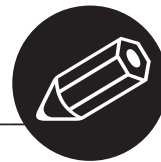


fx-55 PLUS Activities

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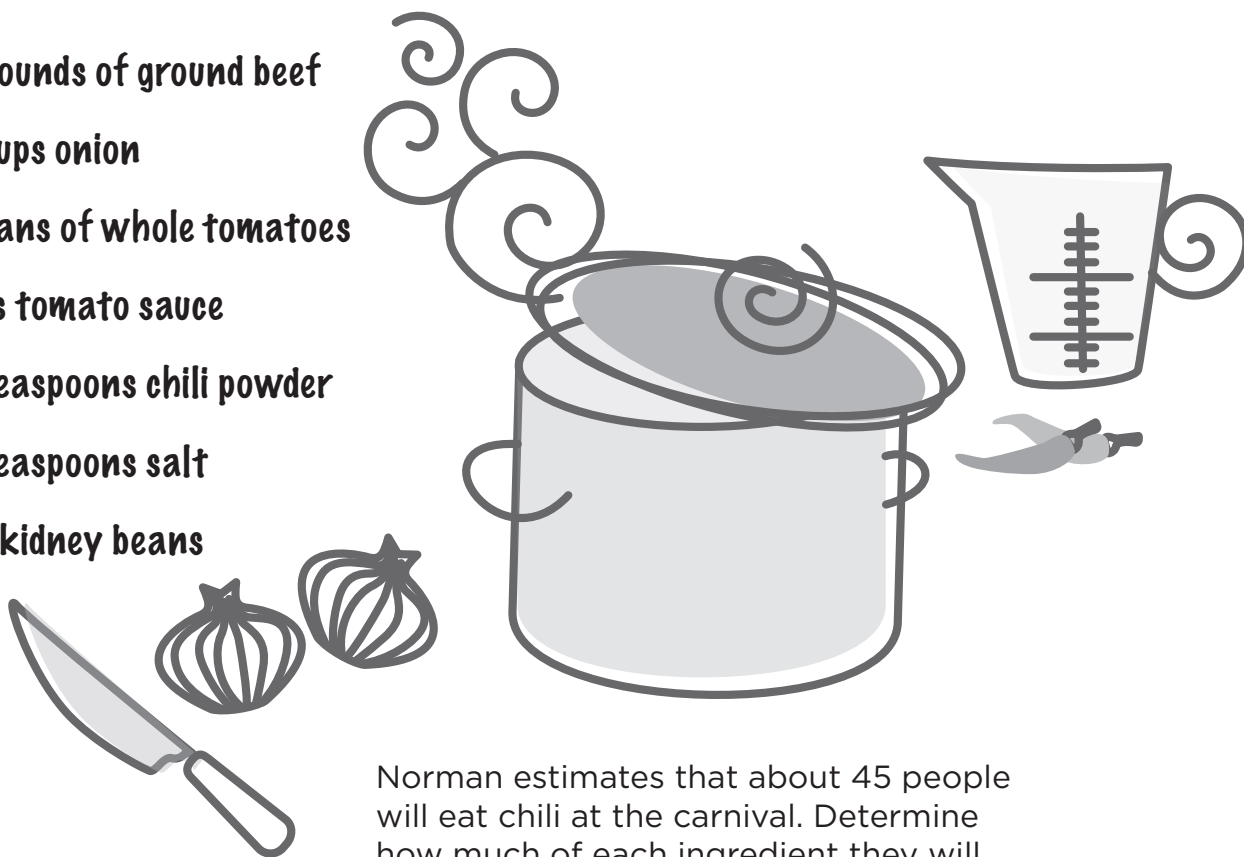


A Chili Day

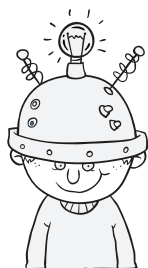
Proportions

Norman's club is planning a carnival. The menu for the food booth includes chili. Norman suggested that they use a recipe that requires the ingredients listed below.

- 1 $\frac{1}{2}$ pounds of ground beef
- 2 $\frac{1}{4}$ cups onion
- 1 $\frac{1}{3}$ cans of whole tomatoes
- 2 cans tomato sauce
- 3 $\frac{1}{4}$ teaspoons chili powder
- 1 $\frac{1}{2}$ teaspoons salt
- 1 can kidney beans



Norman estimates that about 45 people will eat chili at the carnival. Determine how much of each ingredient they will need to make this amount of chili.



Thinking Cap

Advance ticket sales for the food booth were better than expected. Ninety tickets were purchased in advance. Determine how much of each ingredient they will now need. Explain how you found this answer. Why did you use this method? Can you think of any other ways to find the answer?

A Chili Day

Proportions

Instructional Strategies

Hands On:



Use measuring cups to explore the volume of cup measures. For example, use water or rice to explore how many $\frac{1}{2}$ cups it takes to fill 1 cup. If we doubled $1\frac{1}{4}$ cups, what are the minimum number of cups you would use? To triple $\frac{1}{3}$ cup, could you use a different cup measure besides the $\frac{1}{3}$ cup? Once students are comfortable converting cups, have them write a multiplication expression for each exchange they completed.

Getting Started:

Display a recipe for your favorite cookies, but make sure it only serves about half or a third of your class. Share that you will be making the cookies for the class and you would like each group to make a list of ingredients that you need to buy. As you monitor group progress, make sure that at least one group realizes that they will need to double or triple the recipe. Have groups share their lists & reasoning with the class. Use this discussion to introduce the concept of using proportions.

Calculator Notes:



Students use the calculator in this activity to solve proportions.

- The calculator is set up to require manual simplification of fractions. Before starting this activity, be sure all calculators are changed to Auto Simplification. To do so, press **SETUP** **7** (Simp) **1** (Auto).
- The  key can be used to enter fractions.
- The  key can be used to enter mixed numbers.

Example:


1. To find the amount of ground beef needed to serve 45 people, first write the proportion

$$\frac{6}{1\frac{1}{2}} = \frac{6}{x}$$

2. Next, cross multiply to get $6x = 45 \cdot 1\frac{1}{2}$.
3. To solve, enter .
4. Press  to change the improper fraction answer to a mix number that has been simplified.
5. They will need $11\frac{1}{4}$ pounds of ground beef.



Assessment:

Students should be encouraged to check their answer by using decimals instead of fractions to calculate their answers. They should use the  key to change the final fraction answers to decimal, and vice versa.

Objective:

Use the calculator to solve problems involving proportions.

Common Core State Standards:

6.RP.3b - Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?*

Standards for Mathematical Practice:

5. Use appropriate tools strategically.
7. Look for and make use of structure.

A Chili Day

Proportions

Ground beef: See Calculator Notes example.

Onion: $\frac{6}{2\frac{1}{4}} = \frac{45}{x}$; $6x = 45 \cdot 2\frac{1}{4}$

$($ 4 5 \times $\frac{\square}{\square}$ 2 \rightarrow 1 \rightarrow 4 \rightarrow $)$ \div 6 $=$ $\frac{135}{8}$ $\frac{a}{b} \cdot \frac{d}{c}$ $16\frac{7}{8}$

Whole Tomatoes: $\frac{6}{1\frac{1}{3}} = \frac{45}{x}$; $6x = 45 \cdot 1\frac{1}{3}$

$($ 4 5 \times $\frac{\square}{\square}$ 1 \rightarrow 1 \rightarrow 3 \rightarrow $)$ \div 6 $=$ 10

Tomato Sauce: $\frac{6}{2} = \frac{45}{x}$; $6x = 45 \cdot 2$

$($ 4 5 \times 2 $)$ \div 6 $=$ 15

Chili Powder: $\frac{6}{3\frac{1}{4}} = \frac{45}{x}$; $6x = 45 \cdot 3\frac{1}{4}$

$($ 4 5 \times $\frac{\square}{\square}$ 3 \rightarrow 1 \rightarrow 4 \rightarrow $)$ \div 6 $=$ $\frac{195}{8}$ $\frac{a}{b} \cdot \frac{d}{c}$ $24\frac{3}{8}$

Salt: $\frac{6}{1\frac{1}{2}} = \frac{45}{x}$; $6x = 45 \cdot 1\frac{1}{2}$

$($ 4 5 \times $\frac{\square}{\square}$ 1 \rightarrow 1 \rightarrow 2 \rightarrow $)$ \div 6 $=$ $\frac{45}{4}$ $\frac{a}{b} \cdot \frac{d}{c}$ $11\frac{1}{4}$

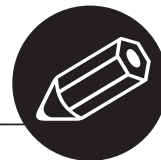
Kidney Beans: $\frac{6}{1} = \frac{45}{x}$; $6x = 45 \cdot 1$

$($ 4 5 \times 1 $)$ \div 6 $=$ 7.5 $\frac{a}{b} \cdot \frac{d}{c}$ $7\frac{1}{2}$



Thinking Cap Answers:

One way to find the answer is to multiply each amount in the ingredient list for 45 people by 2. So, they will need $22\frac{1}{2}$ pounds ground beef, $33\frac{3}{4}$ cups onions, 20 cans whole tomatoes, 30 cans tomato sauce, $48\frac{3}{4}$ teaspoons chili powder, $22\frac{1}{2}$ teaspoons salt, and 15 cans kidney beans. Another way to find these answers is to set up proportions and solve. Answers as to why a particular method was used will vary.



A Simple Discovery

Greatest Common Factor

EXTRA! EXTRA!

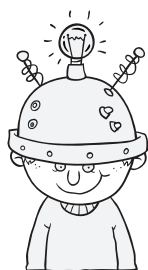
Students Discover Way to Find GCF Using **Simp** Key

by Tim Evans

Last Friday, students in Mr. Frie's math class discovered that they could use the **Simp** key on their calculators to find the greatest common factor of two numbers. One of Mr. Frie's students, Cheryl Anderson, said, "We wanted to come up with a quick and accurate way to find the GCF. This idea is a great one and will make our work a lot easier!"

How do you think Mr. Frie's class did this? Test your ideas on the pairs of numbers below. Then explain why your method works. (Hint: Write the two numbers as a fraction)

- | | | | |
|----|----------|-----|----------|
| 1. | 12, 72 | 2. | 45, 60 |
| 3. | 72, 48 | 4. | 90, 130 |
| 5. | 18, 36 | 6. | 28, 63 |
| 7. | 230, 355 | 8. | 120, 320 |
| 9. | 138, 300 | 10. | 162, 360 |



Thinking Cap

Mr. Frie's students also came up with a way to check their work on the calculator using the GCF and the final fraction for each pair of numbers. How did they do this?

A Simple Discovery

Greatest Common Factor

Instructional Strategies

Hands On:

Use interlocking cubes to find greatest common factors. To set up the activity, designate one color as ones and keep them as individual cubes. Choose another color and connect 2 to represent factors of 2. Choose another color and connect 3 cubes to represent factors of 3. Create factors of 4 and 5 using other colors. For the first example, have students find the greatest common factor of 6 and 8. To do this, have students build a 6 and an 8 using the ones color. Ask students if they can make 6 with the factors of 2 (they can do this by using 3 of these 2 factors). Continue by having them build 6 with factors of 3 (use 2 of the 3 factors), factors of 4 (not possible), and factors of 5 (not possible). Do the same with 8. Ask students which factors they could use for both 6 and 8. In this case, they both used the 2 factor color and therefore, have a greatest common factor of 2. Try the same with 12 and 8.

Getting Started:

Talk about why you would want to find the greatest common factor between two numbers. Ask groups to come up with reasons why this might be useful. Have each group share their ideas and guide the discussion to look at using greatest common factors as a way to simplify fractions.

Calculator Notes:

Students use the calculator in this activity to discover a way to find the greatest common factor of two numbers using the **Simp** key.

- The **□** key can be used to enter the two numbers as a fraction.
- This activity makes use of Manual Simplify mode (the calculators come in this mode, by default). However, if you need to return them to Manual mode, press **SETUP** **7** **2**. If not in Manual mode, the calculator will automatically simplify your results without sharing information on each common factor.
- The **Simp** key can be used to simplify the fraction to find the GCF.
- When you have fully simplified a fraction, you will notice that the little ‘down’ arrow on the right side of the screen disappears.

Example:

1. For exercise 1, enter **□** **1** **2** **▶** **7** **2** **□** to enter the two numbers as a fraction.
2. Then press **Simp** **□**, and a 2 will appear on the display followed by $\frac{6}{36}$. Record the 2.
3. Press **Simp** **□** again, and again a 2 will appear on the display followed by $\frac{3}{18}$. Record the 2.
4. Press **Simp** **□** again, and a 3 will appear on the display followed by $\frac{1}{6}$. Record the 3.
5. Press **Simp** **□** again, and you should see the word “Simplified”. This means that the fraction has been simplified completely. To find the GCF, multiply the three recorded factors. The GCF of 12 and 72 is 12.

Objective:

Use the calculator to find the greatest common factors of pairs of numbers.

Common Core State Standards: 6.NS.4

– Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1-100 with a common factor as a multiple of a sum of two whole numbers with no common factor. *For example, express $36 + 8$ as $4(9 + 2)$.*

Standards for Mathematical Practice:

3. Construct viable arguments and critique the reasoning of others.
5. Use appropriate tools strategically.



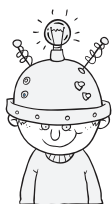
Assessment:

Encourage students to divide each number by the GCF. If their answer is correct, the GCF of the two quotients will be 1.

