $\frac{1}{4}$ cup of walnuts. If you want to make 3 loaves of banana nut bread, how many cups of walnuts do you need?
		   a. $\frac{3}{4}$
		2. Julie ate $\frac{1}{6}$ of the cookies her mom left out. After Julie ate some, there were 10 cookies left on the plate. How many cookies did Julie eat?
		   a. 2 cookies
		3. http://www.illustrativemathematics.org/illustrations/857
			• http://www.illustrativemathematics.org/illustrations/344
			• http://www.illustrativemathematics.org/illustrations/365
			• http://www.illustrativemathematics.org/illustrations/262
			• http://learnzillion.com/lessonsets/429-solve-word-problems-involving-multiplication-of-fractions-by-whole-numbers
			• http://learnzillion.com/lessons/1430-word-problems-involving-multiplying-a-fraction-by-a-whole-number
			• http://learnzillion.com/lessons/126-multiply-fractions-by-whole-numbers-using-models

During the Task

- Have students work on this task individually for about 10 minutes in the beginning.
- After the individual time, group students in pairs so they can share their work and thoughts about how to approach the task.
- Provide students with manipulatives to help them work through the task. Remind students to record their work with the manipulatives by drawing a sketch of their fraction models.
- Some students may have trouble getting started with the task. Ask those students, "How might you work backward to begin this task?"
- Some students may confuse the amount taken with the amount remaining. Ask students probing questions like, "If 1/3 of the brownies are taken, what fraction would be remaining?"
- For students who may be writing answers without explanations, ask them how they might explain their reasoning so that someone in another class understands their work.

After the Task

Have students think of other ways they can solve the same problem. Provide students with additional practice solving word problems involving multiplication of a fraction by a whole number, including problems where one of the factors is unknown.

Student Instructional Task

This week is Teacher Appreciation Week. Each day there will be a tray of sweets in the lounge for the teachers to enjoy.

1. Mrs. Blakely brought a tray of brownies and placed it in the teachers' lounge at school one morning. Mr. Granier went into the lounge before lunch and took $\frac{1}{3}$ of the brownies on the tray. Later that day, Mrs. Poche went into the lounge and took $\frac{1}{4}$ of the remaining brownies. Right before school ended, Mr. Scott went into the lounge and took $\frac{1}{2}$ of the remaining brownies. After school, Mrs. Blakely went to get the tray and found that 6 brownies had not been eaten.

   a. How many brownies were on the tray when Mrs. Blakely first placed it in the lounge? Explain your reasoning. Use equations or visual fraction models to support your explanation.

   b. Which teacher took the greatest fraction of the total number of brownies Mrs. Blakely left in the lounge?

2. Imagine that you have made a tray of cookies and are leaving them in the lounge for the teachers. Write your own word problem. Decide how many teachers will take what fractions of the cookies on the tray when they visit the lounge. Make sure that in your problem you include a question that requires someone to figure out how many cookies were originally on your tray. After you write your problem, provide the solution. Be sure to show all of your work.

Instructional Task Exemplar Response

This week is Teacher Appreciation Week. Each day there will be a tray of sweets in the lounge for the teachers to enjoy.

1. Mrs. Blakely brought a tray of brownies and placed it in the teachers' lounge at school one morning. Mr. Granier went into the lounge before lunch and took $\frac{1}{3}$ of the brownies on the tray. Later that day, Mrs. Poche went into the lounge and took $\frac{1}{4}$ of the remaining brownies. Right before school ended, Mr. Scott went into the lounge and took $\frac{1}{2}$ of the remaining brownies. After school, Mrs. Blakely went to get the tray and found that 6 brownies had not been eaten.

    a. How many brownies were on the tray when Mrs. Blakely first placed it in the lounge? Explain your reasoning. Use equations or visual fraction models to support your explanation.
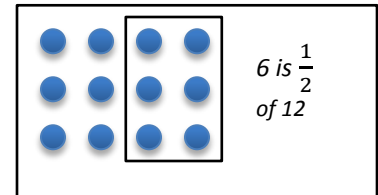
Mrs. Blakely found 6 brownies.

