SIXTH GRADE MATHEMATICS

CHAPTER 12

FRACTIONS

TOPICS COVERED:

- Fraction sense
- Adding and subtracting fractions and mixed numbers
- Equations with adding and subtracting fractions
- Hands-on multiplying fractions
- Multiplying fractions and mixed numbers
- Applications of multiplying fractions
- Hands-on dividing fractions
- Dividing fractions and mixed numbers
- Applications of dividing fractions

Created by Lance Mangham, 6th grade teacher, Carroll ISD

Activity 12-1: **America's Most Wanted** Name:

Each student in the class will create a "Most Wanted" poster for two mixed numbers.
Select one of the following based on your birthday:

JAN: $1\frac{2}{5}$, FEB: $2\frac{3}{7}$, MAR: $3\frac{4}{9}$, APR: $4\frac{1}{3}$, MAY: $1\frac{4}{15}$, JUNE: $2\frac{5}{12}$, JULY: $3\frac{3}{8}$, AUG: $4\frac{1}{4}$, SEPT: $1\frac{9}{20}$, OCT: $2\frac{7}{15}$, NOV: $3\frac{4}{10}$, DEC: $4\frac{3}{9}$

Now select one of the following on your own. Make the fraction you chose a mixed number by placing a whole number (1 to 4) in front of it. ***Make sure the fractional parts of the two numbers you have chosen have different denominators and add up to more than one whole.***

$\frac{3}{4}$ $\frac{4}{5}$ $\frac{5}{6}$ $\frac{7}{8}$ $\frac{5}{8}$ $\frac{9}{10}$ $\frac{7}{10}$ $\frac{11}{12}$ $\frac{13}{15}$ $\frac{11}{15}$ $\frac{6}{8}$ $\frac{8}{10}$ $\frac{9}{12}$ $\frac{10}{12}$ $\frac{2}{3}$ $\frac{6}{15}$ $\frac{4}{12}$ $\frac{8}{20}$

Include enough wording on your poster to explain what each item is. Note that the word "fraction" below will really be a mixed number in most cases.

REQUIREMENT	**Points**
1. **Title** – example: Have you seen these fractions? WANTED! $10,000 reward! Extremely dangerous!!	5 pts.
2./3. **Fraction suspects written with numbers and words** – example: $\frac{3}{4}$ (three-fourths) and $\frac{2}{5}$ (two-fifths)	10 pts.
4. **Fraction mug shots** - Three pictures of each fraction: one with the area model, one with the length model, and one with the group model	20 pts.
5. **Fraction aliases** – three equivalent fractions to each suspect	10 pts.
6. **Fractions friends (known to be close to the suspects)** – list two fractions a little less than each suspect and two fractions a little more than the each suspect.	10 pts.
7. **Fraction families** – find the LCD for the two fractions. Both fractions are members of the family with the denominator that you find. Using their family names ($\frac{15}{20}$ and $\frac{8}{20}$), state who is the older, bigger brother and who is the little, younger sister. Draw the mug shot for each fraction using its family name (use the group or area model). Finally, list at least three other family members with the same denominator.	15 pts.
8. **A dangerous combination** - fractions added together – if you should see these two suspects together they may look like this…add the two fractions and give the answer as both a mixed number in simplest form and an improper fraction.	15 pts.
9. **A getaway with a "takeaway"–** Use the larger of the two fractions. Write a brief story about how it may have been hurt recently robbing a bank and could have lost some value (make up a smaller fraction with a different denominator). Subtract this value from the suspect to show what it may now look like in number form as well as a new mug shot (group or area model).	15 pts.

(1) TITLE	
(2) (3) Fraction #1 in numbers and words	**(2) (3) Fraction #2 in numbers and words**
(4) Mug shots	**(4) Mug shots**
(5) Aliases	**(5) Aliases**
(6) Friends	**(6) Friends**
(7) The same family	
(8) A dangerous combination	
(9) A getaway with a takeaway	

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Activity 12-2: **Simplifying/Mixed/Improper/Compare/Order** Name:

Write each fraction in simplest form.

1.	$\frac{9}{12}$		2.	$\frac{10}{25}$		3.	$\frac{3}{24}$		4.	$\frac{8}{18}$	
5.	$\frac{9}{15}$		6.	$\frac{7}{21}$		7.	$\frac{10}{12}$		8.	$\frac{4}{8}$	
9.	$\frac{10}{45}$		10.	$\frac{14}{20}$		11.	$\frac{15}{36}$		12.	$\frac{21}{56}$	

Write each improper fraction as a mixed number. For the first three problems you complete draw pictures that show how the improper fraction and mixed number are equivalent.

13.	$\frac{17}{5}$		14.	$\frac{17}{6}$		15.	$\frac{21}{10}$		16.	$\frac{25}{4}$	
17.	$\frac{20}{3}$		18.	$\frac{15}{6}$		19.	$\frac{30}{8}$		20.	$\frac{100}{75}$	
21.	$\frac{96}{10}$		22.	$\frac{25}{2}$		23.	$\frac{36}{15}$		24.	$\frac{22}{12}$	

Write each whole or mixed number as an improper fraction.

25.	$3\frac{3}{4}$		26.	4		27.	$5\frac{5}{6}$		28.	$1\frac{9}{10}$	
29.	$2\frac{3}{8}$		30.	$4\frac{7}{8}$		31.	$2\frac{3}{5}$		32.	6	
33.	$3\frac{11}{12}$		34.	$2\frac{7}{12}$		35.	$5\frac{4}{15}$		36.	$2\frac{7}{15}$	

Compare the following fractions using <, >, or =.

37.	$\frac{3}{7}$ $\frac{5}{8}$	38.	$\frac{1}{3}$ $\frac{3}{9}$	39.	$\frac{1}{2}$ $\frac{3}{7}$
40.	$\frac{5}{4}$ $\frac{9}{7}$	41.	$\frac{2}{3}$ $\frac{7}{10}$	42.	$2\frac{5}{9}$ $2\frac{3}{5}$

Order each set of fractions from greatest to least.

43.	$\frac{3}{4}, \frac{5}{8}, \frac{1}{2}$		44.	$\frac{5}{8}, \frac{5}{6}, \frac{2}{3}$	
45.	$\frac{1}{2}, \frac{5}{12}, \frac{2}{3}$		46.	$\frac{3}{5}, \frac{2}{3}, \frac{7}{12}$	
47.	$\frac{8}{9}, \frac{3}{4}, \frac{5}{6}, \frac{2}{3}$		48.	$\frac{4}{5}, \frac{13}{16}, \frac{7}{8}, \frac{31}{40}$	

Use your fraction sense to solve each problem.

1.	Name a fraction between $\frac{1}{3}$ and $\frac{2}{3}$.	
2.	Name a fraction between $\frac{3}{5}$ and $\frac{4}{5}$.	
3.	Name five fractions between one-half and 1.	
4.	Name five fractions between 0 and one-fourth.	
5.	Name a fraction between $\frac{1}{4}$ and $\frac{1}{2}$ whose denominator is 16.	
6.	Name a fraction between $\frac{2}{3}$ and $\frac{3}{4}$ whose denominator is 10.	
7.	Name a fraction between 0 and $\frac{1}{6}$ whose numerator is 1.	
8.	Name a fraction between 0 and $\frac{1}{10}$ whose numerator is not 1.	
9.	Name a fraction that is halfway between $\frac{2}{9}$ and $\frac{5}{9}$.	
10.	Name a fraction that is halfway between $\frac{2}{3}$ and $\frac{4}{5}$.	
11.	How many fractions are there between one-fourth and one-half?	

Use the clues to discover the identity of the mystery fraction.