A Simple Discovery

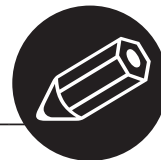
Greatest Common Factor

- | | | | | | |
|-----|----|----|----|----|----|
| 1. | 12 | 2. | 15 | 3. | 24 |
| 4. | 10 | 5. | 18 | 6. | 7 |
| 7. | 5 | 8. | 40 | 9. | 6 |
| 10. | 18 | | | | |



Thinking Cap Solution:

Multiply the final fraction by the fraction formed by the GCF over itself. If the GCF is correct, the result should be the fraction formed by the original two numbers.

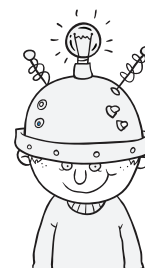


And the Winner Is...

Adding Fractions and Mixed Numbers

Choose a partner and play a game using a calculator with the fraction boxes shown below. Take turns with your partner and circle two boxes of your choice. Then, find the sum of the fractions or mixed numbers in the boxes you chose. Record the answer as a score. Continue playing the game until all of the boxes have been chosen. The player with the highest total score wins!

$\frac{2}{3}$	$2\frac{1}{4}$	$\frac{3}{8}$	$\frac{3}{20}$	$\frac{9}{10}$	$6\frac{1}{12}$
$\frac{7}{9}$	$4\frac{7}{8}$	$1\frac{3}{5}$	$\frac{1}{20}$	$\frac{5}{6}$	$3\frac{3}{4}$
$8\frac{4}{7}$	$\frac{8}{11}$	$\frac{6}{11}$	$9\frac{5}{8}$	$3\frac{4}{5}$	$\frac{9}{11}$
$7\frac{3}{10}$	$\frac{9}{20}$	$5\frac{10}{11}$	$1\frac{1}{5}$	$\frac{9}{16}$	$10\frac{1}{5}$
$\frac{5}{7}$	$7\frac{2}{9}$	$\frac{4}{11}$	$4\frac{7}{12}$	$\frac{1}{9}$	$8\frac{3}{7}$
$4\frac{3}{5}$	$\frac{9}{11}$	$7\frac{3}{7}$	$9\frac{1}{3}$	$\frac{5}{8}$	$3\frac{7}{10}$



Thinking Cap

What strategies did you use to try to get the greatest possible sum?

And the Winner Is...

Adding Fractions and Mixed Numbers

Instructional Strategies

Hands On:



Use fraction tiles or circles to explore sums of fractions and mixed numbers. As a warm up, ask students which fraction is bigger $\frac{3}{4}$ or $\frac{5}{6}$? After they have made a conjecture, have them build each fraction to demonstrate which fraction is bigger. Try several examples like $\frac{3}{8}$ and $\frac{2}{3}$ until students get comfortable determining which is larger. Once they are comfortable finding the bigger fraction, challenge students to find a fraction bigger than a given mixed number.

Getting Started:


Give students 3 fractions and ask them to predict which 2 have the greatest sum. Give students time to think about it before soliciting answers and discussing the reasons for their choices. After a couple turns, add a mixed number to the list and have them find the greatest sum.

Calculator Notes:

Students use the calculator in this activity to find the sum of fractions and mixed numbers with like and unlike denominators.

- The  key can be used to enter fractions.
- The  key can be used to enter mixed numbers.

Example:

1. Suppose the first player circles $8\frac{3}{7}$ and $\frac{9}{10}$. The calculator should be used to find the sum:  $9\frac{23}{70}$.
2. The player should record this sum and all other sums of the number in the two boxes chosen at each turn.
3. Once all of the boxes have been chosen, each player should use the calculator to add all of his or her recorded sums.



Assessment:

Encourage students to check their sums by estimating the sums before finding them on the calculator.

Objective:

Use the calculator to add fractions and mixed numbers with like and unlike denominators.

Common Core State Standards:

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. *For example, $\frac{2}{3} + \frac{5}{4} = \frac{8}{12} + \frac{15}{12} = \frac{23}{12}$. (In general, $\frac{a}{b} + \frac{c}{d} = \frac{ad + bc}{bd}$.)*

Standards for Mathematical Practice:

1. Make sense of problems and persevere in solving them.
5. Use appropriate tools strategically.

And the Winner Is...

Adding Fractions and Mixed Numbers

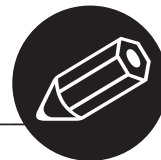
Answers will vary depending upon the boxes chosen by each player.



Thinking Cap Solution:

As an extension, students describe any strategies they used while playing the game. Encourage students to think of other possible strategies they might use if they played the game again.

Possible Answers: I tried to choose the two greatest possible numbers from the ones that were left.

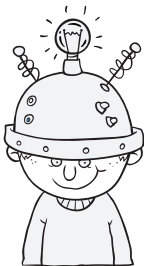


Can You Fix It?

Prime Factorization

T Tyler's math class is studying prime factorization. He completed his homework assignment on prime factorization and showed it to Leeza. She said that in each exercise there was one incorrect number in the prime factorization. Can you help Tyler correct his work? (Hint: Sometimes the incorrect number can be an exponent!)

1.	$2^3 \times 3^3 = 72$
2.	$2^2 \times 3^3 \times 5 = 180$
3.	$3^4 \times 11 = 1053$
4.	$2^2 \times 3^2 \times 7^2 = 900$
5.	$2^3 \times 3^2 \times 5 = 120$
6.	$2^3 \times 5^4 = 1000$
7.	$2^4 \times 5 \times 13 = 624$
8.	$3^2 \times 5^2 \times 11 = 315$
9.	$3 \times 5^2 \times 11 = 525$
10.	$2 \times 3^2 \times 11 = 594$
11.	$3^2 \times 5^3 = 225$
12.	$3^3 \times 13 = 297$



Thinking Cap

Leeza told Tyler that for some of the exercises she could tell which number was incorrect by simply looking at the answer. Explain what Leeza meant by this.

Can You Fix It?

Prime Factorization

Instructional Strategies

Getting Started:

To get students used to using exponents, pose the following scenario to your class. Your parents offer you two options for earning allowance once you've completed your chores: Option 1: \$5 a week. Option 2: On the first week, they will pay you 2 pennies. Each following week they will double it. Have groups explore both options and present their findings to the class. As students examine option 2, make sure they make the connection between exponents and repeated multiplication. Continue your discussion to remind students how to find prime factors of a number and write them as exponents.

Calculator Notes:

Students use the calculator in this activity to find the incorrect number in the prime factorization of a number.

- The x^y key can be used to calculate the powers.
- After using the x^y key, you need to press \blacktriangleright to exit the power template and enter additional information.
- When only using the 2nd power, you can save time by pressing x^2 .

Example:

1. For exercise 1, $2^3 \times 3^3 = 216$, so either one of the bases or one of the powers is too high.
2. Try reducing the second exponent to 2. Since $2^3 \times 3^2 = 72$, the correct prime factorization is $2^3 \times 3^2 = 72$.

Assessment:



Students should be encouraged to use the calculator to check the correct prime factorization they record. They should be sure their result on the calculator is the same as the number to the right of the equal sign in the exercise.

Objective:

Use the calculator to find the prime factorization of numbers.

Common Core State Standard:

6.EE.1 – Write and evaluate numerical expression involving whole-number exponents.

Standards for Mathematical Practice:

3. Construct viable arguments and critique the reasoning of others.
8. Look for and express regularity in repeated reasoning.

Can You Fix It?

Prime Factorization

1. $2 \times 3 \times 3 \times 3 = 72$

2. $2 \times 3 \times 3 \times 5 = 180$

3. $3 \times 4 \times 1 \times 3 = 1053$

4. $2 \times 3 \times 3 \times 5 \times 3 = 900$

5. $2 \times 3 \times 3 \times 3 \times 5 = 120$

6. $2 \times 3 \times 3 \times 5 \times 3 = 1000$

7. $2 \times 4 \times 3 \times 1 \times 3 = 624$

8. $3 \times 5 \times 7 = 315$

9. $3 \times 5 \times 7 = 525$

10. $2 \times 3 \times 3 \times 1 \times 1 = 594$

11. $3 \times 5 \times 3 = 225$

12. $3 \times 3 \times 1 \times 1 = 297$

Thinking Cap Solution:



Leeza knew that the answer was divisible by certain numbers by using the divisibility rules. If one of those numbers was not included in the prime factorization or if there were numbers other than those included, Leeza knew she needed to change that number.

First to Fifty!!

Game: Play in pairs with player A & B:

1. Player A enters a 1, 2, or 3.
2. Player B adds 1, 2, or 3 to the previous number.
3. Continue taking turns until one player reaches 50 (winner).
4. Let player B go first on the second round.

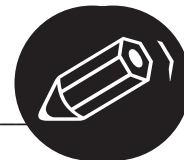
Questioning strategies: What are some questions you could ask the class to spark conversation about this game?

Challenge: Instead of using the numbers 1, 2, or 3, each player must pick a different form of the number for each turn. For example, rather than adding 1, you could enter $+2^0$.

Extensions:

How could you make this game more challenging?

Make up your own game.



Fractions to Flip Over

Reciprocals

Jessie found some exercises in a math book in which some of the fractions and mixed numbers had accidentally been left out. She looked in the answer key and found that the answer to all of the exercise is 1. She decided to use her calculator to help her find the missing fractions. Share how Jessie found the fractions. Then, find the fractions yourself. (Hint: Use the $\frac{1}{x}$ key on your calculator to find reciprocals.)

Exercises

1. $\frac{3}{4} \times \square \times \square \times 5\frac{2}{5}$

2. $\square \times 3\frac{5}{6} \times \square \times \frac{3}{8}$

3. $7\frac{1}{9} \times \square \times \frac{3}{7} \times \square$

4. $\square \times 8\frac{12}{13} \times 5\frac{15}{28} \times \square$

5. $18\frac{3}{4} \times \square \times \square \times 10\frac{9}{10}$

6. $\frac{11}{21} \times \square \times \square \times 23\frac{19}{20}$

7. $32\frac{48}{49} \times \square \times \frac{55}{101} \times \square$

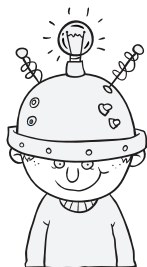
8. $\square \times 29\frac{36}{45} \times \square \times \frac{79}{100}$

9. $\square \times 45\frac{34}{54} \times \square \times 21\frac{81}{98}$

10. $\frac{100}{101} \times \square \times \square \times 55\frac{90}{127}$

11. $\frac{160}{177} \times \square \times \square \times 150\frac{1}{3}$

12. $6\frac{79}{80} \times \square \times \square \times 105\frac{6}{17}$



Thinking Cap

Write some additional exercise that could be added to this exercise set. Explain why you wrote the exercises you did.



Fractions to Flip Over

Reciprocals

Instructional Strategies

Hands On:

Play the Give Me One!!! game: The goal of the game is to create an expression that equals 1.




- **Subtraction Option:** Give students 159 and ask them what number should be subtracted to get 1. Give them time to explore on their own before asking a student to share their answer. Continue with several examples like 89, 1000, etc.
- **Division Option:** Ask students what number should 135 be divided by to get 1. Again, give students time to explore before asking a student to share their answer.
- **Multiplication Option:** Challenge students to find a number can be multiplied by 5 to get 1. Give students plenty of time to explore. Ask students to explain what they've found and challenge them to another whole number. Once they are comfortable with whole numbers, give them a fraction like $\frac{2}{3}$. Continue with several examples.

Getting Started:















Use the multiplication option from the Hands On section to introduce the concept of reciprocals. Demonstrate how to enter & calculate with fractions on the calculator.

Calculator Notes:

Students use the calculator in this activity to find the missing fractions and mixed numbers.

- The  key can be used to enter fractions.
- The  key can be used to enter mixed numbers.
- The  key can be used to find the reciprocal.

Example:

1. For Exercise 1, find the reciprocals of $\frac{3}{4}$ and $5\frac{2}{5}$.
2. To find the reciprocal for $\frac{3}{4}$, enter      . Its reciprocal is $\frac{4}{3}$.
3. To find the reciprocal for $5\frac{2}{5}$, enter        . Its reciprocal is $\frac{5}{27}$.



Assessment:

Encourage students to multiply the four numbers to be sure the product is 1.

Objective:

Use the calculator to find the reciprocal of fractions and mixed numbers.