This is the number of brownies Mr. Scott left.
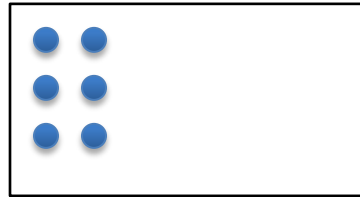
Mr. Scott took $\frac{1}{2}$ of the number of brownies he found. $\frac{1}{2} \times ? = 6$

? is the number of brownies Mr. Scott found.

Mr. Scott found 12 brownies.

6 is $\frac{1}{2}$ of 12
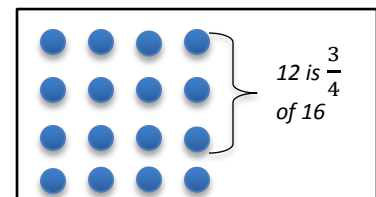
Mrs. Poche left 12 brownies after taking $\frac{1}{4}$ of the number of brownies she found, so 12 is $\frac{3}{4}$ of the number of brownies Mrs. Poche found. $\frac{3}{4} \times ? = 12$

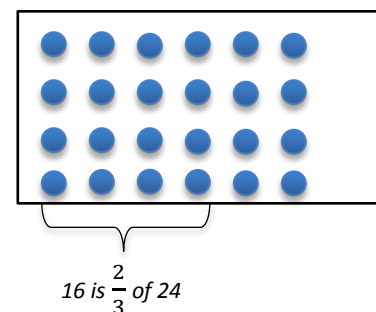*? is the number of brownies Mrs. Poche found.*

Mrs. Poche found 16 brownies.

12 is $\frac{3}{4}$ of 16

Mr. Granier left 16 brownies after taking $\frac{1}{3}$ of the number of brownies he found, so 16 is $\frac{2}{3}$ of the number of brownies Mr. Granier found. $\frac{2}{3} \times ? = 16$

? is the number of brownies Mr. Granier found, which is also the number of brownies Mrs. Blakely placed in the lounge.

16 is $\frac{2}{3}$ of 24

Mrs. Blakely placed a tray of 24 brownies in the lounge in the morning.

b. Which teacher took the greatest fraction of the total number of brownies Mrs. Blakely left in the lounge? Explain your reasoning.

Mr. Granier took 8 brownies. That is $\frac{8}{24}$ of the total number of brownies.

Mrs. Poche took 4 brownies. That is $\frac{4}{24}$ of the total number of brownies.

Mr. Scott took 6 brownies. That is $\frac{6}{24}$ of the total number of brownies.

Therefore, Mr. Granier took the greatest fraction of the total number of brownies because $\frac{8}{24}$ is the greatest fraction of the three. Since the denominator is the same on all three fractions, I can compare the numerators—8 is the greatest number.

2. Imagine that you have made a tray of cookies and are leaving them in the lounge for the teachers. Write your own word problem. Decide how many teachers will take what fractions of the cookies on the tray when they visit the lounge. Make sure that in your problem you include a question that requires someone to figure out how many cookies were originally on your tray. After you write your problem, provide the solution. Be sure to show all of your work.

Answers will vary. Sample response:

Jamie brought a tray of cookies to place in the teachers' lounge on Tuesday. Later that morning, Mrs. Breaux went into the lounge and took $\frac{1}{4}$ of the cookies. Right before lunch, Mr. Smith went into the lounge and took $\frac{1}{3}$ of the remaining cookies. After lunch, Mrs. Babin ate $\frac{1}{2}$ of the remaining cookies. After school, Mr. Thomas went to get the tray and found it with 8 cookies left. How many cookies were on the tray when Jamie first left it in the lounge?

Mr. Thomas found 8 cookies.