12.	My numerator is 6 less than my denominator. I am equivalent to $\frac{3}{4}$.	
13.	My denominator is 5 more than twice my numerator. I am equivalent to $\frac{1}{3}$.	
14.	The GCF of my numerator and denominator is 3. I am equivalent to $\frac{2}{5}$.	
15.	The GCF of my numerator and denominator is 5. I am equivalent to $\frac{4}{6}$.	
16.	My numerator and denominator are prime numbers. My numerator is one less than my denominator.	
17.	My numerator and denominator are prime numbers. The sum of my numerator and denominator is 24.	
18.	My numerator is divisible by 3. My denominator is divisible by 5. My denominator is 4 less than twice my numerator.	
19.	My numerator is divisible by 3. My denominator is divisible by 5. My denominator is 3 more than twice my numerator.	
20.	My numerator is a prime number. The GCF of my numerator and denominator is 2. I am equivalent to one-fifth.	

Activity 12-4: **Addition and Subtraction** Name:

Add or Subtract. Write each answer in simplest form.

1.	$\frac{7}{10}-\frac{1}{2}=$		2.	$\frac{1}{3}+\frac{2}{9}=$	
3.	$4\frac{1}{4}+2\frac{1}{2}=$		4.	$8\frac{4}{9}-5\frac{2}{3}=$	
5.	$6\frac{1}{8}+3\frac{3}{4}=$		6.	$2\frac{1}{6}-1\frac{2}{3}=$	
7.	$1\frac{1}{3}-\frac{1}{6}=$		8.	$5\frac{1}{7}-2\frac{1}{4}=$	
9.	$4\frac{5}{8}+2\frac{1}{4}=$		10.	$8\frac{3}{5}+2\frac{7}{10}=$	
11.	$5\frac{2}{7}+3\frac{1}{2}=$		12.	$7\frac{1}{4}+8\frac{3}{8}=$	
13.	$5\frac{1}{8}-2\frac{1}{3}=$		14.	$7\frac{6}{7}-2\frac{8}{14}=$	
15.	$10\frac{4}{9}-3\frac{9}{10}=$		16.	$12\frac{1}{4}-8\frac{3}{5}=$	
17.	$11\frac{4}{5}-4\frac{7}{8}=$		18.	$15\frac{7}{10}-8\frac{1}{2}=$	

Activity: **Multiplying Fraction Levels** Name:

<table>
<tr><td colspan="3">For each level, draw pictures to represent the problem. Look for the “rule” that works based on the answers in the pictures.</td></tr>
<tr><td>Multiplication
Level 0</td><td>$4 \bullet 3$
$2 \bullet 6$</td><td>4 groups of 3
2 groups of 6</td></tr>
<tr><td rowspan="5">Multiplication

Level 1</td><td>$1 \bullet \frac{1}{3} = \frac{1}{3}$</td><td rowspan="5">Sample of how to read:
Five groups of one-sixth

<u>Easiest rule that works</u>

The whole number becomes the numerator (or multiply the whole number times the numerator). The denominator stays the same.</td></tr>
<tr><td>$2 \bullet \frac{1}{3} = \frac{2}{3}$</td></tr>
<tr><td>$3 \bullet \frac{1}{3} = \frac{3}{3} = 1$</td></tr>
<tr><td>$3 \bullet \frac{1}{6} = \frac{3}{6} = \frac{1}{2}$</td></tr>
<tr><td>$5 \bullet \frac{1}{6} = \frac{5}{6}$</td></tr>
<tr><td rowspan="5">Multiplication

Level 2</td><td>$2 \bullet \frac{2}{6} = \frac{4}{6} = \frac{2}{3}$</td><td rowspan="5">Sample of how to read:
Three groups of two-fifths

<u>Easiest rule that works</u>

Multiply the numerator times the whole number to get the new numerator. The denominator stays the same.</td></tr>
<tr><td>$3 \bullet \frac{3}{8} = \frac{9}{8} = 1\frac{1}{8}$</td></tr>
<tr><td>$2 \bullet \frac{2}{5} = \frac{4}{5}$</td></tr>
<tr><td>$3 \bullet \frac{2}{5} = \frac{6}{5} = 1\frac{1}{5}$</td></tr>
<tr><td>$4 \bullet \frac{3}{9} = \frac{12}{9} = 1\frac{1}{3}$</td></tr>
<tr><td rowspan="3">Multiplication

Level 3</td><td>$\frac{1}{2} \bullet 6 = 3$ (or $\frac{6}{2}$)</td><td rowspan="3">Sample of how to read:
One-fifth of a group of ten

<u>Easiest rule that works</u>
Take the whole number and divide it by the denominator.
or
The whole number becomes the numerator (or multiply the whole number times the numerator). The denominator stays the same.</td></tr>
<tr><td>$\frac{1}{4} \bullet 8 = 2$ (or $\frac{8}{4}$)</td></tr>
<tr><td>$\frac{2}{5} \bullet 10 = 4$ (or $\frac{20}{5}$)</td></tr>
</table>

<table>
<tr><td rowspan="9">Multiplication

Level 4
Multiplication</td><td>$\frac{1}{2} \bullet \frac{2}{4} = \frac{1}{4}$</td><td rowspan="4">Sample of how to read:
One-third of a group of six-eighths

<u>Easiest rule that works</u>
Numerator = Numerator #2 divided by denominator #1
Denominator = Denominator #2</td></tr>
<tr><td>$\frac{1}{2} \bullet \frac{3}{5} = \frac{3}{10}$</td></tr>
<tr><td>$\frac{2}{3} \bullet \frac{1}{4} = \frac{1}{6}$</td></tr>
<tr><td>$\frac{2}{5} \bullet \frac{3}{4} = \frac{3}{10}$</td></tr>
<tr><td>$\frac{1}{2} \bullet \frac{2}{4} = \frac{1}{4} = \frac{2}{8}$</td><td rowspan="5"><u>Finding one rule that always works</u>
Take the same problems from set #4. Find several equivalent fractions to each answer. What is an easy rule for the circled answers?

Numerator = Multiply the two numerators
Denominator = Multiply the two denominators

Does this rule work for all problems in levels 1-3 also?</td></tr>
<tr><td>$\frac{1}{2} \bullet \frac{4}{5} = \frac{2}{5} = \frac{4}{10}$</td></tr>
<tr><td>$\frac{2}{3} \bullet \frac{1}{4} = \frac{1}{6} = \frac{2}{12}$</td></tr>
<tr><td>$\frac{2}{5} \bullet \frac{3}{4} = \frac{3}{10} = \frac{6}{20}$</td></tr>
<tr><td>$\frac{4}{5} \bullet \frac{5}{8} = \frac{20}{40} = \frac{1}{2}$</td></tr>
<tr><td>$\frac{4}{9} \bullet \frac{1}{8} = \frac{4}{72} = \frac{1}{18}$</td><td rowspan="2">Does this rule work for all problems in levels 1-3 also?</td></tr>
<tr><td>$\frac{5}{7} \bullet \frac{14}{15} = \frac{70}{105} = \frac{2}{3}$</td></tr>
<tr><td>Multiplication

Level 5
Mixed Numbers</td><td>$1\frac{1}{2} \bullet 2\frac{1}{2}$
$1\frac{1}{3} \bullet 3\frac{1}{2}$</td><td>You can not simply multiply the whole numbers and then the fractions!
Show distributive property = drawing with pictures!</td></tr>
<tr><td>Multiplication

Level 6
Simplify before you multiply</td><td>$\frac{4}{5} \bullet \frac{5}{8}$</td><td>The commutative property allows simplifying before multiplying.</td></tr>
</table>

Activity 7-14: **Multiplying and Dividing Fractions** Name:

1. Multiplication is the same as repeated addition when you add the same number again and again.
2. Times means "groups of."
3. A multiplication problem can be shown as a rectangle.
4. You can reverse the order of the factors and the product stays the same.
5. When you multiply two whole numbers, the product is larger than the factors unless one of the factors is zero or one.
6. When you multiply two positive numbers, the product is larger than the factors unless one of the factors is zero or a fraction smaller than one.

1. Four times three means four groups of three. Three times four means three groups of four.
2. The problem three times four can be shown by a three by four rectangle.
3. The problem one-half times one-half can be shown by a two-by-two rectangle representing one whole.

Draw a picture for $\frac{3}{4} \bullet \frac{2}{5}$

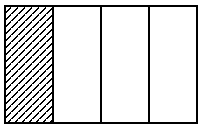
$4\frac{1}{2} \bullet 2\frac{3}{4}$. Estimate the answer. Use the distributive property.