Common Core State Standards:

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. *For example, interpret $\frac{3}{4}$ as the result of dividing 3 by 4, noting that $\frac{3}{4}$ multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size $\frac{3}{4}$. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?*

Standards for Mathematical Practice:

5. Use appropriate tools strategically.
7. Look for and make use of structure.

Fractions to Flip Over

Reciprocals

Solutions may vary; e.g., if students get creative the solution to #1 may also be :

$$\frac{4}{27} \text{ \& } \frac{5}{3} .$$

$$1. \quad \frac{4}{3} \text{ \& } \frac{5}{27}$$

$$2. \quad \frac{6}{23} \text{ \& } \frac{8}{3}$$

$$3. \quad \frac{9}{84} \text{ \& } \frac{7}{3}$$

$$4. \quad \frac{13}{116} \text{ \& } \frac{28}{155}$$

$$5. \quad \frac{4}{75} \text{ \& } \frac{10}{109}$$

$$6. \quad \frac{21}{11} \text{ \& } \frac{20}{479}$$

$$7. \quad \frac{49}{1616} \text{ \& } \frac{101}{55}$$

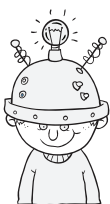
$$8. \quad \frac{5}{149} \text{ \& } \frac{100}{79}$$

$$9. \quad \frac{27}{1232} \text{ \& } \frac{98}{2139}$$

$$10. \quad \frac{101}{100} \text{ \& } \frac{127}{7075}$$

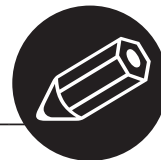
$$11. \quad \frac{177}{160} \text{ \& } \frac{3}{451}$$

$$12. \quad \frac{80}{559} \text{ \& } \frac{17}{1791}$$



Thinking Cap Solutions:

Exercises may vary but should include two pairs of fractions and/or mixed numbers with a product of 1



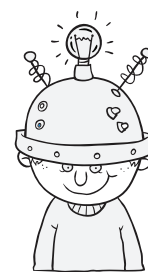
I'm aMAZEd by Fractions!

Subtracting Mixed Numbers and Whole Numbers

Find your way through this maze of mixed numbers and whole numbers by subtracting either $1\frac{2}{3}$ or $2\frac{3}{4}$ to get from one number to the next. You can move up, down, right, left, or diagonally. You cannot use a path more than once. Good luck and have fun!

START

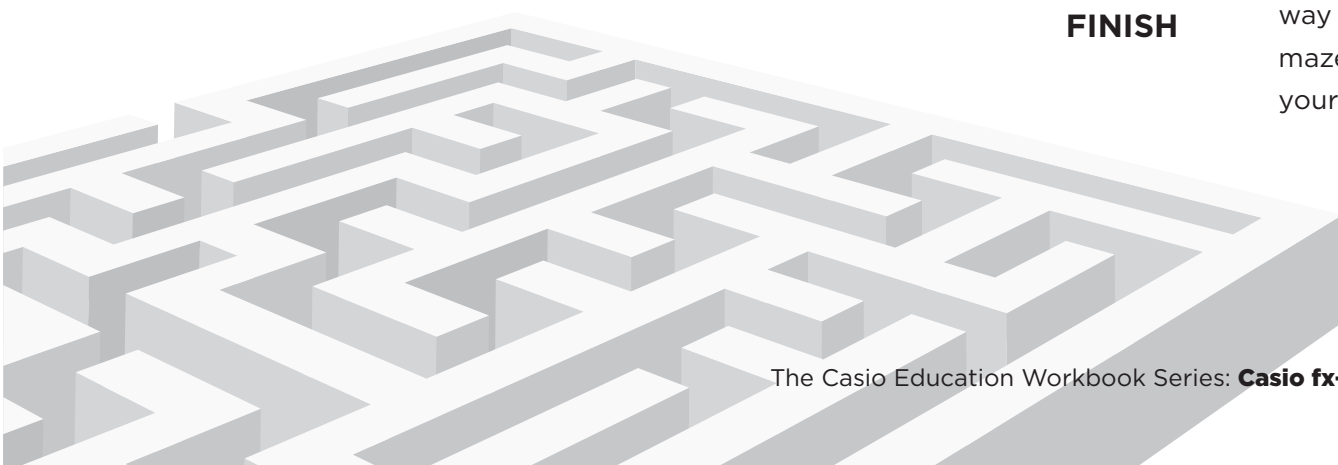
$24\frac{1}{2}$	24	$22\frac{1}{3}$	$18\frac{11}{12}$	$3\frac{5}{12}$	$11\frac{3}{4}$
$21\frac{3}{4}$	$20\frac{3}{4}$	$20\frac{7}{12}$	$16\frac{1}{6}$	$7\frac{2}{3}$	$10\frac{2}{3}$
18	$20\frac{1}{12}$	$18\frac{7}{12}$	$14\frac{1}{2}$	6	9
$17\frac{1}{3}$	$14\frac{7}{12}$	$18\frac{5}{12}$	$11\frac{3}{4}$	$4\frac{1}{3}$	$7\frac{1}{3}$
16	$11\frac{5}{6}$	$15\frac{2}{3}$	14	$11\frac{1}{4}$	8
$13\frac{1}{4}$	$10\frac{1}{2}$	$7\frac{3}{4}$	5	$9\frac{7}{12}$	$3\frac{1}{2}$
$10\frac{1}{2}$	$7\frac{3}{4}$	$8\frac{1}{2}$	$7\frac{11}{12}$	$5\frac{1}{6}$	$\frac{3}{4}$



Thinking Cap

Do you think there is more than one way to find your way through this maze? Explain your answer.

FINISH



I'm aMAZEd by Fractions!

Subtracting Mixed Numbers and Whole Numbers

Instructional Strategies

Hands On:

Use fraction circles to explore subtracting fractions. Give groups 3 circles and ask students to build the answer if we subtract $1\frac{1}{3}$. You can start with simpler examples using 1 circle if needed. Continue to challenge groups to build solutions with different subtraction problems.

Getting Started:

Once students are familiar with using the calculator for fractions, set up the activity and challenge them to find the quickest path.

Calculator Notes:

Students use the calculator in this activity to subtract whole numbers and mixed numbers with like and unlike denominators.

- The calculator is setup to require manual simplification of fractions. Before starting this activity, be sure all calculators are changed to Auto Simplification. To do so, press **SETUP** **7** (Simp) **1** (Auto).
- The **STO M** key can be used to enter the necessary sums into the memory of the calculator.
- The **RCL M** key can be used to recall the number stored in memory.
- The **M₊** key can be used to enter mixed numbers.

Example:

- Start with $24\frac{1}{2}$. Since you will need to subtract two different mixed numbers from $24\frac{1}{2}$, you can enter it into the memory of the calculator and simply recall it to subtract the second time.
- To enter $24\frac{1}{2}$ into memory and subtract $1\frac{2}{3}$, press **M₊** **2** **4** **▶** **1** **▶** **2** **STO M** **−** **M₊** **1** **▶** **2** **▶** **3** **≡** $\frac{197}{6}$. Press **a_b/_c/_d** to change the answer to a mixed number, $22\frac{5}{6}$.
- Then, to subtract $2\frac{3}{4}$, press **RCL M** **−** **2** **▶** **3** **▶** **4** **≡** $\frac{87}{4}$. Press **a_b/_c/_d** to change the answer to a mixed number, $21\frac{3}{4}$.
- Since $21\frac{3}{4}$ is the only difference that can be connected to $24\frac{1}{2}$, draw a line from $24\frac{1}{2}$ to $21\frac{3}{4}$.



Assessment:

Encourage students to estimate each difference before they actually use the calculator to find it.

Objective:

Use the calculator to subtract mixed numbers and whole numbers with like and unlike denominators.

Common Core State Standards:

4.NF.3c. – Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.

Standards for Mathematical Practice:

1. Make sense of problems and persevere in solving them.
5. Use appropriate tools strategically.

I'm aMAZEd by Fractions!

Subtracting Mixed Numbers and Whole Numbers

Lines should be drawn from

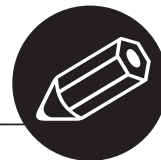
$24\frac{1}{2}$ to $21\frac{3}{4}$ to $20\frac{1}{12}$ to $18\frac{5}{12}$ to $15\frac{2}{3}$ to 14 to $11\frac{1}{4}$ to $9\frac{7}{12}$ to $7\frac{11}{12}$ to $5\frac{1}{6}$ to $\frac{3}{4}$.



Thinking Cap Solution:

As an extension, students can determine whether there is more than one path through the maze. To do this, they must examine every line they have drawn to be sure it cannot be drawn in a different way.

Answer: No, in each case, there is only one way the line can be drawn to get to one of the possible differences.



It's a Match!

Simplifying Fractions

Simplify each fraction. Then match each fraction on the left with the equivalent fraction on the right.

$$\frac{18}{60}$$

$$\frac{10}{25}$$

$$\frac{40}{32}$$

$$\frac{21}{35}$$

$$\frac{4}{24}$$

$$\frac{4}{9}$$

$$\frac{14}{32}$$

$$\frac{36}{48}$$

$$\frac{11}{15}$$

$$\frac{12}{72}$$

$$\frac{20}{45}$$

$$\frac{15}{25}$$

$$\frac{21}{48}$$

$$\frac{33}{45}$$

$$\frac{30}{24}$$

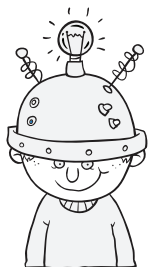
$$\frac{18}{24}$$

$$\frac{12}{30}$$

$$\frac{15}{60}$$



Were there any fractions in simplest form to begin with? How did you know?



Thinking Cap

Create your own It's a Match! puzzle. Describe how you created your puzzle. Then exchange puzzles with a classmate, and solve each other's puzzle.

It's a Match!

Simplifying Fractions

Instructional Strategies

Hands On:

Use fraction tiles to create equivalent fractions. Give each group a set of fraction tiles and ask them if they can make $\frac{1}{2}$ using the $\frac{1}{4}$ tiles; the $\frac{1}{3}$ tiles; etc. Have them share the equivalent fractions they find. Have them build $\frac{1}{3}$ using different sizes of tiles. Once they are comfortable building these equivalent fractions, challenge them to build equivalent fractions to $\frac{3}{4}$, $\frac{5}{8}$, etc. As an extension, have them find equivalent fractions for mixed or improper fractions.

Getting Started:

Have students put their calculators into Manual Simplify mode (see Option 2 below) and challenge them to figure out what the **Simp** key does on the calculator. After a few minutes of exploration, have them share their ideas in their groups. Ask each group to share their ideas.


Calculator Notes:

Students use the calculator in this activity to simplify fractions. Students then match equivalent fractions.





The  key can be used to enter the fraction into the calculator.

In order to reduce the fraction, you have two choices

Option 1: If Auto Simplify is set, the calculator will automatically identify the simplest form of a fraction. To set Auto mode, press **SETUP** **7** **1**.

Option 2: If Manual Simplify is set (the default), students must press **Simp**  to find a simplified version of a fraction; this can continue multiple times before reaching the most simplified result. To set Manual mode, press **SETUP** **7** **2**.

Example: (Manual Mode)

To simplify the fraction $\frac{18}{60}$, enter  **1** **8**  **6** **0** . Then press **Simp**  twice to simplify the fraction to $\frac{3}{10}$.



Assessment:

One way students can check their answers is to divide the original numerator of each fraction by its original denominator to find the decimal equivalent. They can then change the decimal to a fraction by pressing the **F-D** key. Encourage students to do this for the equivalent fractions they have matched. [Note: this refers to manual mode; in auto-simplify mode, the calculator will go straight to the simplified form of the fraction.]

Ask students to explain what the calculator is doing when you simplify fractions.

Objective:

Use the calculator to simplify fractions.

Common Core State Standards:

3.NF.3b - Recognize and generate simple equivalent fractions, e.g., $\frac{1}{2} = \frac{2}{4}$, $\frac{4}{6} = \frac{2}{3}$. Explain why the fractions are equivalent, e.g., by using a visual fraction model.

Standards for Mathematical Practice:

5. Use appropriate tools strategically.
6. Attend to precision.

It's a Match!

Simplifying Fractions

$$\frac{18}{60} = \frac{3}{10} \text{ is equivalent to } \frac{15}{50} = \frac{3}{10}$$

$$\frac{10}{25} = \frac{2}{5} \text{ is equivalent to } \frac{12}{30} = \frac{2}{5}$$

$$\frac{40}{32} = \frac{5}{4} \text{ is equivalent to } \frac{30}{24} = \frac{5}{4}$$

$$\frac{21}{35} = \frac{3}{5} \text{ is equivalent to } \frac{15}{25} = \frac{3}{5}$$

$$\frac{4}{24} = \frac{1}{6} \text{ is equivalent to } \frac{12}{72} = \frac{1}{6}$$

$$\frac{4}{9} \text{ is equivalent to } \frac{20}{45} = \frac{4}{9}$$

$$\frac{14}{32} = \frac{7}{16} \text{ is equivalent to } \frac{21}{48} = \frac{7}{16}$$

$$\frac{36}{48} = \frac{3}{4} \text{ is equivalent to } \frac{18}{24} = \frac{3}{4}$$

$$\frac{11}{15} \text{ is equivalent to } \frac{33}{45} = \frac{11}{15}$$

Yes, when you first entered the fraction there was no \Downarrow indicator.

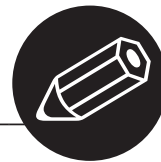
This meant the fraction could not be simplified from its original form.

Alternately, when pressing $\boxed{\text{Simp}} \boxed{\equiv}$, the fx-55 indicates that the answer is already simplified.



Thinking Cap Solution:

Puzzles will vary. See students' work.