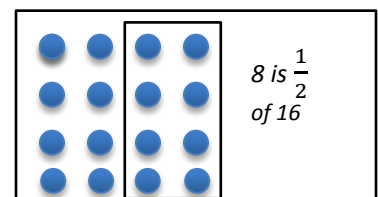*This is the number of cookies Mrs. Babin left.*
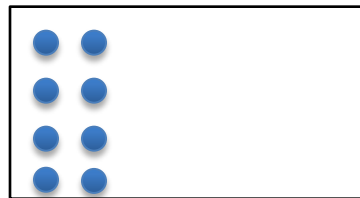
Mrs. Babin ate $\frac{1}{2}$ of the number of cookies she found.

? is the number of brownies Mrs. Babin found.
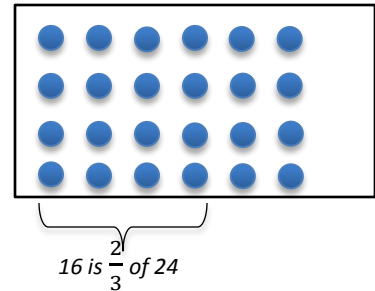
Mrs. Babin found 16 cookies.

$\frac{1}{2} \times ? = 8$

8 is $\frac{1}{2}$ of 16

Mr. Smith left 16 cookies after taking $\frac{1}{3}$ of the number of cookies he found, so 16 is $\frac{2}{3}$ of the number of cookies Mr. Smith found.
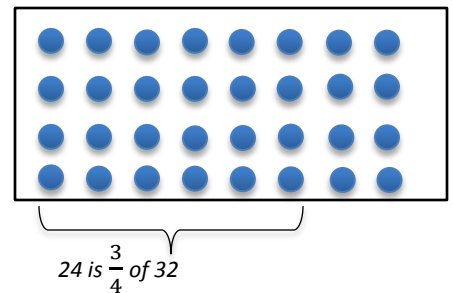*? is the number of cookies Mr. Smith found.*

Mr. Smith found 24 cookies.

$$\frac{2}{3} \times ? = 16$$

16 is $\frac{2}{3}$ of 24

Mrs. Breaux left 24 cookies after taking $\frac{1}{4}$ of the number of cookies she found, so 24 is $\frac{3}{4}$ of the number of cookies Mrs. Breaux found.
? is the number of cookies Mrs. Breaux found.

Mrs. Breaux found 32 cookies.

$$\frac{3}{4} \times ? = 24$$

24 is $\frac{3}{4}$ of 32

Jamie placed 32 cookies in the lounge.

Dollars and Cents (IT)

Overview

Students will apply their knowledge of the value of coins to compare decimals and fractions with denominators of 10 and 100.

Standards

Understand decimal notation for fractions, and compare decimal fractions.

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

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

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

Prior to the Task

Standards Preparation: The material in the chart below illustrates the standards and sample tasks that are prerequisites for student success with this task's standards.

Grade Level Standards	The Following Standards Will Prepare Them	Items to Check for Task Readiness	Sample Remediation Items
4.NF.C.5	• 4.NF.A.1 • 4.NF.B.3a-c	1. Write a fraction equivalent to $\frac{4}{10}$ using a denominator of 100. a. $\frac{40}{100}$ 2. Add $\frac{73}{100} + \frac{6}{10}$. a. $\frac{133}{100}$ or $1\frac{33}{100}$ 3. http://www.illustrativemathematics.org/illustrations/153 4. http://www.illustrativemathematics.org/illustrations/154	• http://www.illustrativemathematics.org/illustrations/743 • http://www.illustrativemathematics.org/illustrations/881 • http://www.illustrativemathematics.org/illustrations/831 • http://www.illustrativemathematics.org/illustrations/837 • http://www.illustrativemathematics.org/illustrations/835 • http://learnzillion.com/lessonsets/523-express-fractions-with-a-denominator-of-10-as-equivalent-to-fractions-with-denominators-of-100 • http://learnzillion.com/lessonsets/291-express-a-fraction-with-denominator-10-as-an-equivalent-fraction-with-denominator-100 • http://learnzillion.com/lessonsets/10-convert-between-fractions-and-decimals
4.NF.C.6	• 4.NF.C.5	1. Write $\frac{54}{100}$ in decimal notation.	• http://learnzillion.com/lessonsets/292-use-decimal-notation-for-fractions-with-denominators-10-or-100 • http://learnzillion.com/lessonsets/10-convert-between-