$3\frac{1}{2} \bullet \frac{2}{3}$. Estimate the answer.

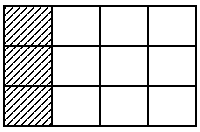
$2\frac{1}{2} \bullet 5\frac{1}{4} = 10\frac{1}{8}$. Why not?

Example #1: You can model $\frac{2}{3}$ of $\frac{1}{4}$.

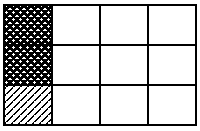
Show $\frac{1}{4}$.



Divide into thirds.



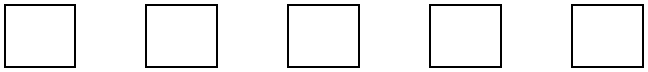
Shade $\frac{2}{3}$ of the $\frac{1}{4}$.



$\frac{2}{3}$ of $\frac{1}{4} = \frac{2}{12} = \frac{1}{6}$

Example #2: Model $\frac{1}{2}$ of 5.

Show 5.



Find $\frac{1}{2}$ of each.

Combine the 5 halves.

$\frac{1}{2}$ of $5 = \frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} = \frac{5}{2} = 2\frac{1}{2}$

Activity 12-5: **Multiplying Fractions Visually** Name:

In order to demonstrate your understanding of the concept of multiplication of fractions, show how to find each of the following products visually, rather than with rules. Make a diagram or sketch to illustrate your visual methods for solving each problem. Use graph paper.

1.	$\frac{3}{4} \bullet \frac{2}{3}$	2.	$\frac{3}{4}$ of $\frac{4}{7}$	3.	$\frac{1}{4} \bullet 12$
4.	$\frac{1}{2} \bullet \frac{6}{7}$	5.	$\frac{3}{4}$ of 8	6.	$\frac{1}{4} \bullet \frac{3}{4}$
7.	$\frac{1}{4}$ of 22	8.	$\frac{2}{3}$ of $\frac{3}{5}$	9.	$\frac{1}{2}$ of $\frac{1}{5}$
10.	$\frac{1}{2} \bullet \frac{5}{4}$				

11. Write a clear explanation of your thought processes when you have finished the problems above.

12.-15. Write four ***interesting*** word problems that require finding the product of fractions. The problems should make reasonable sense (for example, do not say $4\frac{2}{3}$ people were at the park). Solve each of your four word problems using visual models. You will turn in both your problems and your visual solutions.

Activity 12-6: **Multiplying Fractions** Name:

Draw a model to represent each product.

1.	$\frac{1}{6}$ of $\frac{3}{4}$	2.	$\frac{2}{5}$ of $\frac{1}{2}$

Find each product. You do not have to simplify improper fractions into mixed numbers.

3.	$\frac{1}{9}$ of $\frac{2}{3}$		4.	$\frac{2}{7}\bullet\frac{1}{2}$		5.	$\frac{5}{8}\bullet 6$	
6.	$\frac{3}{4}$ of $\frac{4}{7}$		7.	$\frac{7}{10}$ of $\frac{1}{3}$		8.	$\frac{3}{4}\bullet\frac{5}{6}$	
9.	$\frac{3}{8}$ of $\frac{7}{10}$		10.	$\frac{3}{4}\bullet\frac{1}{9}$		11.	$\frac{2}{9}$ of 8	
12.	$\frac{1}{3}$ of 2		13.	$\frac{5}{9}$ of 4		14.	$\frac{3}{4}$ of $\frac{2}{5}$	
15.	$\frac{1}{3}$ of $\frac{1}{5}$		16.	$\frac{5}{8}\bullet\frac{1}{2}$		17.	$\frac{4}{9}\bullet\frac{3}{4}$	
18.	$6\bullet\frac{2}{3}$		19.	$\frac{3}{5}\bullet 10$		20.	$12\bullet\frac{5}{6}$	
21.	$e=\frac{6}{7}$ of $\frac{8}{15}$		22.	$\frac{5}{12}\bullet 10=t$		23.	$h=\frac{8}{9}\bullet\frac{9}{10}$	
24.	$d=\frac{4}{9}\bullet\frac{15}{16}$		25.	$\frac{3}{10}\bullet\frac{5}{8}=k$		26.	$h=\frac{3}{7}\bullet 35$	
27.	$n=\frac{3}{20}\bullet\frac{5}{6}$		28.	$\frac{9}{14}\bullet\frac{7}{12}=z$		29.	$f=\frac{5}{12}\bullet\frac{4}{15}$	
30.	$\frac{3}{14}\bullet\frac{2}{9}=c$		31.	$\frac{3}{4}\bullet\frac{8}{9}=t$		32.	$y=15\bullet\frac{3}{10}$	

Activity 12-7: **Multiplying Mixed Numbers** Name:

To multiply mixed numbers, first convert each to an improper fraction. Then multiply the fractions.

Express each mixed number as an improper fraction.

1.	$2\frac{4}{5}$		2.	$6\frac{3}{4}$		3.	$8\frac{6}{7}$	
4.	$5\frac{2}{9}$		5.	$9\frac{5}{6}$		6.	$3\frac{1}{12}$	

For all problems on this page, show all work on a separate sheet of paper.
You may leave your answer as an improper fraction for all problems below.
Find each product.

7.	$3\frac{1}{5}\bullet\frac{3}{4}$		8.	$9\bullet 4\frac{2}{3}$		9.	$2\frac{5}{6}\bullet 4\frac{1}{2}$	
10.	$\frac{4}{7}\bullet 3\frac{1}{9}$		11.	$1\frac{3}{8}\bullet 2\frac{2}{7}$		12.	$4\frac{1}{6}\bullet\frac{9}{10}$	
13.	$3\frac{3}{4}\bullet 2\frac{4}{5}$		14.	$\frac{5}{7}\bullet 4\frac{3}{8}$		15.	$20\bullet 1\frac{2}{5}$	

Solve each equation.

16.	$2\frac{4}{9}\bullet\frac{6}{11}=s$		17.	$p=1\frac{1}{8}\bullet 3\frac{3}{7}$		18.	$\frac{6}{7}\bullet 2\frac{5}{12}=x$	
19.	$d=14\bullet 1\frac{3}{4}$		20.	$5\frac{2}{5}\bullet -\frac{8}{9}=t$		21.	$3\frac{3}{5}\bullet 2\frac{2}{9}=a$	
22.	$r=1\frac{4}{5}\bullet 3\frac{4}{7}$		23.	$n=\frac{2}{3}\bullet 5\frac{1}{6}$		24.	$1\frac{5}{14}\bullet\frac{7}{8}=y$	

Solve each equation.

28.	$5\frac{1}{3}\left(\frac{2}{3}\right)=a$		29.	$4\left(\frac{5}{8}\right)=q$		30.	$s=7\frac{1}{3}\bullet\frac{6}{11}$	
31.	$j=\frac{1}{4}+\frac{1}{3}\bullet\frac{1}{2}$		32.	$g=2\frac{1}{4}\left(\frac{1}{3}\right)$		33.	$6\left(5\frac{2}{3}\right)=r$	
34.	$t=\frac{1}{6}\bullet 1\frac{2}{5}$		35.	$p=6\frac{1}{6}\bullet\left(\frac{6}{37}\right)$		36.	$(6)\left(3\frac{1}{3}\right)=k$	

CHOCOLATE BANANA RAISIN COOKIES

(Makes 24 cookies)

Semi-Sweet Chocolate	$\frac{3}{8}$ of a pound	**Butter**	$\frac{3}{4}$ of a cup
Flour	$2\frac{1}{8}$ cups	**Sugar**	$\frac{1}{2}$ of a cup
Cocoa Powder	$\frac{1}{4}$ cup	**Light-Brown Sugar**	$\frac{1}{2}$ of a cup
Baking Powder	2 teaspoons	**Chocolate Extract**	1 teaspoon
Salt	$\frac{1}{4}$ of a teaspoon	**Eggs**	2 large
Mashed Bananas	$3\frac{1}{3}$ medium size	**Pecans**	$1\frac{1}{2}$ cups
White Chocolate	$\frac{5}{8}$ of a pound	**Raisins**	1 cup

You gather the ingredients above. Assume each problem uses the ingredients as they start above (do not use the remaining amount for the next problem.) Determine whether the following problems require **subtraction or multiplication**. Then solve. Show all work on a separate sheet of paper.