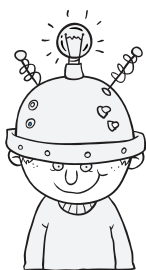


It's About Average

Mean

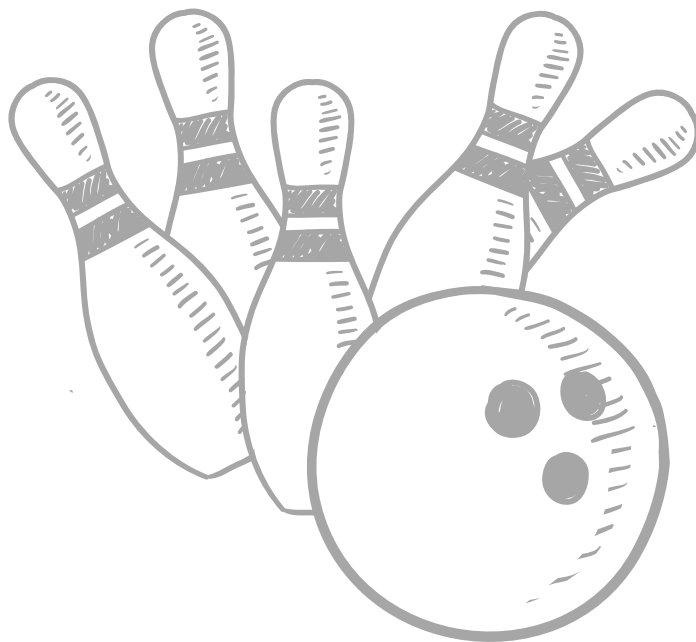
Wendy and six of her friends went bowling last weekend. They each bowled five games and recorded their scores on a chart. When Wendy got home and looked at the chart, she realized they had forgotten to record their scores for the fifth game! But she remembered that they each had an average score of 105 and was able to figure out the missing scores. Decide how she found the missing scores and complete the chart.

	Game 1	Game 2	Game 3	Game 4	Game 5
Wendy	125	112	101	91	
Shilah	108	96	102	117	
Marcella	140	90	93	96	
Jaime	83	90	150	85	
Amber	100	105	110	102	
Amy	75	100	105	80	
Mac	98	95	122	107	



Thinking Cap

Do you think the mean of 105 is representative of how well each person bowled? Explain your answer.



It's About Average

Mean

Instructional Strategies

Hands On:

Use interlocking cubes to demonstrate how the mean works. Give each group of four 20 interlocking cubes. Challenge them to build 4 towers that are equal length (they should come up with 5 blocks in each tower for a group of 4). Ask the whole class what they just did. Guide the discussion so that students realize that by building towers of equal length, they share the 20 cubes equally and that this represents the mean. Give groups more cubes and try again. To encourage understanding, for the first few examples make sure that the mean comes out as a whole number. As a challenge, give them cubes that will not give a whole number mean and discuss what the implications are for these examples.

Getting Started

Challenge students to find the missing test score if their average was 80. There were 5 total tests and the first 4 scores were 80, 99, 75, 83. What was the last score? Ask groups to find the missing test score and be ready to present their findings to the class.

Calculator Notes

Students use the calculator in this activity to find the missing number in a set of data when they know the mean of the data.

The **STO M** key can be used to enter the necessary sums into the memory of the calculator.

The **RCL M** key can be used to recall the number stored in memory.

The **()** and **)** keys can be used to group expressions.

Example:

- For all seven bowlers, the mean is 105 and they each bowled five games. Therefore, the sum of the scores for all five games for each bowler was $105 \times 5 = 525$. To calculate this and add it to memory, press **1 0 5 × 5 STO M**.

Note: this product will be used to find the missing score for every bowler.

- To find Wendy's score for Game 5, press **RCL M** to recall 525 from the memory of the calculator.
- Then, enter **− () 1 2 5 + 1 1 2 + 1 0 1 + 9 1) =** to find that Wendy's score for Game 5 was 96.



Assessment:

Have students calculate the average for all five scores for each bowler. If the score they found for Game 5 is correct, the mean will be 105.

Objective:

Use the calculator to find a missing number in a set of data given the mean of the data.

Common Core State Standards:

6.SP.5c - Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.

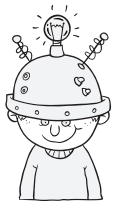
Standards for Mathematical Practice:

- Reason abstractly and quantitatively.
- Attend to precision.

It's About Average

Mean

	Game 1	Game 2	Game 3	Game 4	Game 5
Wendy	125	112	101	91	96
Shilah	108	96	102	117	102
Marcella	140	90	93	96	106
Jaime	83	90	150	85	117
Amber	100	105	110	102	108
Amy	75	100	105	80	165
Mac	98	95	122	107	103

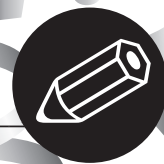


Thinking Cap Answers:

The mean score is representative of how some of the people bowled. For example, it is very representative of Amber's scores since her scores did not vary significantly. On the other hand, Jaime was an inconsistent bowler and the mean score does not show the wide range of her scores.

Name _____

Date _____

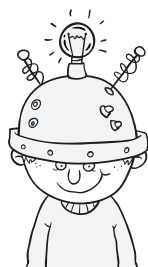


Keep It Down!

Unit Rates

Lyla is planning a party. She is trying to keep the cost down by comparing prices. She found that the best way to do this was to shop around, write down the prices of the items she needs, and then find the unit prices. The lowest unit price is the best buy. Can you help her find the best buy for each of the items listed below? (Hint: Use the **SETUP** key to fix the unit prices to the nearest cent.)

Item	Price 1	Unit Price	Price 2	Unit Price	Best Buy
Cups	100 for \$5.65		50 for \$3.75		
Plates	500 for \$8.99		100 for \$2.50		
Napkins	1000 for \$6.89		500 for \$4.25		
Forks	500 for \$7.59		250 for \$3.69		
Renting Chairs	25 for \$62.50		15 for \$33.75		
Renting Videos	6 for \$9.00		5 for \$7.75		
Film	5 for \$16.25		3 for \$9.30		



Thinking Cap:

Suppose Lyla always needs to buy the greatest number of items listed in each case. For example, she needs to buy five rolls of film. Does this mean that it is always best for her to buy the greater quantity? Explain your answer.

Keep It Down!

Unit Rates

Instructional Strategies

Getting Started:

Bring newspaper/internet ads from 2 competing stores that advertise the same items which have different rates. For example, one store sells a 6-pack of soda for \$1.99 and another store sells a 2-liter bottle of soda for \$1.25. Challenge groups to find which bargain is the better deal. Have groups present their reasoning. As an extension, ask students to go through ads and create their own problems involving better deals.

Calculator Notes:

Students use the calculator in this activity to find the unit rate.

- The **SETUP** key can be used to fix the number of decimal places to 2.
- The **÷** key can be used to divide the numbers to find the unit rate.

Example:

1. To find the unit prices of 100 cups for \$5.65, press **SETUP**, **3** (Fix), **2** to find the unit price to the nearest cent.
2. Enter **5** **.** **6** **5** **÷** **1** **0** **0** **=** to find the unit price of \$0.06.
3. To find the unit price of 50 cups for \$3.75, enter **3** **.** **7** **5** **÷** **5** **0** **=**. The unit price is \$0.08.

Note: The number of decimal places remains fixed at 2 until you change it.

4. Since \$0.06 is less than \$0.08, 100 cups for \$5.65 is the best buy.

Assessment:



Encourage students to check their answers by multiplying the unit price by the number of items. The answer should be approximately equal to the original price.

Objective:

Use the calculator to find the unit rate.

Common Core State Standards:

5.NBT.7 – Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Standards for Mathematical Practice:

2. Reason abstractly and quantitatively.
6. Attend to precision.

Keep It Down!

Unit Rates

Cups: See Calculator Notes example.

Plates: $8 \div 99 = 0.02$

$2 \div 51 = 0.03$

500 plates for \$8.99 is the best buy.

Napkins: $6 \div 89 = 0.01$

$4 \div 25 = 0.01$

Note: These unit prices are the same. In order to compare them, the number of decimal places will need to be increased. To do this, press **SETUP** **3** (Fix) **7**.

$6 \div 89 = 0.0068900$

$4 \div 25 = 0.0085000$

1000 napkins for \$6.89 is the best buy.

Forks: Press **SETUP** **3** (Fix) **2** to find the unit prices to the nearest cent.

$7 \div 59 = 0.02$

$3 \div 69 = 0.01$

250 forks for \$3.69 is the best buy.

Chairs: $62 \div 25 = 2.50$

$33 \div 15 = 2.25$

15 chairs for \$33.75 is the best buy

Videos: $9 \div 6 = 1.50$

$7 \div 75 = 1.55$

6 videos for \$9.00 is the best buy

Film: $16 \div 5 = 3.25$

$9 \div 3 = 3.10$

3 rolls of film for \$9.30 is the best buy



Thinking Cap Solution:

No, if the smaller quantity is the best buy, she can just buy more items at that price.

Puzzling Exponents

Powers

Instructional Strategies

Getting Started:

As a warm up, have students find the number that is represented by 2^3 , 3^5 , 21^6 , etc. Challenge them to find the missing value for $2^x = 32$, $5^x = 25$, etc. Encourage them to use the calculator to explore exponents.

Calculator Notes:

Students use the calculator in this activity to evaluate powers.

The x^{\square} key can be used to evaluate all powers.

The x^2 key can be used to raise numbers to the second power.

Example:

- To find the answer to the first problem, enter $3 \ 5 \ x^{\square} \ 4 \ =$. The answer is 1,500,625.
- In the answer column, the letter identified with this answer is T.



Assessment:

The answer to each problem is listed in the answer column on the right side of the page. If students arrive at an answer that is not found in this column, ask them to complete the problem again.

Objective:

Use the calculator to gain a better understanding of the behavior of exponents.

Common Core State Standards:

6.EE.1 – Write and evaluate numerical expression involving whole-number exponents.

Standards for Mathematical Practice:

- Reason abstractly and quantitatively.
- Use appropriate tools strategically.

Puzzling Exponents

Powers

1. Answer Choice: T; 1,500,625
2. Answer Choice: L; 9
3. Answer Choice: U; 5
4. Answer Choice: E; 2
5. Answer Choice: F; 1,048,576
6. Answer Choice: O; 687
7. Answer Choice: P; 2
8. Answer Choice: A; 47
9. Answer Choice: S; 7,529,536
10. Answer Choice: R; 126
11. Answer Choice: X; 3
12. Answer Choice: W; 474,552
13. Answer Choice: N; 56

E	X	P	O	N	E	N	T	S	A	R	E
4	11	7	6	13	4	13	1	9	8	10	4
		P	O	W	E	R	F	U	L!		
		7	6	12	4	10	5	3	2		



Thinking Cap Solution:

Answers may vary. See students' work.

Random Fractions: I want at least $\frac{1}{2}$!!! Please?

Let's set up your calculator to produce random fractions.

- Press **SETUP**.
- Select **1** (Math0).
- Press **Ran#** **=**.

To change to decimal:

- Press **F \leftrightarrow D**.

```

1:Math0  2:Line0
3:Fix    4:Norm
5:ab/c   6:d/c
7:SimP   8:CONT
    
```

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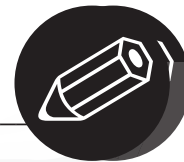
Ran#
                Math ▲
                -----
                869
                1000
    