Grade Level Standards	The Following Standards Will Prepare Them	Items to Check for Task Readiness	Sample Remediation Items
		a. 0.54 2. Write $\frac{17}{10}$ in decimal notation. 　a. 1.7 3. Write 0.35 as a fraction. 　a. $\frac{35}{100}$ 4. http://www.illustrativemathematics.org/illustrations/152 5. http://www.illustrativemathematics.org/illustrations/103	fractions-and-decimals
4.NF.C.7	• 4.NF.C.2 • 4.NF.C.6	1. Shelli has 0.54 of a meter of ribbon, and Juno has 0.45 of a meter of ribbon. Write a statement using <, =, or > to compare the amount of ribbon Shelli has to the amount of ribbon Juno has. 　a. 0.54 meter > 0.45 meter 2. http://www.illustrativemathematics.org/illustrations/182	• http://www.illustrativemathematics.org/illustrations/812 • http://www.illustrativemathematics.org/illustrations/811 • http://www.illustrativemathematics.org/illustrations/183 • http://learnzillion.com/lessonsets/672-compare-two-decimals-to-hundredths

During the Task

- When students begin writing the fractions for the values in the table, they may not know what denominator to use. Students may try to add the number of coins each friend has and use that as the denominator. Remind students that they are finding the amount of money, and ask them, "How many cents are in a dollar?"
- Pay attention to students who are using the values in the table as the numerator without finding the value of the coins listed. Guide students to find the value of the coins in each cell of the table before writing the fractions.
- Students may struggle with determining how much money each friend brought to school. Students are not expected to add decimals in 4th grade (this is reserved for 5th grade). Therefore, students will need to find the total by adding the fractions. Once students write fractions that all have a denominator of 100, they will be able to add the fractions. Have students rewrite the improper fractions as mixed numbers. Discuss what the whole number in the mixed numbers means in terms of the money they are using.
- Students may use manipulative (base 10 blocks, unit cubes, grid paper) to help compare decimals and fractions and write equivalent fractions.

After the Task

Discuss with students the prices of items they would like to purchase from the store. Students may conduct research to find prices of various items. Students should write the prices of the items they want to purchase as fractions and then find the total cost of the items. Guide students in a discussion about how they can save enough money to buy the items they have researched.

Student Instructional Task

The table below shows how many of each type of coin each of five friends brought to school. Use the table to answer the questions that follow.

	Pennies	Nickels	Dimes	Quarters
Ali	27	4	11	6
Sally	64	5	2	1
Karl	118	3	6	3
Tisa	38	8	9	5
Marie	52	15	5	8

1. What fraction of a dollar does Ali have in nickels? Write your answer as a fraction with a denominator of 100 and as a decimal.

2. Tisa wrote the fraction $\frac{4}{10}$ to represent the value of one type of coin she has. Which of her groups of coins can be represented with this fraction? How much money does the fraction represent?

3. Write the amount of money Marie has in pennies as a decimal. Write the amount of money Marie has in dimes as a decimal. Compare the decimals you wrote using <, =, or >. Draw a model to justify your comparison.

4. Sally wants to know how much money she has in just pennies and dimes. Use fractions to show how much money Sally has if she combines her pennies and dimes.

5. Write a statement using <, =, or > to compare how much money Ali has in dimes to the amount of money he has in quarters. Use decimals or fractions in your comparison.

6. Which friend brought the most money to school? Using fractions, show how you know your answer is correct. Write the total amount of money each friend brought as a fraction and as a decimal.