		Correct Operation(s)	Answer
1.	Nicole ate $\frac{1}{5}$ of a pound of semi-sweet chocolate for breakfast. How much semi-sweet chocolate is left?		
2.	Carter ate $\frac{1}{5}$ of the semi-sweet chocolate with his broccoli soup. How much semi-sweet chocolate did he eat?		
4.	Grant accidentally threw $\frac{3}{4}$ of the flour in the trash. How much flour did he throw in the trash?		
5.	Brooke gave $\frac{3}{4}$ of a cup of flour to her friend Eric. How much flour was left?		
7.	Bailey made 60 cookies, $2\frac{1}{2}$ times the normal recipe, so that her sisters could have some also. How many mashed bananas did she use?		

8.	Emily does not like pecans so she uses only $\frac{2}{7}$ of the normal amount. How many cups of pecans does she use?		
10.	Three-fourths of the butter somehow turns up sitting on Andrew's head. How much butter is left for the recipe?		
11.	Chris has determined that eating small amount of cocoa powder can help you calculate pi more accurately. If Chris ate $\frac{1}{16}$ of a cup of the powder, how much was left to use in the recipe?		
13.	Justin took $\frac{1}{32}$ of a teaspoon of salt and threw it over his shoulder, accidentally hitting Valerie in the face. How much of the salt did not hit Valerie?		
14.	Haley loves raisins. She took $\frac{8}{9}$ of the raisins to create a picture of Raisin Guy. How much of a cup of raisins did she use?		
16.	Brittany, like, loves to put extra butter on everything. So, like, she uses $5\frac{1}{2}$ times the normal amount of butter in the recipe. How much, like, butter did she use?		
17.	Heather lost $\frac{2}{3}$ of the mashed bananas while she was helping Crissy and Haley learn their dance. How many mashed bananas did she lose?		
18.	Leslie found ants in $\frac{8}{9}$ of a cup of flour. How many cups of flour did not contain ants?		

Activity 12-9: **Products** Name:

Use the four numerals 1, 2, 3, and 4 to create two fractions that give the ***three greatest products***. Then repeat the same process for the numbers 3, 4, 5, and 6.

1st attempt:	$\frac{\square}{\square} \times \frac{\square}{\square} = \frac{\square}{\square}$	$\frac{\square}{\square} \times \frac{\square}{\square} = \frac{\square}{\square}$
2nd attempt:	$\frac{\square}{\square} \times \frac{\square}{\square} = \frac{\square}{\square}$	$\frac{\square}{\square} \times \frac{\square}{\square} = \frac{\square}{\square}$
3rd attempt:	$\frac{\square}{\square} \times \frac{\square}{\square} = \frac{\square}{\square}$	$\frac{\square}{\square} \times \frac{\square}{\square} = \frac{\square}{\square}$

Use the four numerals 1, 2, 3, and 4 to create two fractions that give the ***three least products***. Then repeat the same process for the numbers 3, 4, 5, and 6.

1st attempt:	$\frac{\square}{\square} \times \frac{\square}{\square} = \frac{\square}{\square}$	$\frac{\square}{\square} \times \frac{\square}{\square} = \frac{\square}{\square}$
2nd attempt:	$\frac{\square}{\square} \times \frac{\square}{\square} = \frac{\square}{\square}$	$\frac{\square}{\square} \times \frac{\square}{\square} = \frac{\square}{\square}$
3rd attempt:	$\frac{\square}{\square} \times \frac{\square}{\square} = \frac{\square}{\square}$	$\frac{\square}{\square} \times \frac{\square}{\square} = \frac{\square}{\square}$

1.	What patterns do you see?

The teachers are working late again and they are getting hungry. Mr. Mangham and Mr. Underwood are grading math tests. Mrs. Atkins and Mrs. Fauatea are planning tomorrow's lesson. Mrs. Landry is preparing a pop quiz for her science classes. Mr. Mangham remembers that there were 2 Cosmic Brownies left in the teachers' lounge from earlier today. He takes a break from work at 8:06pm and eats $\frac{2}{3}$ of the Brownies sitting in the lounge. Mrs. Fauatea is next on break at 8:18pm. She eats $\frac{3}{5}$ of whatever Mr. Mangham left in the lounge. Mrs. Atkins, on her break at 8:32pm, decides to eat $\frac{1}{4}$ of the remaining Cosmic Brownies. Mrs. Landry then walks into the lounge at 8:51pm and eats exactly $\frac{2}{15}$ of a brownie (not of what is remaining – exactly $\frac{2}{15}$ of a brownie). Mr. Underwood finally is able to take a break at 9:03pm. He decides to eat the rest of the brownies and not leave any for the fifth grade teachers!

Complete the chart below to find the amount of brownie each person ate. **Show all of your work on a separate sheet of paper.** After solving each problem mathematically, support your answers with **pictures** on graph paper which clearly show how you arrived at each answer. A total of at least 5 pictures (one for each teacher's part of the problem) are necessary. Finally, explain in **words** step-by-step how you were able to solve this problem using pictures.

	Amount of Brownie(s) eaten by teacher…	Amount of Brownie(s) left in the Lounge…
START		2
Mr. Mangham		
Mrs. Fauatea		
Mrs. Atkins		
Mrs. Landry		
Mr. Underwood		0

Activity 12-11: **Breakfast Anyone? (Multiplying)** Name:

With so many papers to grade, Mr. Mangham, Mr. Underwood, and Mrs. Landry arrived at school early. After grading two sets of tests each, they headed to the teachers' lounge to see if anyone had left food that could be considered breakfast. Ms. Wright surprised them all by having Donut Sticks waiting for them!!! Next to the Donut Sticks was a note:

I am giving you all of these Donut Sticks to be divided as follows:

Mr. Mangham gets $\frac{5}{9}$ of the Donut Sticks. Mr. Underwood gets $\frac{1}{6}$ of the Donut Sticks. Mrs. Landry gets $\frac{2}{9}$ of the Donut Sticks. Please do not open any packages to break up Donut Sticks into pieces – this will cause a mess!!!

Quickly, the teachers counted and realized that there were 17 individually wrapped Donut Sticks sitting on the table.

1. Can the teachers divide the Donut Sticks based on the directions given? Explain how you arrived at your answer with words and numbers.

Mrs. Atkins, having just eaten breakfast at McDonald's, then comes walking by carrying one additional Donut Stick. Mr. Mangham quickly asks if he can add this to the 17 already on the table. Mrs. Atkins says sure, since she is not hungry.

2. With the additional Donut Stick, can the teachers divide the new total of 18 based on the fractions given to them in the directions? Explain how you arrived at your answer with words and numbers.

Based on your choice of either 17 or 18 Donut Sticks, solve the following problems:

3. How many Donut Sticks will Mr. Mangham get? Explain how you arrived at your answer with words, pictures, and numbers.

4. How many Donut Sticks will Mr. Underwood get? Explain how you arrived at your answer with words, pictures, and numbers.

5. How many Donut Sticks will Mrs. Landry get? Explain how you arrived at your answer with words, pictures, and numbers.

6. How many total Donut Sticks did Mr. Mangham, Mr. Underwood, and Mrs. Landry receive? (You should notice something special about this number!)

7. Mrs. Atkins came back and took any remaining Donut Sticks. How many did Mrs. Atkins pick up?

8. All of the teachers were a little confused at exactly what had just happened. It just did not seem to make sense and, being so early in the morning, they were not able to arrive at a reasonable explanation. Explain to the teachers what happened using fraction concepts with words, pictures, and numbers.