```

```

Ran#
                Math ▲
                -----
                0.869
    
```

With your partner, sort your fractions into the table:

NO!!!!	YES!!!!
Less than $\frac{1}{2}$	At Least $\frac{1}{2}$



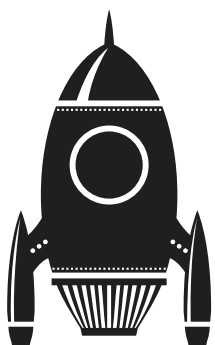
Spaceship Port

Exploring Remainders

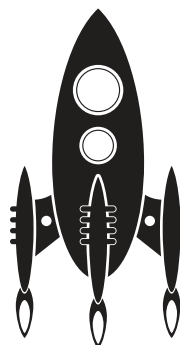
Spaceships land in the city of Ozzie at Spaceship Port. Employees in the Landing Pad Department made the schedule below to show how many ships land each day. The schedule also shows the number of hours each pad is used each day. One of the employees checked the schedule and found that the number of ships landing was too low for each pad. For each pad, the same number of ships should land each hour with none left over. Can you help fix the schedule so that an exact number of spaceships land at each pad with none left over? (Hint: Use the $\div R$ key on your calculator!)



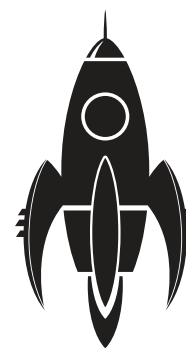
Lunar Pad



Venus Pad

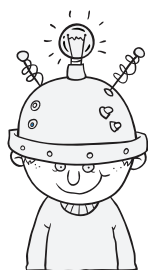


Pluto Pad



Saturn Pad

Old Schedule	Old Schedule	Old Schedule	Old Schedule
153 ships land in 6 hours	133 ships land in 9 hours	138 ships land in 8 hours	184 ships land in 7 hours
New Schedule	New Schedule	New Schedule	New Schedule
___ ships land in 6 hours	___ ships land in 9 hours	___ ships land in 8 hours	___ ships land in 7 hours



Thinking Cap

Another employee said that the numbers in the original schedule were correct, just mixed up. She said that the number of ships for each pad was correct, but the number of hours was with the wrong pad. Is this possible? Prove your answer.

Spaceship Port

Exploring Remainders

Instructional Strategies

Hands On:

Give each student a calculator and challenge them to figure out what the $\boxed{\div R}$ key does. After they have explored for a few minutes, ask them to share their conjectures with their groups. Have groups share their ideas and provide examples to verify their conjectures.

Getting Started:

Pose this scenario to the class: The Choco Factory bakes chocolate chip cookies, and they guarantee that each cookie has exactly 11 chips. The supervisor looks at the total number of chips used for the past 5 batches & knows that 3 batches have a problem. How does she know that? The total number of chips in each of the 5 batches is: 121, 178, 100, 198, & 154 (121 & 154 are the batches that are correct because there are no chips left over once 11 have been used in each cookie). Use the $\boxed{\div R}$ key to show whether or not there is a remainder.

Calculator Notes:

Students use the calculator in this activity as a tool to solve problems involving the meaning of remainders. Students must find the problem with the landing schedule and fix the schedule.

- They use the $\boxed{\div R}$ key on the calculator to see that there are ships remaining after the number of hours are divided into the number of ships.
- Students then fix the schedule by determining the next greater dividend for each pad so that there will not be a remainder.

Example: On the Lunar Pad, $\boxed{1} \boxed{5} \boxed{3} \boxed{\div R} \boxed{6} \boxed{=}$ 25 R 3. Since 6 is the divisor and there is a remainder of 3, there need to be $6 - 3 = 3$ more ships scheduled to land on the Lunar Pad. The corrected schedule should show 156 ships landing on the Lunar Pad in 6 hours.



Assessment:

Students should be encouraged to check their corrected schedule using the $\boxed{\div R}$ key to be sure that there are no remainders.

Objective:

Use the calculator to solve problems involving the meaning of remainders.

Common Core State Standard:

4.NBT.6 – Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division, illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Standards for Mathematical Practice:

1. Make sense of problems and persevere in solving them.
5. Use appropriate tools strategically.

Spaceship Port

Exploring Remainders

Lunar Pad: $\boxed{1} \boxed{5} \boxed{3} \boxed{\div R} \boxed{6} \boxed{=}$ 25 R 3, so there are 26 ships landing each hour, or $26 \times 6 = 156$ ships in 6 hours.

Venus Pad: $\boxed{1} \boxed{3} \boxed{3} \boxed{\div R} \boxed{9} \boxed{=}$ 14 R 7, so there are 15 ships landing each hour, or $15 \times 9 = 135$ ships in 9 hours.

Pluto Pad: $\boxed{1} \boxed{3} \boxed{8} \boxed{\div R} \boxed{8} \boxed{=}$ 17 R 2, so there are 18 ships landing each hour, or $18 \times 8 = 144$ ships in 8 hours.

Saturn Pad: $\boxed{1} \boxed{8} \boxed{4} \boxed{\div R} \boxed{7} \boxed{=}$ $\boxed{2} \boxed{6}$ R 2, so there are 27 ships landing each hour, or $27 \times 7 = 189$ ships in 7 hours.



Thinking Cap Solutions:

As an extension, students fix the schedule in a different way. They can use the $\boxed{\div R}$ key on the calculator to determine the number of hours that should go with each pad. For example, the 153 ships scheduled to land on the Lunar Pad should land in either 9, 8, or 7 hours. Students will find that $\boxed{1} \boxed{5} \boxed{3} \boxed{\div R} \boxed{9} \boxed{=}$ 17 R 0, so the corrected schedule for this situation should show 153 ships landing in 9 hours on the Lunar Pad.

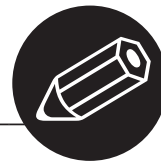
Answer: Yes

Lunar Pad Since $\boxed{1} \boxed{5} \boxed{3} \boxed{\div R} \boxed{9} \boxed{=}$ 17 R 0, 153 ships land in 9 hours.

Venus Pad: Since $\boxed{1} \boxed{3} \boxed{3} \boxed{\div R} \boxed{7} \boxed{=}$ 19 R 0, 133 ships land in 7 hours.



Pluto Pad: Since $\boxed{1} \boxed{3} \boxed{8} \boxed{\div R} \boxed{6} \boxed{=}$ 23 R 0, 138 ships land in 6 hours.

Saturn Pad: Since $\boxed{1} \boxed{8} \boxed{4} \boxed{\div R} \boxed{8} \boxed{=}$ 23 R 0, 184 ships land in 8 hours.



The Case of the Missing Fractions

Fractions and Decimals


Juan found the following list of ingredients for a recipe for an oatmeal cake. Someone had changed all of the fractions to decimals! To make matters worse, Juan could not read some of the numbers in the decimals! He knows that cups and teaspoons are measured in eighths, fourths, thirds, and halves. He also knows one stick of margarine contains 8 tablespoons. Can you help Juan find the missing fractions so he can make the cake? Are there any ingredients that could have more than one possible fraction? (Hint: Use the  and  keys on your calculator!)


Rise and Shine Oatmeal Cake

Cake

0.7  cup milk

0.  cup oats

0.  5 cup brown sugar

0.  3 cup oil

1 egg

1.2  cups flour

2 teaspoons baking powder

0.  teaspoon salt


0.1  5 teaspoon nutmeg

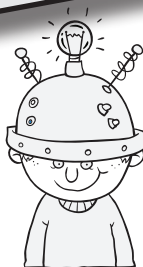
Topping

0.  75 cup flour


0.6  cup sugar

0.2  cup oats

0.6  5 of a stick of margarine, softened



Thinking Cap

Suppose Juan wants to double the recipe. Can you help him decide how much of each ingredient to use? (Hint: Use the  key to enter mixed numbers into the calculator!)

The Case of the Missing Fractions

Fractions and Decimals

Instructional Strategies

Hands On:

Use double sided fraction and decimal circles to explore equivalent fractions and decimals. At first, have pairs or groups use the circles to name the decimal equivalent of $\frac{1}{2}$; $\frac{1}{4}$; etc. Continue by giving groups decimals and have them name the fraction equivalent. Once students are comfortable recognizing the basic fractions and their equivalent decimals (and the reverse), ask them to “build” the decimal equivalent of $\frac{3}{4}$; $\frac{5}{8}$; $1\frac{1}{2}$; etc. Use white boards to share the answers as a quick way to check for understanding. As a challenge, have groups create their own fraction and decimal building challenges.

Getting Started:

Display the Oatmeal Cake recipe as it appears in the worksheet and share how frustrated you are that some of the numbers have been blocked out. Give groups a few minutes to look at the recipe and try to figure out how they will make this cake. As groups figure out one or two of the missing fractions, discuss the process as a whole class. Demonstrate how to use the calculator to change fractions to decimals and back.

Calculator Notes:

Students use the calculator in this activity to change fractions to decimals and vice versa. Students should experiment with different fractions until they find the correct one in each case.

- The calculator is setup to require manual simplification of fractions. Before starting this activity, be sure all calculators are changed to Auto Simplification. To do so, press **SETUP** **7** (Simp) **1** (Auto).
- The **$\frac{\square}{\square}$** key can be used to enter fractions into the calculator.
- The **$\frac{\square}{\square} \rightarrow$** key can be used to change fractions to decimals.

Example: The recipe shows 0.7 $\frac{\square}{\square}$ cup milk. The only possible fraction with a denominator of 8, 4, 3, or 2 that changes to a decimal with a 7 in the tenths place is $\frac{3}{4}$. Since **3** **$\frac{\square}{\square}$** **4** **$\frac{\square}{\square} \rightarrow$** 0.75, the missing digit is a 5 and the fraction is $\frac{3}{4}$.



Assessment:

Students should be encouraged to use the **$\frac{\square}{\square} \rightarrow$** key to change the decimals back to fractions to be sure they recorded the fractions accurately.

Objective:

Use the calculator to solve problems involving changing fractions to decimals and vice versa

Common Core State Standard:

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

Standards for Mathematical Practice:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.

The Case of the Missing Fractions

Fractions and Decimals

Cake:

$0.75 = \frac{3}{4}$ cup milk; $0.5 = \frac{1}{2}$ cup oats; $0.25 = \frac{1}{4}$ or $0.75 = \frac{3}{4}$ cup brown sugar;

$0.33 = \frac{1}{3}$ cup oil; $1.25 = 1\frac{1}{4}$ cups flour; $0.5 = \frac{1}{2}$ teaspoon salt

$0.125 = \frac{1}{8}$ teaspoon nutmeg

Topping:

$0.375 = \frac{3}{8}$ or $0.875 = \frac{7}{8}$ cup flour; $\frac{2}{3}$ cup sugar; $0.25 = \frac{1}{4}$ cup oats;

$0.625 = \frac{5}{8}$ of a stick of margarine

Thinking Cap Solutions:



As an extension, students are asked to double the recipe. They can use the $\frac{\square}{\square}$ key to enter the fraction and then press $\times 2 \frac{\square}{\square}$ to double each amount. In the case of a mixed number, they can use the $\frac{\square}{\square}$ key. For example, to enter $1\frac{1}{4}$, press $\frac{\square}{\square}$ 1 \blacktriangleright 1 \blacktriangleright 4.

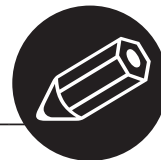
Answers:

Cake: $1\frac{1}{2}$ cups milk; 1 cup oats; $\frac{1}{2}$ or $1\frac{1}{2}$ cups brown sugar; $\frac{2}{3}$ cups oil;

2 eggs; $2\frac{1}{2}$ cups flour; 4 teaspoons baking powder; 1 teaspoon salt

$\frac{1}{4}$ teaspoon nutmeg.



Topping: $\frac{3}{4}$ or $1\frac{3}{4}$ cups flour; $1\frac{1}{3}$ cups sugar; $\frac{1}{2}$ cups oats; $1\frac{1}{4}$ sticks of margarine.

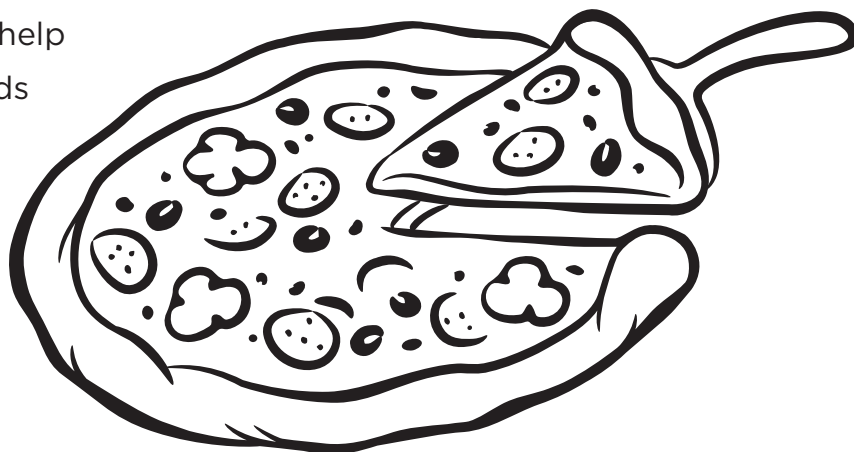


The Great Pizza Caper

Mixed Numbers and Improper Fractions

Max likes to invite some of his friends to share some pizzas equally. Every time he orders the pizza, someone in his family eats some of it before he can decide how many friends he can invite! Laurel says she can use mixed numbers and improper fractions to help Max quickly decide how many friends he can invite. Study each of the situations given below and show how Laurel helped Max.

(Hint: Use the  and  keys on your calculator!)



Situation 1

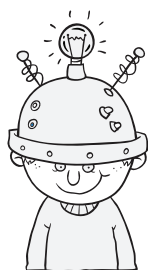
Max ordered 4 pizzas and his brother ate $\frac{2}{3}$ of one of them. How many friends can Max invite to share the remaining pizza if each friend eats $\frac{1}{3}$ of a pizza?

Situation 2

Max ordered 5 pizzas and his sisters ate $1\frac{1}{4}$ pizzas. How many friends can Max invite to share the remaining pizza if each friend eats $\frac{1}{4}$ of a pizza?

Situation 3

Max ordered 6 pizzas each cut into 16 pieces, and his cousins ate 10 pieces. How many friends can Max invite to share the remaining pizza if each friend eats $\frac{1}{8}$ of a pizza?