7. Another friend, Chang, brought more money than Karl but less than Ali. What amount of money could Chang have brought? Write your answer as a fraction and as a decimal.

8. A seventh friend, Abe, says he has $1\frac{68}{100}$ dollars in coins in his bank at home. Write this as a decimal. Is this more or less money than Sally? Use a model to show you are correct.

Instructional Task Exemplar Response

The table below shows how many of each type of coin each of five friends brought to school. Use the table to answer the questions that follow.

	Pennies	Nickels	Dimes	Quarters
Ali	27	4	11	6
Sally	64	5	2	1
Karl	118	3	6	3
Tisa	38	8	9	5
Marie	52	15	5	8

1. What fraction of a dollar does Ali have in nickels? Write your answer as a fraction with a denominator of 100 and as a decimal.

   *4 nickels is 20 cents, which is $\frac{20}{100}$ of a dollar. As a decimal, that is 0.20.*

2. Tisa wrote the fraction $\frac{4}{10}$ to represent the value of one type of coin she has. Which of her groups of coins can be represented with this fraction? How much money does the fraction represent?

   $\frac{4}{10}$ represents Tisa's nickels. This is 40 cents or $0.40.
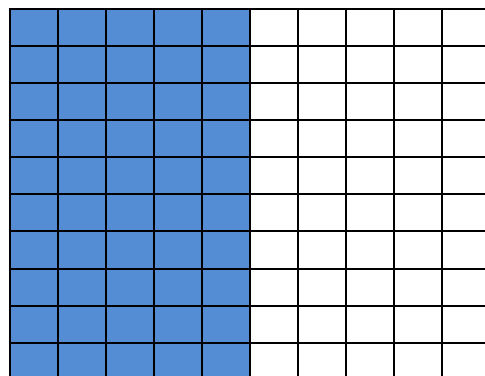
3. Write the amount of money Marie has in pennies as a decimal. Write the amount of money Marie has in dimes as a decimal. Compare the decimals you wrote using <, =, or >. Draw a model to justify your comparison.

   Marie has 0.52 in pennies. Marie has 0.5 in dimes. 0.52 > 0.5
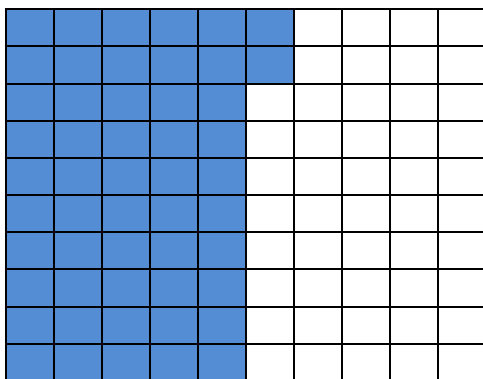
   0.52   *0.5*

4. Sally wants to know how much money she has in just pennies and dimes. Use fractions to show how much money Sally has if she combines her pennies and dimes.

   Pennies: $\frac{64}{100}$ *Dimes: $\frac{2}{10}$* $\frac{64}{100} + \frac{2}{10} = \frac{64}{100} + \frac{20}{100} = \frac{84}{100}$ *Maria has $\frac{84}{100}$ of a dollar or $0.84.*

5. Write a statement using <, =, or > to compare how much money Ali has in dimes to the amount of money he has in quarters. Use decimals or fractions in your comparison.

   Dimes: $\frac{11}{10} = \frac{110}{100}$ *Quarters:* $\frac{150}{100}$ $\frac{110}{100} < \frac{150}{100}$

6. Which friend brought the most money to school? Using fractions, show how you know your answer is correct. Write the total amount of money each friend brought as a fraction and as a decimal.