Activity: **Dividing Fractions with Pictures** Name:

Division Level 0 (draw pictures)	$12 \div 3 = 4$ $15 \div 5 = 3$	How many groups of 3 are there in 12? How many groups of 5 are there in 15?
Division Level 1 (draw pictures)	$2 \div \frac{1}{2} = 4$	**NOTE:** When divide by positive fraction, the answer gets bigger. Sample of how to read: How many groups of one-half are in two? **<u>Easiest rule that works</u>** Multiply the denominator times the whole number.
	$2 \div \frac{1}{3} = 6$	
	$4 \div \frac{1}{2} = 8$	
Division Level 2 (draw pictures)	$\frac{1}{4} \div 2 = \frac{1}{8}$	Sample of how to read: How many groups of two are in one-fourth? **<u>Easiest rule that works</u>** One over the product of the denominator and whole number.
	$\frac{1}{5} \div 3 = \frac{1}{15}$	
	$\frac{1}{6} \div 4 = \frac{1}{24}$	
Division Level 3 (draw pictures)	$\frac{2}{3} \div \frac{1}{3} = 2$	Sample of how to read: How many groups of one-eighths are in four-eighths? **<u>Easiest rule that works</u>** The numerator of the first fraction is the answer. ***or*** Divide the two numerators.
	$\frac{3}{4} \div \frac{1}{4} = 3$	
	$\frac{5}{6} \div \frac{1}{6} = 5$	
	$\frac{4}{8} \div \frac{1}{8} = 4$	
Division Level 4 (draw pictures)	$\frac{4}{6} \div \frac{2}{6} = 2$	Sample of how to read: How many groups of three-tenths are in nine-tenths? **<u>Easiest rule that works</u>** Divide the two numerators. ***or*** Numerator = Divide the two numerators Denominator = Divide the two denominators
	$\frac{6}{8} \div \frac{2}{8} = 3$	
	$\frac{8}{12} \div \frac{4}{12} = 2$	
	$\frac{6}{7} \div \frac{2}{7} = 3$	
Division Level 5 (draw pictures)	$\frac{4}{6} \div \frac{1}{3} = 2 = \frac{4}{2}$	Sample of how to read: How many groups of one-forth are in nine-twelfths? **<u>Easiest rule that works</u>** Numerator = Divide the two numerators
	$\frac{8}{12} \div \frac{1}{6} = 4 = \frac{8}{2}$	
	$\frac{6}{8} \div \frac{1}{4} = 3 = \frac{6}{2}$	

	$\frac{8}{10} \div \frac{1}{5} = 4 = \frac{8}{2}$	Denominator = Divide the two denominators
Division ***Level 6*** ***(draw pictures)***	$3 \div \frac{2}{3} = 4\frac{1}{2}$	Sample of how to read: How many groups of two-thirds are in three? **<u>Easiest rule that works</u>** Multiply whole number by denominator and divide by numerator
	$2\frac{3}{4} \div \frac{3}{4} = 3\frac{2}{3}$	
	$3\frac{2}{3} \div \frac{2}{3} = 5\frac{1}{2}$	
	$6 \div \frac{2}{3} = 9$	
	$9 \div \frac{2}{3} = 13\frac{1}{2}$	

Level 7: Introduce reciprocal rule with mixed numbers.

$$3\frac{2}{3} \div 4\frac{1}{4}$$

3 rules for dividing fractions:

1. Divide straight across.
2. Find a common denominator
3. Use the reciprocal to make the denominator one

The rule for Level 4 always works when dividing fractions! However, this rule is not always the easiest. Take $\frac{2}{3} \div \frac{1}{4}$ for example. Dividing the denominators leaves another fraction. To arrive at a rule that will work easily for every problem, the best way to write this problem would be:

$$\frac{\frac{2}{3}}{\frac{1}{4}}$$ "Two-thirds divided by one-forth"

When dividing any two numbers the goal is to get the denominator to 1. Any number over one is just itself. Take $\frac{8}{2}$. Divide both the numerator and denominator by 2 and the answer becomes $\frac{4}{1} = 4$. In the fraction problem to get a denominator of 1, we have to multiply $\frac{1}{4}$ by its **reciprocal. Any number times it reciprocal equals 1.** The reciprocal of $\frac{1}{4}$ is $\frac{4}{1}$. So we need to multiply both the numerator and denominator by $\frac{4}{1}$.

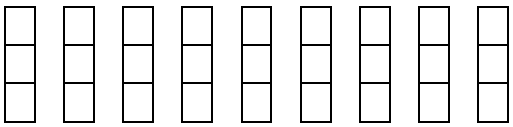
$$\frac{\frac{2}{3}}{\frac{1}{4}} \bullet \boxed{\frac{\frac{4}{1}}{\frac{4}{1}}} = \frac{\frac{8}{3}}{\frac{4}{4}} = \frac{\frac{8}{3}}{1} = \frac{8}{3} = 2\frac{2}{3}$$

Activity 12-12: **Dividing Fractions** Name:

(*Taken from TEXTEAMS Rethinking Middle School Mathematics: Numerical Reasoning*)

1. You can solve a division problem by subtracting.
2. To divide two numbers, $a \div b$, you can think, "How many b's are in a?"
3. You can check a division problem by multiplying.
4. The division sign means "into groups of."
5. The quotient tells "how many groups of" there are.
6. You can break the dividend apart to make dividing easier.
7. Remainders can be represented as whole numbers or fractions.
8. If you divide a number by itself, the answer is one.
9. If you divide a number by one, the answer is the number itself.
10. If you reverse the order of the dividend and the divisor, the quotient will be different unless the dividend and divisor are the same number.

Mr. Mangham plans to make small cheese pizzas to sell during the weekends to make some extra money. He has 9 bars of cheddar cheese. How many pizzas can he make if each takes the amount listed in the table? On a piece of notebook paper or computer paper create the five columns shown below. Answer the following questions by completing the row for each question.

	Situation	**Think about it (what is the question asking)**	**Picture It**	**Write it in symbols**	**Process it (What do you actually do?)**	**Solve it**
1.	$\frac{1}{3}$ bar of cheese	How many $\frac{1}{3}$'s are in 9?		$9 \div \frac{1}{3}$	$9 \bullet 3$	
2.	$\frac{1}{4}$ bar of cheese					
3.	$\frac{2}{3}$ bar of cheese					

Mr. Mangham still needs more money so he is going to sell small bags of coffee. He buys a large twelve-pound bag. How many small bags can he make based on the following situations?

	Situation	**Think about it (what is the question asking)**	**Picture It**	**Write it in symbols**	**Process it (What do you actually do?)**	**Solve it**
4.	$\frac{1}{5}$ pound					
5.	$\frac{1}{6}$ pound					
6.	$\frac{3}{4}$ pound					

Activity 12-13: **Dividing Fractions** Name:

(*Taken from TEXTEAMS Rethinking Middle School Mathematics: Numerical Reasoning*)

Use ideas from your work on the questions about cheese pizzas and coffee bags to complete the following calculations.

1.	$12 \div \frac{1}{4}$		2.	$12 \div \frac{1}{3}$		3.	$12 \div \frac{2}{3}$	
4.	$15 \div \frac{5}{3}$		5.	$18 \div \frac{5}{6}$		6.	$21 \div \frac{2}{3}$	

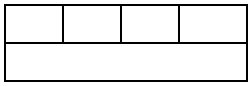
7.	Explain in words why $8 \div \frac{1}{3} = 24$ and $8 \div \frac{2}{3} = 12$. How are these two calculations related? Why is the answer to $8 \div \frac{2}{3}$ exactly half the answer to $8 \div \frac{1}{3}$?
8.	Describe a procedure that seems to make sense for dividing any whole number by any fraction.
9.	Write a story problem that can be solved by the division $12 \div \frac{2}{3}$. Explain why the calculation matches the story.

Activity 12-14: **Dividing Fractions** Name:

(*Taken from TEXTEAMS Rethinking Middle School Mathematics: Numerical Reasoning*)

Mr. Mangham brought jars of M&M®'s to be shared by members of the student groups winning a class game. How much of a pound of candy will each student get based on the following?