Thinking Cap

What must be true about the number of pieces for each pizza that are cut into in Situation 1 and Situation 2? Explain your answers.

The Great Pizza Caper

Mixed Numbers and Improper Fractions

Instructional Strategies

Hands On:








Use fraction circles to demonstrate scenarios as an introduction to the activity. For example, give each group 2 pizzas (2 fraction circles). Tell them that their brother ate $\frac{1}{2}$ of one of the pizzas. Ask them how many friends can each have a $\frac{1}{2}$ pizza (in this case, there will be 3 halves left, so they can share with 3 friends). Try another example, using 6 pizzas and the brother eats $\frac{2}{3}$ of the pizza. How many friends can each have a $\frac{1}{3}$ pizza? As a challenge, give them an example like the 3rd scenario of the activity.

Getting Started:

Demonstrate how to use the calculator to recreate the situations explored in the Hands On section of the lesson.


Calculator Notes:

Students use the calculator in this activity first to subtract a fraction or a mixed number from a whole number. Then they use the calculator to change the mixed number answers to improper fractions to determine the number of friends Max can invite.

- The  key can be used to enter fractions
 - The  key can be used to enter mixed numbers
 - The  key can be used to toggle between mixed numbers and improper fractions (Note: this only works when Simplify mode is set to Auto — on the fx-55 Plus press **SETUP** **7** **1**.)
- Example:** For Situation 1, **4**  **2**  **3**  $3\frac{1}{3}$. Press the  key to change the mixed number to $\frac{10}{3}$. Since $10 \times \frac{1}{3} = \frac{10}{3}$, Max can invite 10 friends if he does not eat any.

Assessment:



Encourage students to work backward to check their answers. To check the example, use the  key to change $\frac{10}{3}$ to a mixed number. Then add $\frac{2}{3}$. The answer should be 4.

Objective:

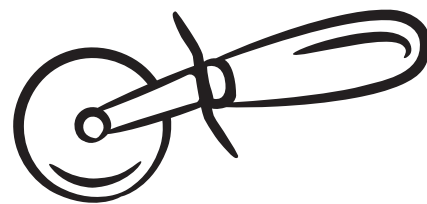
Use the calculator to solve problems that involve changing mixed numbers to improper fractions.

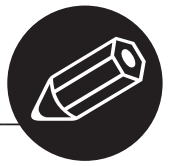
Common Core State Standards:

4.NF.3c – Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.

Standards for Mathematical Practice:

1. Make sense of problems and persevere in solving them.
3. Construct viable arguments and critique the reasoning of others.



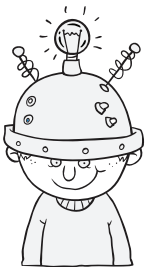


The Perfect Fit

Volume of Rectangular Prisms

Rita makes baby toys for a local toy manufacturer. She is packing some baby blocks she has made into a shipping box. The shipping box has a volume of 1536 cubic inches. The dimensions of the blocks she is packing in the box are given below. She must pack all of the same sized blocks into one box. Rita wants to decide before she actually packs the box which blocks might fit into the box with no space left over. Can you help Rita decide which blocks could be packed into this box? (Hint: Use the $\boxed{x^3}$ key to find the volume of each block. Then use the $\boxed{\div R}$ key to find the maximum number of blocks possible and the space left over.)

Dimensions of Blocks	Maximum Number of Blocks Possible	Space Left Over
Block 1: 6 in. by 6 in. by 6 in.		
Block 2: 5 in. by 5 in. by 5 in.		
Block 3: 4 in. by 4 in. by 4 in.		
Block 4: 3 in. by 3 in. by 3 in.		
Block 5: 2 in. by 2 in. by 2 in.		
Block 6: $2\frac{1}{2}$ in. by $2\frac{1}{2}$ in. by $2\frac{1}{2}$ in.		



Thinking Cap

Using any of the blocks Rita chose, what box dimensions are possible?



The Perfect Fit

Volume of Rectangular Prisms

Instructional Strategies

Hands On:

Use interlocking cubes to build rectangular prisms and find the volume of the prism by counting cubes. Start with cubes of varying side length and then advance to building prisms of different side lengths. Have students count the number of cubes it takes to build the cubes & prisms. Make the connection between the number of cubes and the volume. Have groups make conjectures about how to calculate the volume without counting cubes. As an extension, ask groups to build a larger prism (i.e., $5 \times 2 \times 4$) and predict how many same size cubes (i.e., $2 \times 2 \times 2$) would fit inside the prism.

Getting Started:

Hold up a large rectangular prism and a cube that would fit into the prism, and ask the class if the smaller prism would fit in the larger. As they agree that it would fit, challenge groups to find a way to determine how many of the smaller cubes would fit into the larger one. Ask groups to share their strategies and then summarize the discussion to demonstrate how to use division to determine how many cubes will fit into the larger prism.

Calculator Notes:

Students use the calculator in this activity to find the volume of cubes and determine how many of those cubes would fit into the given maximum volume of 1536 cubic inches.

- The **[STO]** key can be used to enter the volume of the shipping box into the memory of the calculator; the **[RCLM]** key can be used to recall the volume
- The **[xⁿ]** key can be used to find the volume of each cube.

Example:

1. To enter the volume of the shipping box into the memory of the calculator, enter **[1][5][3][6][STO]**.
2. To complete the chart for Block 1, press **[RCLM]** to recall the volume of the shipping box and then enter **[÷][R][6][xⁿ][3][=]**.
3. The result is 7, $R=24$, which tells us a maximum of 7 blocks will fit into the shipping box with 24 cubic inches of space left over.

Assessment:



Encourage students to check their answers by working backwards. To do this for the example above, enter **[7][x][6][xⁿ][3][+][2][4][=]**. If the answer is correct, the result should be 1536.

Objective:

Use the calculator to solve problems involving finding the volume of rectangular prisms.

Common Core State Standard:

5.MD.5a – Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.

Standards for Mathematical Practice:

4. Model with mathematics.
7. Look for and make use of structure..

The Perfect Fit

Volume of Rectangular Prisms

Block 1: See example above.

Block 2: $\boxed{\text{RCLM}} \boxed{\div \text{R}} \boxed{5} \boxed{x^{\circ}} \boxed{3} \boxed{=}$ 12, R=36; The maximum number of blocks is 12 with 36 cubic inches of space left over.

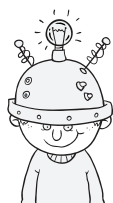
Block 3: $\boxed{\text{RCLM}} \boxed{\div \text{R}} \boxed{4} \boxed{x^{\circ}} \boxed{3} \boxed{=}$ 24, R=0; The maximum number of blocks is 24 with no space left over.

Block 4: $\boxed{\text{RCLM}} \boxed{\div \text{R}} \boxed{3} \boxed{x^{\circ}} \boxed{3} \boxed{=}$ 56, R=24; The maximum number of blocks is 56 with 24 cubic inches of space left over.

Block 5: $\boxed{\text{RCLM}} \boxed{\div \text{R}} \boxed{2} \boxed{x^{\circ}} \boxed{3} \boxed{=}$ 192, R=0; The maximum number of blocks is 192 with no space left over.

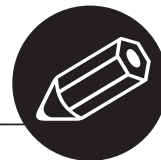
Block 6: $\boxed{\text{RCLM}} \boxed{\div \text{R}} \boxed{2} \boxed{\cdot} \boxed{5} \boxed{x^{\circ}} \boxed{3} \boxed{=}$ 98, R=4.75; The maximum number of blocks is 98 with 4.75 cubic inches of space left over.

Since there is no space left over for blocks 3 and 5, either of these could be packed in a shipping box with this volume.



Thinking Cap Solutions:

16 in. by 12 in. by 8 in., 24 in. by 16 in. by 4 in., 32 in. by 12 in. by 4 in., 48 in. by 8 in. by 4 in., or 96 in. by 4 in. by 4 in.

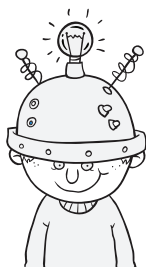


The Real Deal

Percents

The marketing department at the Real Deal Store checks every week to be sure they have the lowest prices on all of their advertised items. They make a list like the one below showing their advertised price and a competitor's advertised price. Can you help the marketing department decide who has the best price on each item? (Hint: To find the amount off the original price, enter the price first followed by the \times symbol, then enter the number for the percent and press the $\%$ key.)

Item	Real Deal Ad	Real Deal Price	Competitor's Ad	Competitor's Price	Who's Best?
1	25% off \$8.50		33% off \$10.89		
2	15% off \$12.99		20% off \$16.50		
3	66% off \$49.99		75% off \$58.88		
4	12% off \$28.75		18% off \$25.50		
5	65% off \$45.80		45% off \$32.90		
6	30% off \$127.45		35% off \$140.19		



Thinking Cap:

One of the employees in the marketing department said that she knew of a way to find the prices without ever using the STO key or the RCL key on her calculator. How did she do this? Use this new method to check all of your answers in your list above

The Real Deal

Percents

Instructional Strategies

Getting Started:

Bring newspaper/internet ads from 2 competing stores that advertise the same items which have different % off of the same item. For example, one store sells jeans for \$59 at 25% off and another store sells jeans for \$70 at 30% off. Challenge groups to find which bargain is the better deal. Have groups present their reasoning. As an extension, ask students to go through ads and create their own problems involving better deals.

Calculator Notes:

Students use the calculator in this activity to find the percent of a price and then subtract to find the discount price.

- The **%** key can be used to find the percent of the price.
- The **STO M** key can be used to enter the necessary sums into the memory of the calculator.
- The **RCL M** key can be used to recall the number stored in memory.

Example:

1. To find the Real Deal price for Item 1, enter **8 0 . 5 0 X 2 5 %**;
2. Then, press **8 0 . 5 0 = RCL M =** to get 6.375.
3. To find the Competitor's price for Item 1, enter **1 0 . 8 9 X 3 3 % STO M =**
4. Then, press **1 0 . 8 9 = RCL M =** to get 7.2963.
5. Since $6.375 < 7.2963$, Real Deal has the best price on Item 1.

Objective:

Use the calculator to solve problems involving percents.

Common Core State Standards:

6.RP.3c - Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.

Standards for Mathematical Practice:

3. Construct viable arguments and critique the reasoning of others.
5. Use appropriate tools strategically.



Assessment:

Have students estimate their answers before they use the calculator to find the actual answers. Then, have them compare their estimates to be sure their actual answers seems correct.

The Real Deal

Percents

Item	Real Deal Ad	Real Deal Price	Competitor's Ad	Competitor's Price	Who's Best?
1	25% off \$8.50	\$6.375	33% off \$10.89	\$7.2963	Real Deal
2	15% off \$12.99	\$11.0415	20% off \$16.50	\$13.2	Real Deal
3	66% off \$49.99	\$16.9966	75% off \$58.88	\$14.72	Competitor
4	12% off \$28.75	\$25.3	18% off \$25.50	\$20.91	Competitor
5	65% off \$45.80	\$16.03	45% off \$32.90	\$18.095	Real Deal
6	30% off \$127.45	\$89.215	35% off \$140.19	\$91.1235	Real Deal



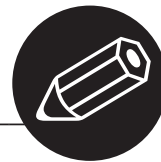
Thinking Cap Solutions:

The employee multiplies the price of the item by the difference of 100 and the percent.

Item 1:

Real Deal Price: $8 \cdot 50 \times (100 - 25) \% = 6.375$

Competitor's Price: $10 \cdot 89 \times (100 - 33) \% = 7.2963$



The Smart Calculator

Exploring Patterns

Cho and Jane were working together on a math assignment. They were using a calculator to find the products shown below. Jane noticed that the first factor of each set of products was the same. She wondered if there was a way to use the calculator to find the products without entering the first factor each time. Cho said that he knew of a way to use the **STO M** and the **RCL M** keys to tell the calculator to remember the first factor and then use the factor again. Can you help Jane figure out how Cho used these keys? Explain why your key sequence works. Then use your key sequence to complete the assignment. Describe the pattern you see in each problem.

1. $16 \times 1 =$
 $16 \times 10 =$
 $16 \times 100 =$
 $16 \times 1,000 =$

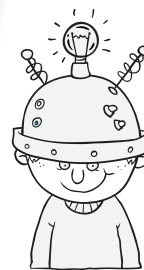