   Ali: $\frac{27}{100} + \frac{20}{100} + \frac{110}{100} + \frac{150}{100} = \frac{307}{100}$; *Ali has $3.07*

   Sally: $\frac{64}{100} + \frac{25}{100} + \frac{20}{100} + \frac{25}{100} = \frac{134}{100}$; *Maria has $1.34*

   Karl: $\frac{118}{100} + \frac{15}{100} + \frac{60}{100} + \frac{75}{100} = \frac{268}{100}$; *Karl has $2.68*

   Tisa: $\frac{38}{100} + \frac{40}{100} + \frac{90}{100} + \frac{125}{100} = \frac{293}{100}$; *Tisa has $2.93*

   Marie: $\frac{52}{100} + \frac{75}{100} + \frac{50}{100} + \frac{200}{100} = \frac{377}{100}$; *Marie has $3.77*

   Marie brought the most money to school.

7. Another friend, Chang, brought more money than Karl but less than Ali. What amount of money could Chang have brought? Write your answer as a fraction and as a decimal.

   Sample answer (any answer between $2.68 and $3.07 could be given):

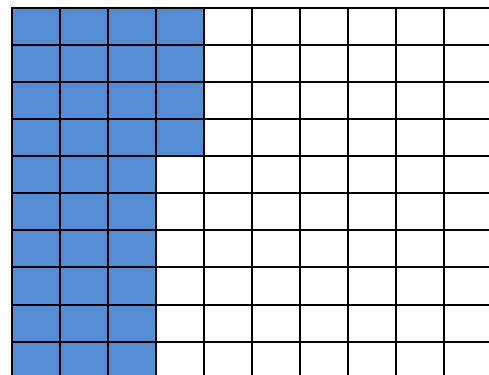   *Chang could have $2.75 or $\frac{275}{100}$.*

8. A seventh friend, Abe, says he has $1\frac{68}{100}$ dollars in coins in his bank at home. Write this as a decimal. Is this more or less money than Maria? Use a model to show you are correct.

   $1\frac{68}{100} = 1.68$ *This is more money than Sally. Since both have the same whole number, 1, I only have to compare the places after the decimal.*
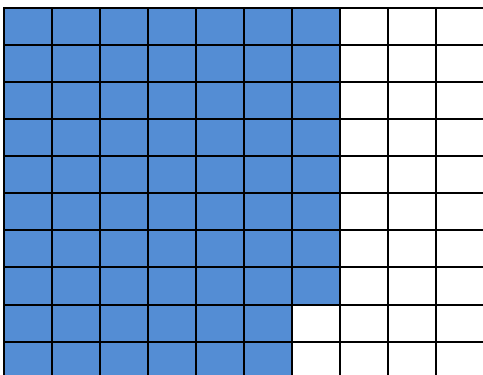
   0.68   *0.34*

Class Picnic (IT)

Overview

Students will apply their understanding of factors and multiples to determine the amount of food needed for the class picnic.

Standards

Use the four operations with whole numbers to solve problems.

4.OA.A.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies, including rounding.

Gain familiarity with factors and multiples.

4.OA.B.4 Find all factor pairs for a whole number in the range 1-100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1-100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1-100 is prime or composite.

Prior to the Task

Standards Preparation: The material in the chart below illustrates the standards and sample tasks that are prerequisites for student success with this task's standards.

Grade Level Standards	The Following Standards Will Prepare Them	Items to Check for Task Readiness	Sample Remediation Items
4.OA.A.3	• 3.OA.D.8 • 4.NBT.A.3	1. Salim wants to buy a new MP3 player, which costs $75, including tax. He already has $22 saved. If Salim saves $2 per week from his allowance, how many weeks will he have to save to have enough to buy the MP3 player? a. 27 weeks 2. http://www.illustrativemathematics.org/illustrations/1289	• http://www.illustrativemathematics.org/illustrations/13 • http://www.illustrativemathematics.org/illustrations/1301 • http://www.illustrativemathematics.org/illustrations/1807 • http://learnzillion.com/lessonsets/415-solve-multistep-word-problems-using-the-four-operations • http://learnzillion.com/lessonsets/352-solve-multistep-word-problems • http://learnzillion.com/lessonsets/47-assess-the-reasonableness-of-multiplication-and-division-answers • http://learnzillion.com/lessonsets/46-assess-the-reasonableness-of-answers-in-addition-and-subtraction-problems • http://learnzillion.com/lessonsets/5-solve-multistep-word-problems