On a piece of notebook paper or computer paper create the six columns shown below. You will answer the following questions by completing the row for each question.

	Situation	**Think about it (what is the question asking)**	**Picture It**	**Write it in symbols**	**Process it (What do you actually do?)**	**Solve it**
1.	$\frac{1}{2}$ pound and 4 students	$\frac{1}{2}$ pound divided by 4		$\frac{1}{2} \div 4$	Divide whole in half and the half into 4 equal parts	$\frac{1}{8}$
2.	$\frac{1}{4}$ pound and 3 students					
3.	$\frac{1}{3}$ pound and 3 students					
4.	$\frac{1}{5}$ pound and 2 students					

Next, Mr. Mangham brought very long chocolate bars to give away as prizes in another team competition. What fraction of a bar did each team member get assuming it was shared equally?

	Situation	**Think about it (what is the question asking)**	**Picture It**	**Write it in symbols**	**Process it (What do you actually do?)**	**Solve it**
5.	a two person team won $\frac{3}{4}$ of a bar					
6.	a four person team won $\frac{7}{8}$ of a bar					
7.	a four person team won $1\frac{1}{2}$ bars					

Activity 12-15: **Dividing Fractions** Name:

(*Taken from TEXTEAMS Rethinking Middle School Mathematics: Numerical Reasoning*)

Use ideas from your work on the questions about M&M®'s and candy bars to complete the following calculations.

1.	$\frac{1}{2} \div 4$		2.	$\frac{3}{2} \div 2$		3.	$\frac{2}{5} \div 3$	
4.	$\frac{4}{5} \div 4$		5.	$\frac{7}{10} \div 2$		6.	$\frac{9}{5} \div 3$	

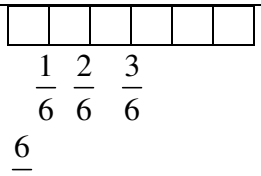
7.	Describe a procedure that seems to make sense for dividing any fraction by any whole number.
8.	Write a story problem that can be solved by the division $\frac{8}{3} \div 4$. Explain why the calculation matches the story.

Activity 12-16: **Dividing Fractions** Name:

(*Taken from TEXTEAMS Rethinking Middle School Mathematics: Numerical Reasoning*)

Mr. Mangham is making ribbons for all of his students to wear in honor of his former student, Marci Holden. It takes $\frac{1}{6}$ of a yard to make a ribbon for each student. How many badge ribbons can he make from the lengths listed below? For each answer that has a remainder, some ribbon left over, tell what fractional part of another badge ribbon you could make with the amount left over.

On a piece of notebook paper or computer paper create the six columns shown below. You will answer the following questions by completing the row for each question. The first one has been done for you.

	Situation	**Think about it (what is the question asking)**	**Picture It**	**Write it in symbols**	**Process it (What do you actually do?)**	**Solve it**
1.	$\frac{1}{2}$ yard	$\frac{1}{2}$ yd. divided into pieces of $\frac{1}{6}$ yd.		$\frac{1}{2} \div \frac{1}{6}$	Divide yard in half, whole into sixths. How many sixths in a half?	3
2.	$\frac{3}{4}$ yard					
3.	$\frac{5}{8}$ yard					
4.	$2\frac{2}{3}$ yard					

Next, Mr. Mangham is making bows for the math students that are not in his classes so that he can easily recognize them. It takes $\frac{1}{2}$ yard of ribbon to make one bow. How many bows can Mr. Mangham make from each of the following amounts of ribbon?

	Situation	**Think about it (what is the question asking)**	**Picture It**	**Write it in symbols**	**Process it (What do you actually do?)**	**Solve it**
5.	$\frac{4}{5}$ yard					
6.	$\frac{8}{9}$ yard					
7.	$1\frac{3}{4}$ yard					
8.	$2\frac{1}{3}$ yard					

Activity 12-17: **Dividing Fractions** Name:

(*Taken from TEXTEAMS Rethinking Middle School Mathematics: Numerical Reasoning*)

1.	Based on your work on all of the problems so far, what general procedure makes sense for dividing with fractions? Remember that a set of steps to do a computation is called an algorithm. So this should be your algorithm for dividing fractions.

Use ideas from your work on the previous activities to complete the following calculations.

2.	$\frac{2}{5} \div 2$		3.	$6 \div \frac{2}{3}$		4.	$\frac{3}{4} \div \frac{2}{3}$	
5.	$1\frac{3}{4} \div \frac{1}{2}$		6.	$7 \div 3$		7.	$\frac{2}{3} \div 1\frac{1}{4}$	

8.	Write a story problem that can be solved by the division $1\frac{3}{4} \div \frac{1}{2}$. Explain why the calculation matches the story.

Activity 12-18: **Dividing Fractions** Name:

To divide fractions, one could simply divide the two numerators and divide the two denominators**.** $\frac{6}{21} \div \frac{2}{3} = \frac{3}{7}$**.** However, this rule is not always the easiest. Take $\frac{2}{3} \div \frac{1}{4}$ for example. Dividing the denominators leaves another fraction. The best way to write this problem would be:

$$\frac{\frac{2}{3}}{\frac{1}{4}}$$ "Two-thirds divided by one-forth"

When dividing any two numbers, the goal is to get the denominator to 1. Any number over one is just itself. In the problem above to get a denominator of 1, we have to multiply $\frac{1}{4}$ by its **reciprocal.**

Any number times its reciprocal equals 1. The reciprocal of $\frac{1}{4}$ is $\frac{4}{1}$. So we need to multiply both the numerator and denominator by $\frac{4}{1}$.

$$\frac{\frac{2}{3}}{\frac{1}{4}} \bullet \boxed{\frac{\frac{4}{1}}{\frac{4}{1}}} = \frac{\frac{8}{3}}{\frac{4}{4}} = \frac{\frac{8}{3}}{1} = \frac{8}{3} = 2\frac{2}{3}$$

This rule can be simplified to: **To divide fractions, multiply the first fraction by the reciprocal of the second number.** $\frac{2}{3} \div \frac{1}{4} = \frac{2}{3} \bullet \frac{4}{1} = \frac{8}{3} = 2\frac{2}{3}$

Reciprocal comes from "re" meaning backward and "pro" meaning forward. In writing the reciprocal you have gone "back and forth" and returned to the identity for multiplication.

Find the reciprocal of each number.

1.	$\frac{1}{4}$		2.	$\frac{5}{6}$		3.	7		4.	$\frac{8}{15}$	
5.	12		6.	$\frac{9}{14}$		7.	$\frac{3}{11}$		8.	6	

Find each quotient. Show all work on a separate sheet of paper. Simplify, but improper fractions are okay.

9.	$\frac{5}{6} \div \frac{1}{3}$		10.	$\frac{3}{4} \div \frac{5}{8}$		11.	$\frac{1}{2} \div \frac{3}{5}$	
12.	$8 \div \frac{4}{5}$		13.	$\frac{1}{6} \div \frac{2}{9}$		14.	$\frac{9}{10} \div \frac{1}{4}$	
15.	$\frac{3}{8} \div 9$		16.	$\frac{8}{9} \div \frac{2}{3}$		17.	$\frac{2}{5} \div \frac{4}{7}$	
18.	$15 \div \frac{5}{9}$		19.	$\frac{7}{8} \div \frac{7}{10}$		20.	$\frac{1}{9} \div \frac{5}{12}$	

Created by Lance Mangham, 6th grade teacher, Carroll ISD

Activity 12-19: **Dividing Fractions** Name:

Find each quotient. Write in simplest form.

1.	$m = \frac{6}{7} \div \frac{3}{14}$		2.	$\frac{4}{9} \div \frac{14}{15} = b$		3.	$\frac{9}{16} \div \frac{3}{4} = s$	
4.	$m = \frac{3}{5} \div \frac{9}{20}$		5.	$\frac{7}{12} \div \frac{5}{6} = a$		6.	$p = \frac{3}{8} \div \frac{9}{10}$	
7.	$8 \div \frac{1}{2} = a$		8.	$x = \frac{3}{5} \div \frac{9}{10}$		9.	$\frac{5}{9} \div \frac{5}{6} = w$	

Find the reciprocal of each number.