2. $15,873 \times 7 =$
 $15,873 \times 14 =$
 $15,873 \times 21 =$
 $15,873 \times 28 =$

3. $8 \times 9 =$
 $8 \times 99 =$
 $8 \times 999 =$
 $8 \times 9,999 =$

4. $9 \times 1,089 =$
 $9 \times 10,989 =$
 $9 \times 109,989 =$
 $9 \times 1,099,989 =$

5. $1,089 \times 1 =$
 $1,089 \times 2 =$
 $1,089 \times 3 =$
 $1,089 \times 4 =$

6. $10,989 \times 9 =$
 $10,989 \times 8 =$
 $10,989 \times 7 =$
 $10,989 \times 6 =$



Thinking Cap

Use the pattern you found in each problem to give the next two products. Use the calculator to check your answers.

The Smart Calculator

Exploring Patterns

Instructional Strategies

Getting Started:

Ask students what types of patterns they have found when they were learning their multiplication tables. For example, look at 9 & 11 multiplication facts.

Calculator Notes:

Students discover how to use the **STO M** and **RCL M** keys to find products that form patterns.

- The **STO M** key can be used to store the first factor in memory.
- The **RCL M** key can be used to recall the first factor and to find other products.

Example:

1. For the first product in problem 1, **1 6 STO M X 1 =** 16.
2. For the second product, **RCL M X 1 0 =** 160.
3. Continue using a similar key sequence to find all of the products. Don't forget to store each new first factor when starting a new pattern.

Assessment:



Encourage students to check their final products to be sure they see a pattern and confirm their descriptions by trying additional numbers. Challenge them to find other unique patterns and present them to the class.

Objective:

Use the calculator to discover and extend patterns.

Common Core State Standard:

4.NBT.5 – Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Standards for Mathematical Practice:

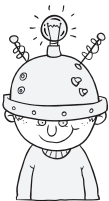
2. Reason abstractly and quantitatively.
8. Look for and express regularity in repeated reasoning.

The Smart Calculator

Exploring Patterns

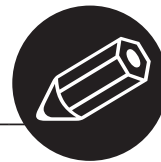
See example for key sequences.

- 16; 160; 1,600; 16,000. The first two digits are 1 and 6. Each product has one more 0 at the end than the previous product.
- 111,111; 222,222; 333,333; 444,444. The first product is all 1s, the second all 2s, the third all 3s, and the fourth all 4s.
- 72; 792; 7,992; 79,992. The first digits are all 7s and the last digits are all 2s. Each product has one more 9 after the 7 than the previous product.
- 9,801; 98,901; 989,901; 9,899,901. The first digits are all 9s, the second digits are all 8s, the next to last digits are all 0s, and the last digits are all 1s. Each product has one more 9 after the 8 than the previous product.
- 1,089; 2,178; 3,267; 4,356. The first digits are the whole numbers in order starting with 1, the second digits are whole numbers in order starting with 0, the third digits are whole numbers starting at 8 and going backwards, and the last digits are whole numbers starting at 9 and going backwards.
- 98,901; 87,912; 76,923; 65,934. The first digits are whole numbers starting with 9 and going backwards, the second digits are whole numbers starting with 8 and going backwards, the third digits are all 9s, the fourth digits are whole numbers in order starting with 0, and the last digits are whole numbers in order starting with 1.



Thinking Cap Solutions:

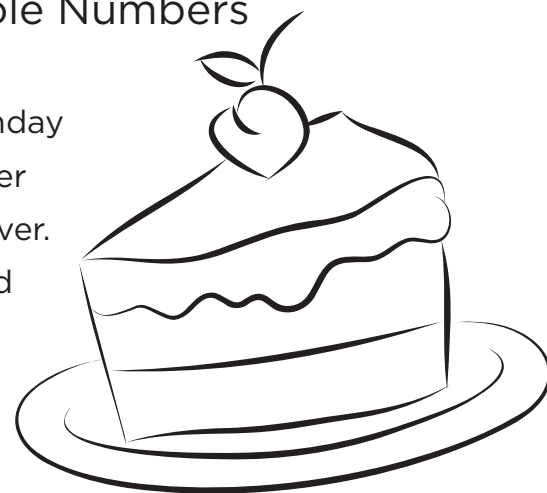
As an extension, students continue the pattern they found in each problem. They can use the key sequence they discovered to check their answers.



What a Party!

Multiplying and Dividing Fractions and Whole Numbers

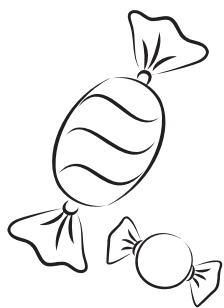
Amy wants to give everyone who attended her birthday party something before they leave. Her dad told her she could give each guest part of the food that was left over. Near the end of the party, he wrote down what Amy could give each guest and a question for Amy to answer about the amount each guest would get. Can you help Amy answer the questions?



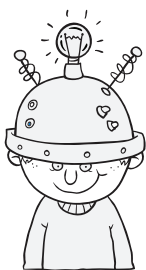
Since $\frac{2}{3}$ of the cake is left, you can give $\frac{3}{4}$ of the remaining cake to Todd. What part of the entire cake will Todd get?

Since there is $\frac{5}{8}$ of a bag of candy left, you can give $\frac{4}{5}$ of the remaining candy to Irene. What part of the entire bag of candy will Irene get?

Since there is $\frac{9}{10}$ of a bag of nuts left, you can give $\frac{2}{3}$ of the remaining nuts to Tyler. What part of the entire bag of nuts will Tyler get?



Since there is $\frac{5}{6}$ of a bag of popcorn left, you can give $\frac{1}{10}$ of the remaining popcorn to Stephanie. What part of the entire bag of popcorn will Stephanie get?



Thinking Cap

Amy showed her answers to her dad. He decided the food should be divided more evenly. So he told Amy to divide the part of each food item he had decided to give each guest equally among all four guests. What part of the original amount of each item will each guest get now?

What a Party!

Multiplying and Dividing Fractions and Whole Numbers

Instructional Strategies

Hands On:


Use fraction circles to demonstrate the cake sharing scenarios. For example, $\frac{1}{2}$ the cake is left; you give $\frac{1}{3}$ of the remaining cake to Katrinka. How much of the entire cake does Katrinka get? It may be helpful to demonstrate a few examples as the whole class follows along and then break into groups or partners to build more scenarios on their own. Challenge groups to create their own scenarios and share them with the class.

Getting Started:

Using student created scenarios from the Hands On section, demonstrate how to use the calculator for cake sharing.


Calculator Notes:

Students use the calculator in this activity to multiply and divide fractions and whole numbers.

- The calculator is setup to require manual simplification of fractions. Before starting this activity, be sure all calculators are changed to Auto Simplification. To do so, press **SETUP** **7** (Simp) **1** (Auto).
- The **** key can be used to enter fractions.

Example:




- To figure out what part of cake Todd will get, enter

 **2** **** **3** **** **** **** **3** **** **4** **** $\frac{1}{2}$.

- So, Todd will get $\frac{1}{2}$ of the entire cake.



Assessment:

Have students multiply the numerators of fractions in their head, press **** and enter the product in the numerator. Multiply the denominators of the fractions in their head, press **** and enter the product in the denominator. Press the **** key to simplify the fraction. The fraction should be the same as the product obtained earlier.

Objective:

Use the calculator to solve problems involving multiplying and dividing fractions and whole numbers.

Common Core State Standards:

4.NF.4c – 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 $\frac{3}{8}$ 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?*

Standards for Mathematical Practice:

- Make sense of problems and persevere in solving them.
- Use appropriate tools strategically.

What a Party!

Multiplying and Dividing Fractions and Whole Numbers

Todd will get $\frac{1}{2}$ of the entire cake.

$$\frac{1}{2} \times \frac{3}{4} = \frac{3}{8}$$

Irene will get $\frac{1}{2}$ of the entire bag of candy.

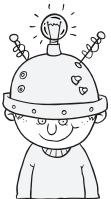
$$\frac{1}{2} \times \frac{4}{5} = \frac{2}{5}$$

Tyler will get $\frac{3}{5}$ of the entire bag of nuts.

$$\frac{3}{5} \times \frac{2}{3} = \frac{2}{5}$$

Stephanie will get $\frac{1}{12}$ of the entire bag of popcorn.

$$\frac{1}{12} \times \frac{1}{10} = \frac{1}{120}$$



Thinking Cap Solution:

Since there are 4 guests, each of the answers to the original questions will need to be divided by 4.

Cake: each person will receive $\frac{1}{8}$ of the entire cake.

$$\frac{3}{8} \div 4 = \frac{3}{32}$$

Candy: each person will receive $\frac{1}{8}$ of the entire bag of candy.

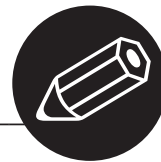
$$\frac{2}{5} \div 4 = \frac{1}{10}$$

Nuts: each person will receive $\frac{3}{20}$ of the entire bag of nuts.

$$\frac{2}{5} \div 4 = \frac{1}{10}$$

Popcorn: each person will receive $\frac{1}{48}$ of the entire bag of popcorn.

$$\frac{1}{120} \div 4 = \frac{1}{480}$$

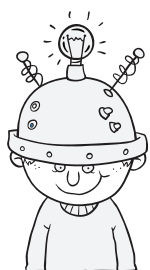


When the Greatest Is Part of the Least

Least Common Multiple

While finding the least common multiple of several pairs of numbers, Austin came up with a way to use the greatest common factor of the numbers to find the least common multiple. He then used his method to write the riddles below. Solve Austin's riddles by using only the numbers given in the riddle. Then, describe Austin's method for finding the least common multiple. (Hint: Use the **Simp** key on your calculator.)

1. Our GCF is 5. If you write us as a fraction in simplest form, you get $\frac{3}{8}$.
What two numbers are we? What is our least common multiple?
2. Our GCF is 18. If you write us as a fraction in simplest form, you get $\frac{1}{3}$.
What two numbers are we? What is our least common multiple?
3. Our GCF is 2. If you write us as a fraction in simplest form, you get $\frac{5}{6}$.
What two numbers are we? What is our least common multiple?
4. Our GCF is 7. If you write us as a fraction in simplest form, you get $\frac{2}{5}$.
What two numbers are we? What is our least common multiple?
5. Our GCF is 12. If you write us as a fraction in simplest form, you get $\frac{3}{4}$.
What two numbers are we? What is our least common multiple?



Thinking Cap

Write some additional riddles like Austin's. Explain why you wrote the riddles you did.

When the Greatest Is Part of the Least

Least Common Multiple

Instructional Strategies

Getting Started:

Pose this problem to the class: The least common multiple of 4, 25, 49 is the same as $4 \times 25 \times 49$; however, the least common multiple of 12, 24, 81 is not $12 \times 24 \times 81$. Challenge them to come up with a conjecture in their group and be prepared to share their explanation with the class.

Calculator Notes:

Students use the calculator in this activity to find the answers to the riddles about the LCM of two numbers and then to create riddles of their own.

- The \times key can be used to multiply to find the numbers.
- The $\frac{\square}{\square}$ key can be used to enter the two numbers as a fraction.
- The Simp key can be used to find the common factors of the numbers.
- When you have fully simplified a fraction, you will notice that the little 'down' arrow on the right side of the screen disappears.

Example:

1. To find the numbers in riddle 1, multiply 5 times the numerator and the denominator of the fraction: $5 \times 3 = 15$ and $5 \times 8 = 40$.
2. To find the LCM of 15 and 40, multiply the three numbers mentioned in the riddle: $5 \times 3 \times 8 = 120$.



Assessment:

Encourage students to check their answers by dividing the LCM by each of the two numbers they found. If their answer is correct, the two quotients should have a GCF of 1.

Objective:

Use the calculator to find the least common multiple of two numbers.

Common Core State Standards:

6.NS.4 - Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1-100 with a common factor as a multiple of a sum of two whole numbers with no common factor. *For example, express $36 + 8$ as $4(9 + 2)$.*

Standards of Mathematical Practice:

1. Make sense of problems and persevere in solving them.
8. Look for and express regularity in repeated reasoning.

When the Greatest Is Part of the Least

Least Common Multiple

1. Two Numbers: 15 and 40

LCM: 120

2. Two Numbers: 18 and 54

LCM: 54

3. Two Numbers: 10 and 12

LCM: 60

4. Two Numbers: 14 and 35

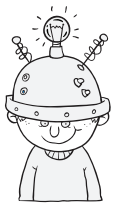
LCM: 70

5. Two Numbers: 36 and 48

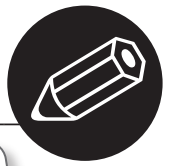
LCM: 144

Austin wrote the two numbers as a fraction and then used the **Simp** key on the calculator to find the GCF of the two numbers. He then multiplied the GCF by each of the numbers in the simplified fraction to find the LCM.