Grade Level Standards	The Following Standards Will Prepare Them	Items to Check for Task Readiness	Sample Remediation Items
4.OA.B.4	• 3.OA.C.7	1. Find all factor pairs of 72. a. 1 and 72, 2 and 36, 3 and 24, 4 and 18, 6 and 12, 8 and 9 2. Is 37 a multiple of 7? How do you know? a. No, 37 is not a multiple of 7 because 7 times 5 is 35, which is only two away from 37. There is no whole number that can be multiplied by 7 to get 37. 3. http://www.illustrativemathematics.org/illustrations/938	• http://learnzillion.com/lessonsets/123-find-and-understand-factors-and-determine-if-a-number-is-a-multiple-of-a-given-number-for-whole-numbers-0100

Real-World Preparation: The following questions will prepare students for some of the real-world components of this task:

• What is a picnic? A picnic is when a person or a group of people prepare and pack a meal that is eaten outside.

During the Task

• This task is often used to find the least common multiple or greatest common factor. Understanding least common multiple (LCM) or greatest common factor (GCF) is not a requirement of 4th grade students as the skill/concept is left for 6th grade. Students can complete these problems by applying their understanding of multiples without understanding the concept of LCM or GCF.

• Provide students with manipulatives to work with as they are working to find the number of packages of hot dogs and hot dog buns they will need. Manipulatives can include paper cups, chips, unit cubes, etc.

• Guide students to create a chart, if necessary, to organize their thinking as they find the number of packages needed to have exactly the same number of hot dogs and buns.

• There are two conditions to the number of packages needed in problem 3—a minimum number of hot dogs needed and Isaac's desire to have exactly the same number of hot dogs and buns. Ask students, "How can you apply your understanding from problem 1 to this new scenario?" Students should realize they are looking for one number that is a multiple of 10 and a multiple of 8 that is greater than 60.

After the Task

Have students plan a picnic for their own class. They should decide who will bring what types of food and drinks. Have students help each other determine the number of packages of the food and drinks they would need to have enough for the class. Discuss whether the number of packages is a factor or a multiple of the number of snacks there will be. Discuss the difference between the terms *factor* and *multiple* as they relate to the context of buying food and drink.

Student Instructional Task

Isaac is planning a picnic for his classmates. Everyone planning to attend the picnic wants to eat hot dogs. He knows that the local store sells hot dogs in packages of 10. The store sells hot dogs buns in packages of 8.

1. What is the fewest number of packages of hot dogs and hot dog buns Isaac can buy to have exactly the same amount of hot dogs and buns? Show how you determined your answer.

2. Isaac discovers that 30 people are coming to the picnic, and everyone wants to eat 2 hot dogs! What is the fewest number of packages of hot dogs Isaac will have to buy to feed all 30 people? What is the fewest number of packages of buns Isaac will have to buy to feed all 30 people? Show how you know.

	Total number needed	Number in package	Total packages needed
Hot dogs			
Hot dog buns			

3. Isaac notices he will have more hot dog buns than hot dogs. He doesn't want to waste food, so he decides to feed the teachers in the other grades.
    a. What is the fewest number of packages of hot dogs and hot dog buns will Isaac need to buy to have **exactly the same** number of hot dogs and buns to feed all 30 people two hot dogs each? Tell how you know.

    b. How many extra hot dogs will there be to feed the teachers in the other grades? Explain how you know.

c. If each teacher in the other grades eats two hot hogs, how many teachers can eat? Explain your reasoning.