10.	$\frac{3}{4}$		11.	$\frac{12}{13}$		12.	9	

Find each quotient. Write in simplest form.

13.	$\frac{1}{2} \div \frac{3}{4}$		14.	$\frac{4}{5} \div \frac{1}{10}$		15.	$\frac{3}{8} \div \frac{3}{4}$	
16.	$\frac{7}{9} \div \frac{1}{3}$		17.	$\frac{14}{15} \div 7$		18.	$\frac{5}{12} \div \frac{5}{6}$	
19.	$\frac{9}{10} \div 3$		20.	$\frac{12}{13} \div \frac{1}{4}$		21.	$\frac{11}{12} \div 6$	
22.	$\frac{1}{5} \div \frac{2}{3}$		23.	$\frac{2}{5} \div \frac{7}{10}$		24.	$\frac{4}{5} \div \frac{1}{2}$	
25.	$\frac{5}{12} \div \frac{3}{16}$		26.	$5 \div \frac{1}{4}$		27.	$\frac{1}{2} \div 4$	
28.	$\frac{5}{8} \div \frac{3}{10}$		29.	$\frac{1}{4} \div \frac{3}{8}$		30.	$\frac{2}{15} \div \frac{1}{6}$	
31.	$\frac{8}{9} \div \frac{2}{3}$		32.	$\frac{3}{4} \div \frac{1}{8}$		33.	$6 \div \frac{4}{7}$	

Solve. Write in simplest form.

34.	A turtle walked $\frac{1}{2}$ mile at the rate of $\frac{1}{5}$ mile per hour. How long did it take?	
35.	A certain math book is $\frac{3}{4}$ of an inch thick. How many of these books will fit on a shelf that is 3 feet wide?	

Activity 12-20: **Dividing Mixed Numbers** Name:

To divide mixed numbers, convert them to improper fractions and follow the same rule as dividing fractions.

Find the reciprocal of each number.

1.	$8\frac{3}{4}$		2.	$9\frac{6}{7}$		3.	$7\frac{5}{6}$		4.	$3\frac{5}{12}$	
5.	14		6.	$1\frac{7}{16}$		7.	$6\frac{7}{8}$		8.	$10\frac{1}{10}$	

Solve each equation. Show all work on a separate sheet of paper.

9.	$j = \frac{6}{7} \div \frac{3}{14}$		10.	$\frac{4}{9} \div \frac{14}{15} = b$		11.	$\frac{9}{16} \div \frac{3}{4} = s$	
12.	$m = \frac{3}{5} \div \frac{9}{20}$		13.	$\frac{7}{12} \div \frac{5}{6} = a$		14.	$p = \frac{3}{8} \div \frac{9}{10}$	
15.	$\frac{5}{12} \div 2\frac{1}{2} = p$		16.	$s = 2\frac{2}{3} \div 1\frac{5}{6}$		17.	$a = 1\frac{4}{5} \div 6$	

You may leave your answer as an improper fraction for all problems below.
Find each quotient. Show all work on a separate sheet of paper.

18.	$4 \div 2\frac{2}{5}$		19.	$3\frac{1}{4} \div 1\frac{3}{8}$		20.	$\frac{8}{9} \div 5\frac{1}{3}$	
21.	$2\frac{1}{2} \div 4\frac{2}{7}$		22.	$3\frac{1}{9} \div 7$		23.	$6\frac{2}{3} \div 4\frac{4}{5}$	
24.	$2\frac{1}{7} \div \frac{3}{14}$		25.	$3\frac{3}{5} \div 2\frac{4}{7}$		26.	$9 \div 3\frac{3}{7}$	
27.	$1\frac{2}{9} \div 1\frac{5}{6}$		28.	$\frac{7}{10} \div 2\frac{5}{8}$		29.	$3\frac{1}{5} \div 1\frac{7}{9}$	
30.	$1\frac{3}{4} \div 14$		31.	$2\frac{2}{15} \div 3\frac{5}{9}$		32.	$2\frac{1}{10} \div \frac{7}{8}$	
33.	$6\frac{3}{4} \div 1\frac{7}{20}$		34.	$18 \div 1\frac{1}{8}$		35.	$4\frac{1}{6} \div 1\frac{3}{7}$	

Activity 12-21: **Dividing Mixed Numbers** Name:

1.	Draw a diagram to show how many $\frac{3}{4}$-ft. pieces of string can be cut from a piece of string four and a half feet long.	
2.	How many $\frac{3}{4}$-c servings are there in a 6 c package of rice?	
3.	George cut 5 oranges into quarters. How many pieces of orange did he have?	
4.	Anna bought a package of ribbon 10 yd long. She needs $1\frac{1}{3}$-yd pieces for a bulletin board. How many pieces can Anna cut from the ribbon?	
5.	Using #4, what if Anna decided to use $\frac{2}{3}$-yd pieces? How many pieces can she now cut?	
6.	A bulletin board is 56 in. wide and 36 in. high. How many $3\frac{1}{2}$-in columns can be created?	
7.	There are 3 boys and 2 girls in the Krunch family. Mr. Krunch bought $3\frac{1}{2}$ pounds of candy to divide equally among them. How much candy did each child get?	
8.	It takes 1 cup of liquid fertilizer to make $7\frac{1}{2}$ gallons of spray. How much liquid fertilizer is needed to make 80 gallons of spray?	
9.	Darlene has $2\frac{1}{4}$ hours to complete three household chores. If she divides her time evenly, how many hours can she give to each?	
10.	Elizabeth bought $3\frac{1}{3}$ pounds of tomatoes for $2\frac{1}{2}$ dollars. How much did she pay per pound?	
11.	Dad paid \$2.00 for a $\frac{3}{4}$ pound box of candy. How much is that per pound?	
12.	The runner ran $2\frac{1}{2}$ miles in $\frac{3}{4}$ hour. At that rate, how many miles could he run in 1 hour? That is, what is his speed in miles per hour?	
13.	Farmer Brown measured his remaining insecticide and found that he had two and a quarter gallons. It takes three-fourths gallon to make a tank of mix. How many tankfuls can he make?	
14.	Linda has $4\frac{2}{3}$ yards of material. She is making baby clothes for her niece. If each pattern requires $1\frac{1}{6}$ yards of material, how many patterns will she be able to make?	

Activity 12-22: **Mixed Fractions** Name:

1. Choose the greatest answer:

A. $\frac{3}{5}+\frac{1}{2}$

B. $\frac{3}{5}-\frac{1}{2}$

C. $\frac{3}{5}\bullet\frac{1}{2}$

D. $\frac{3}{5}\div\frac{1}{2}$

2. Choose the greatest answer:

A. $\frac{3}{5}+\frac{9}{2}$

B. $\frac{3}{5}-\frac{9}{2}$

C. $\frac{3}{5}\bullet\frac{9}{2}$

D. $\frac{3}{5}\div\frac{9}{2}$

3. Solve the problems and explain why each answer makes sense. In addition, think of a word problem for each of the problems below.