Thinking Cap Solution:



Answers may vary. All riddles should be written using the procedure described above.



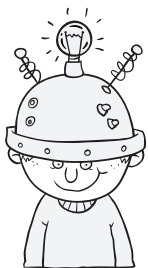
Who's Closest?

Adding and Subtracting Decimals

Karla likes to watch a game show called “Who’s Closest?”. On the show, each of two contestants is given a certain amount of money to spend. Then each contestant has 25 seconds to choose from a list of prizes whose costs are given. The winner is the contestant who comes closest to the amount of money they are given to spend without going over. Play the game “Who’s Closest?” with a classmate using the list of prizes and costs at the right. Decide who will be Contestant 1 and who will be Contestant 2. As Contestant 1 chooses prizes, Contestant 2 records the choices. Then switch places and let Contestant 2 choose while Contestant 1 records. After both contestants have chosen their prizes, use your calculator to add the costs and determine who came the closest without going over. Remember, you have 30 seconds to make your choices!

- Refrigerator \$899.95
- Bedroom Suite \$1,209.70
- Scooter \$5,535.89
- TV \$788.25
- DVD \$357.45
- Camera \$148.90
- Stereo \$999.99
- Boat \$10,785.50
- Vacation \$5,995.65
- Cellphone \$217.25
- Car \$15,599.49
- Bike \$350.50
- Jewelry \$9,876.95
- Microwave \$455.65
- RV \$15,675.35

Contestant 1: \$16,789.50	Contestant 2: \$20,005.99



Thinking Cap

Choose your own amounts for the two contestants. Play the game again using these amounts. Do you think the game could be unfair depending upon the amounts for the contestants to spend? Explain.

Who's Closest?

Adding and Subtracting Decimals

Instructional Strategies

Getting Started:

To introduce the Who's Closest game, tell students they may win \$20,000. Brainstorm items that the students would like to buy and approximate the prices. Have them decide what they might buy.

Calculator Notes:

Students use the calculator in this activity to determine the costs that have been chosen from the given list. They then compare the sum with the given amount of money to see if the sum is less than the amount. If it is, they use the calculator to subtract the sum from the amount to see how close the sum is to the amount. If both contestants are under, the contestant closest to his or her amount wins.

- The **STO/M** key can be used to store the sum in memory
- The **RCL/M** key can be used to recall the sum to subtract it from the amount

Example:

1. If Contestant 1 chooses the refrigerator, the TV, the DVD, the boat, and the bike, the total cost is $899.95 + 788.25 + 357.45 + 1078.5 + 50.5 = 13,181.65$.
2. Since $\$13,181.65 < \$16,789.50$, press **STO/M** to store 13,181.65 in memory. Then $16789.5 - 13181.65 = 3,607.85$.
3. If Contestant 2 chooses the bedroom suite, the computer, the stereo, the boat, the vacation, and the microwave, the total cost is $1209.70 + 5535.89 + 999.99 + 99.99 + 1078.5 + 50.5 + 599.5 + 65.45 + 5.65 = 24,982.38$. Since $\$24,982 > \$20,005.99$, Contestant 2 is over, so Contestant 1 wins!

Objective:

Use the calculator to solve problems involving adding and subtracting decimals.

Common Core State Standard:

5.NBT.7 – Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Standards for Mathematical Practice:

5. Use appropriate tools strategically.
6. Attend to precision.



Assessment:

Students should be encouraged to check their answers by estimating the sum of the costs and comparing the estimate to the actual sum.

Who's Closest?

Adding and Subtracting Decimals

Answers will depend upon the prizes chosen.

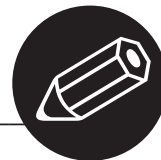


Thinking Cap Solutions:

Encourage students to use a wide variety of different amounts so they can examine the possibility of the game being unfair depending upon the amounts chosen.

Answers:

Answers will depend upon the amounts chosen. The results could be unfair if the amount of money given to a contestant was too high or too low. For example, if the amount was less than the cost of any one prize, then there would be no way that a contestant could win. If the amount was too high, then the contestant could pick any combination of the prizes and still be under his or her amount.



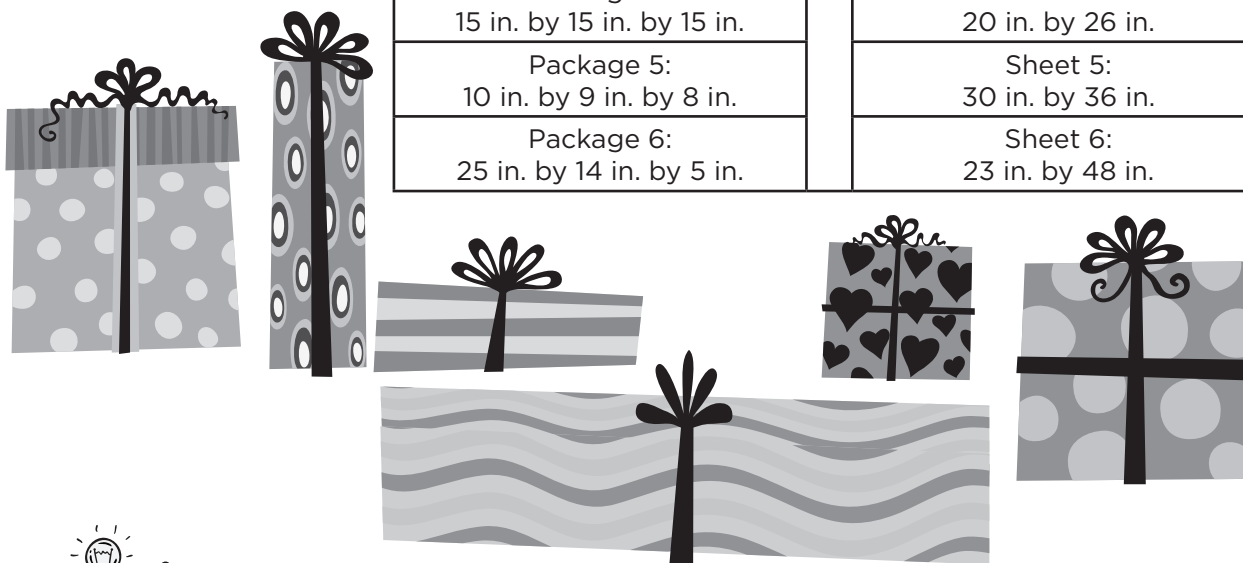
Wrap It Up!

Surface Area of Rectangular Prisms

Gary works at a local department store in the gift wrap department. He came to work one day and found six packages and six different-sized sheets of wrapping paper. His boss gave him a list of the dimensions of each package and the dimensions of each sheet of wrapping paper and told him to decide which package could be wrapped with which sheet of paper. Can you help Gary match the paper and the packages? (Hint: Use the $\boxed{M+}$ key to help you find the surface area of each package.)

Dimensions of Packages
Package 1: 15 in. by 12 in. by 8 in.
Package 2: 18 in. by 12 in. by 10 in.
Package 3: 20 in. by 10 in. by 5 in.
Package 4: 15 in. by 15 in. by 15 in.
Package 5: 10 in. by 9 in. by 8 in.
Package 6: 25 in. by 14 in. by 5 in.

Dimensions of Paper
Sheet 1: 24 in. by 30 in.
Sheet 2: 23 in. by 36 in.
Sheet 3: 30 in. by 48 in.
Sheet 4: 20 in. by 26 in.
Sheet 5: 30 in. by 36 in.
Sheet 6: 23 in. by 48 in.



Thinking Cap

Gary's boss asked him to determine how much paper would be left over after wrapping each package. Can he tell how much he will have left before he wraps the packages? Explain your answer.

Wrap It Up

Surface Area of Rectangular Prisms

Instructional Strategies

Hands On:

Use interlocking cubes to demonstrate the meaning of surface area. For example, ask students to build a cube with 2 cubes on each side. Have them use grid paper with the same dimensions as the individual cubes to find out how much paper it would take to cover the cube. Students may cut out pieces of paper to fit each side. Others might try to use one sheet of grid paper to cover the cube. Whatever method they use, make sure their final product includes only the paper needed to cover each side. Challenge students to build other cubes and cover them. When you summarize the activity, discuss the concept of surface area in relationship to the paper used. As an extension, you may have students ponder what size of paper would be needed to wrap the object since paper usually doesn't come in the shapes they created.

Getting Started:

Using the first package, ask students to draw what the package would look like. Use the following questions to explore the meaning of surface area. How many sides does this package have? What would each side look like? Are any of the sides the same (congruent)? What is the area of each side? What is the total area of all the sides?

Calculator Notes:

Students use the calculator in this activity to find the area of a rectangular sheet of wrapping paper and the surface area of packages that are shaped like rectangular prisms.

- The $\boxed{M+}$ key can be used to find the surface area of each package.

Example:

- To find the surface area of Package 1, first press $\boxed{0}$ $\boxed{STO\ M}$ to reset the memory to 0.
- Enter $\boxed{2}$ $\boxed{\times}$ $\boxed{15}$ $\boxed{\times}$ $\boxed{12}$ $\boxed{M+}$ to calculate and store the area of the two faces with dimensions of 15 in. by 12 in.
- Then enter $\boxed{2}$ $\boxed{\times}$ $\boxed{12}$ $\boxed{\times}$ $\boxed{8}$ $\boxed{M+}$ to calculate and add the area of the two faces with dimensions 12 in. by 8 in. (The adding to the memory is done automatically when you press $\boxed{M+}$)
- Then enter $\boxed{2}$ $\boxed{\times}$ $\boxed{15}$ $\boxed{\times}$ $\boxed{8}$ $\boxed{M+}$ to calculate and add the area of the remaining two faces, with dimensions 15 in. by 8 in. (Be careful to never press $\boxed{=}$ as that will cause you to repeat the addition process)
- Then press $\boxed{RCL\ M}$ to find the surface area of the entire package, which is 792 in².

Assessment:



Students should be encouraged to check the surface area of each package by using an alternate method. For example, the surface area calculated in the example above can also be found by entering:

$\boxed{2}$ $\boxed{\times}$ $\boxed{15}$ $\boxed{\times}$ $\boxed{12}$ $\boxed{+}$ $\boxed{2}$ $\boxed{\times}$ $\boxed{12}$ $\boxed{\times}$ $\boxed{8}$ $\boxed{+}$ $\boxed{2}$ $\boxed{\times}$ $\boxed{15}$ $\boxed{\times}$ $\boxed{8}$ $\boxed{=}$.

Objective:

Use the calculator to solve problems involving the surface area of rectangular prisms.

Common Core State Standard:

6.EE.2c - Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). *For example, use the formulas $V = s^2$ and $A = 6^2$ to find the volume and surface area of a cube with sides of length $s = \frac{1}{2}$.*

Standards for Mathematical Practice:

- Reason abstractly and quantitatively.
- Look for and express regularity in repeated reasoning.

Wrap It Up

Surface Area of Rectangular Prisms

Surface area of packages:

(Don't forget to reset memory to zero — $\boxed{0} \boxed{\text{STO M}}$ — before each package calculation!)

Package 1: $\boxed{2} \boxed{\times} \boxed{1} \boxed{5} \boxed{\times} \boxed{1} \boxed{2} \boxed{\text{M+}}$, $\boxed{2} \boxed{\times} \boxed{1} \boxed{2} \boxed{\times} \boxed{8} \boxed{\text{M+}}$,

$\boxed{2} \boxed{\times} \boxed{1} \boxed{5} \boxed{\times} \boxed{8} \boxed{\text{M+}}$, $\boxed{\text{RCL M}}$ gives us a result of 792 in².

Package 2: $\boxed{2} \boxed{\times} \boxed{1} \boxed{8} \boxed{\times} \boxed{1} \boxed{2} \boxed{\text{M+}}$, $\boxed{2} \boxed{\times} \boxed{1} \boxed{2} \boxed{\times} \boxed{1} \boxed{0} \boxed{\text{M+}}$,

$\boxed{2} \boxed{\times} \boxed{1} \boxed{8} \boxed{\times} \boxed{1} \boxed{0} \boxed{\text{M+}}$, $\boxed{\text{RCL M}}$ gives us a result of 1032 in².

Package 3: $\boxed{2} \boxed{\times} \boxed{2} \boxed{0} \boxed{\times} \boxed{1} \boxed{0} \boxed{\text{M+}}$, $\boxed{2} \boxed{\times} \boxed{1} \boxed{0} \boxed{\times} \boxed{5} \boxed{\text{M+}}$,

$\boxed{2} \boxed{\times} \boxed{2} \boxed{0} \boxed{\times} \boxed{5} \boxed{\text{M+}}$, $\boxed{\text{RCL M}}$ gives us a result of 700 in².

Package 4: Since this package is a cube, with six congruent faces, entering

$\boxed{6} \boxed{\times} \boxed{1} \boxed{5} \boxed{\times} \boxed{1} \boxed{5} \boxed{=}$ gives us a result of 1350 in².

Package 5: $\boxed{2} \boxed{\times} \boxed{1} \boxed{0} \boxed{\times} \boxed{9} \boxed{\text{M+}}$, $\boxed{2} \boxed{\times} \boxed{9} \boxed{\times} \boxed{8} \boxed{\text{M+}}$, $\boxed{2} \boxed{\times} \boxed{1} \boxed{0} \boxed{\times} \boxed{8} \boxed{\text{M+}}$,

$\boxed{\text{RCL M}}$ gives us a result of 484 in².

Package 6: $\boxed{6} \boxed{\text{RCL M}}$ $\boxed{2} \boxed{\times} \boxed{2} \boxed{5} \boxed{\times} \boxed{1} \boxed{4} \boxed{\text{M+}}$, $\boxed{2} \boxed{\times} \boxed{1} \boxed{4} \boxed{\times} \boxed{5} \boxed{\text{M+}}$,

$\boxed{2} \boxed{\times} \boxed{2} \boxed{5} \boxed{\times} \boxed{5} \boxed{\text{M+}}$, $\boxed{\text{RCL M}}$ gives us a result of 1090 in².

Area of paper:

Sheet 1: $\boxed{2} \boxed{4} \boxed{\times} \boxed{3} \boxed{0} \boxed{=}$ 720 in².

Sheet 2: $\boxed{2} \boxed{3} \boxed{\times} \boxed{3} \boxed{6} \boxed{=}$ 828 in².

Sheet 3: $\boxed{3} \boxed{0} \boxed{\times} \boxed{4} \boxed{8} \boxed{=}$ 1440 in².

Sheet 4: $\boxed{2} \boxed{0} \boxed{\times} \boxed{2} \boxed{6} \boxed{=}$ 520 in².

Sheet 5: $\boxed{3} \boxed{0} \boxed{\times} \boxed{3} \boxed{6} \boxed{=}$ 1080 in².

Sheet 6: $\boxed{2} \boxed{3} \boxed{\times} \boxed{4} \boxed{8} \boxed{=}$ 1104 in².

Therefore, Package 1 goes with Sheet 2, Package 2 goes with sheet 5, Package 3 goes with Sheet 1, Package 4 goes with Sheet 3, Package 5 goes with Sheet 4, and Package 6 goes with Sheet 6.



Thinking Cap Solutions:

No, he will need slightly more paper than the surface area of the package to wrap it.