4. Isaac asks some of his classmates to bring some other items for the picnic. Help Isaac's friends figure out what they need to buy.
   a. Tanya will bring the ketchup. She already has 3 bottles, and each bottle has enough for 20 hot dogs. How many more bottles of ketchup will Tanya need to buy so there is enough ketchup for all of the hot dogs? Show how you found your answer.

   b. Jordan is asked to bring mustard, and she finds boxes of mustard packets at a local grocery store. One box has 5 mustard packets. How many boxes of mustard packets must Jordan buy to have enough mustard for all of the hot dogs, if one packet is used for each hot dog? Show how you found your answer.

Instructional Task Exemplar Response

Isaac is planning a picnic for his classmates. Everyone planning to attend the picnic wants to eat hot dogs. He knows that the local store sells hot dogs in packages of 10. The store sells hot dogs buns in packages of 8.

1. What is the fewest number of packages of hot dogs and hot dog buns Isaac can buy to have exactly the same amount of hot dogs and buns? Show how you determined your answer.

   Solution:

   hot dog packages   *hot dog bun packages*

   Isaac would need to buy 4 packages of hot dogs and 5 packages of hot dog buns to have exactly the same number of hot dogs and hot dog buns. Count by multiples of 10 and multiples of 8.

2. Isaac discovers that 30 people are coming to the picnic, and everyone wants to eat 2 hot dogs! What is the fewest number of packages of hot dogs Isaac will have to buy to feed all 30 people? What is the fewest number of packages of buns Isaac will have to buy to feed all 30 people? Show how you know.

	Total number needed	Number in package	Total packages needed
Hot dogs	*30 people x 2 hot dogs = 60 hot dogs*	*10*	*6 packages of hot dogs x 10 = 60 hot dogs*
Hot dog buns	*30 people x 2 hot dogs = 60 hot dog buns*	*8*	*8 packages of hot dog buns x 8 = 64 hot dog buns* *7 packages would only be 56 buns (7 x 8), which is not enough*

3. Isaac notices he will have more hot dog buns than hot dogs. He doesn't want to waste food, so he decides to feed the teachers in the other grades.
   a. What is the least number of packages of hot dogs and hot dog buns will Isaac need to buy to have **exactly the same number** of hot dogs and buns and still be able to feed all 30 people two hot dogs each? Tell how you know.

      Solution: 30 x 2 = 60 hot dogs will be needed to feed all 30 people.

      hot dog packages   *hot dog bun packages*

Since Isaac will need at least 60 hot dogs, he will need to buy 8 packages of hot dogs and 10 packages of hot dog buns to have exactly the same number of hot dogs and hot dog buns.

b. How many extra hot dogs will there be to feed the teachers in the other grades? Explain how you know.

Solution: 80 total hot dogs will be made. 60 of them will be used to feed the other people. So, there will be 20 hot dogs left to feed the teachers in the other grades.

c. If each teacher in the other grades eats two hot hogs, how many teachers can eat? Explain your reasoning.

Solution: There will be 20 hot dogs left over. If each teacher eats two hot dogs, then 10 teachers can eat.

4. Isaac asks some of his classmates to bring some other items for the picnic. Help Isaac's friends figure out what they need to buy.
   a. Tanya will bring the ketchup. She already has 3 bottles, and each bottle has enough for 20 hot dogs. How many more bottles of ketchup will Tanya need to buy so there is enough ketchup for all of the hot dogs? Show how you found your answer.

   Solution: 3 bottles x 20 servings = 60 servings total

   80 servings needed – 60 servings = 20 more servings needed

   1 bottle has 20 servings, so Tanya needs to buy 1 more bottle of ketchup.

   b. Jordan is asked to bring mustard, and she finds boxes of mustard packets at a local grocery store. One box has 5 mustard packets. How many boxes of mustard packets must Jordan buy to have enough mustard for all of the hot dogs, if one packet is used for each hot dog? Show how you found your answer.

   Solution: 80 packets are needed. 16 boxes x 5 packets = 80 packets. So Jordan needs to buy 16 boxes of mustard packets.