A. $\frac{3}{4}+\frac{1}{4}$

B. $\frac{3}{4}-\frac{1}{4}$

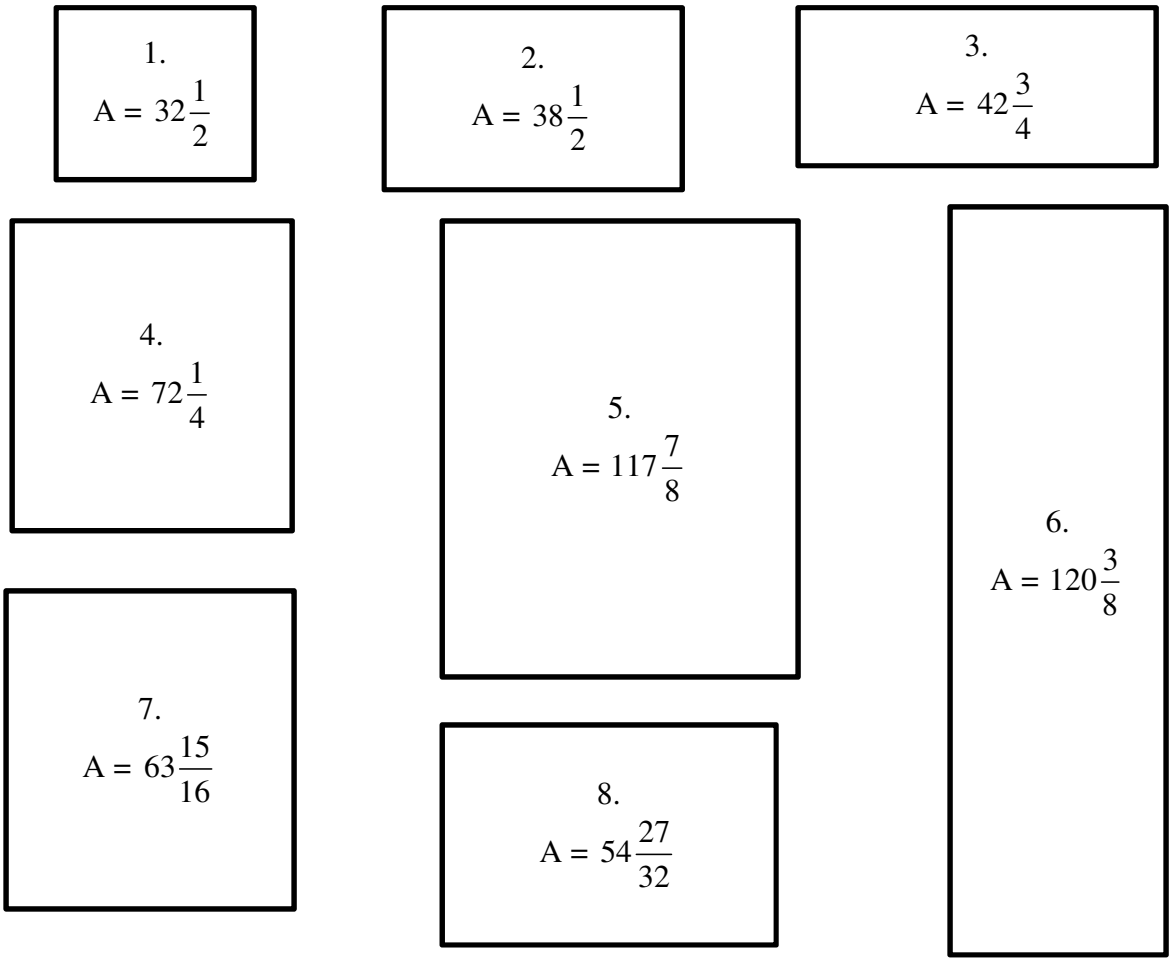
C. $\frac{3}{4}\bullet\frac{1}{4}$

D. $\frac{3}{4}\div\frac{1}{4}$

E. $\frac{1}{4}\div\frac{3}{4}$

Activity 12-23: **Rectangles** Name:

Determine the missing dimension of each of the following rectangles. All area units are in square inches.



1.	Length = $6\frac{1}{2}$ inches	Width =	2.	Length = $5\frac{1}{2}$ inches	Width =
3.	Width = $9\frac{1}{2}$ inches	Length =	4.	Width = $8\frac{1}{2}$ inches	Length =
5.	Length = $10\frac{1}{4}$ inches	Width =	6.	Length = $4\frac{1}{2}$ inches	Width =
7.	Width = $8\frac{1}{4}$ inches	Length =	8.	Length = $6\frac{3}{4}$ inches	Width =

Activity 12-24: **A Camping Trip** Name:

You and your friends are planning a camping trip. You are in charge of making and bringing enough trail mix. The trail mix needs to provide each person with one serving for each day of the trip. Here is the recipe for trail mix:

$2\frac{1}{4}$ cups raisins	$\frac{1}{3}$ cup walnuts	$\frac{1}{8}$ cups coconut pieces
$\frac{3}{4}$ cup peanuts	$\frac{1}{8}$ cup cashew nuts	$\frac{1}{4}$ cup chocolate chips
$\frac{2}{3}$ cup dried pineapple pieces	**Combine all ingredients and mix them.**	

1.	How many cups in all does the recipe make?				
2.	If one serving is $\frac{1}{2}$ cup, how many servings does the recipe make?				
3.	Suppose 12 people go camping for 3 days. How many cups in all should you make?				
4.	For #3, how much of each ingredient should you use to make enough trail mix for each person to have a $\frac{1}{2}$-cup serving on each day?	Raisins		Cashews	
		Peanuts		Coconuts	
		Pineapple		Chocolate	
		Walnuts			
5.	Suppose 3 people are going on the camping trip for 3 days and each serving of trail mix is $\frac{1}{4}$ cup. How many cups in all should you make?				
6.	For #5, how much of each ingredient should you use?	Raisins		Cashews	
		Peanuts		Coconuts	
		Pineapple		Chocolate	
		Walnuts			

Activity 12-25: **Quotients** Name:

Use the four numerals 1, 2, 3, and 4 to create two fractions that give the ***greatest quotient***. Make three attempts. Then repeat the same process for the numbers 3, 4, 5, and 6.

1st attempt: $\frac{\square}{\square} \div \frac{\square}{\square} = \frac{\square}{\square}$ | $\frac{\square}{\square} \div \frac{\square}{\square} = \frac{\square}{\square}$

2nd attempt: $\frac{\square}{\square} \div \frac{\square}{\square} = \frac{\square}{\square}$ | $\frac{\square}{\square} \div \frac{\square}{\square} = \frac{\square}{\square}$

3rd attempt: $\frac{\square}{\square} \div \frac{\square}{\square} = \frac{\square}{\square}$ | $\frac{\square}{\square} \div \frac{\square}{\square} = \frac{\square}{\square}$

Use the four numerals 1, 2, 3, and 4 to create two fractions that give the ***least quotient***. Make three attempts. Then repeat the same process for the numbers 3, 4, 5, and 6.

1st attempt: $\frac{\square}{\square} \div \frac{\square}{\square} = \frac{\square}{\square}$ | $\frac{\square}{\square} \div \frac{\square}{\square} = \frac{\square}{\square}$

2nd attempt: $\frac{\square}{\square} \div \frac{\square}{\square} = \frac{\square}{\square}$ | $\frac{\square}{\square} \div \frac{\square}{\square} = \frac{\square}{\square}$

3rd attempt: $\frac{\square}{\square} \div \frac{\square}{\square} = \frac{\square}{\square}$ | $\frac{\square}{\square} \div \frac{\square}{\square} = \frac{\square}{\square}$

1.	What patterns do you see?

Use the four numerals 1, 2, 3, and 4 to create two fractions that give the ***product closest to 2***. Make three attempts. Then repeat the same process for the numbers 3, 4, 5, and 6.

1st attempt: $\frac{\square}{\square} \times \frac{\square}{\square} = \frac{\square}{\square}$ | $\frac{\square}{\square} \times \frac{\square}{\square} = \frac{\square}{\square}$

2nd attempt: $\frac{\square}{\square} \times \frac{\square}{\square} = \frac{\square}{\square}$ | $\frac{\square}{\square} \times \frac{\square}{\square} = \frac{\square}{\square}$

3rd attempt: $\frac{\square}{\square} \times \frac{\square}{\square} = \frac{\square}{\square}$ | $\frac{\square}{\square} \times \frac{\square}{\square} = \frac{\square}{\square}$

Use the four numerals 1, 2, 3, and 4 to create two fractions that give the ***quotient closest to 2***. Make three attempts. Then repeat the same process for the numbers 3, 4, 5, and 6.

1st attempt: $\frac{\square}{\square} \div \frac{\square}{\square} = \frac{\square}{\square}$ | $\frac{\square}{\square} \div \frac{\square}{\square} = \frac{\square}{\square}$

2nd attempt: $\frac{\square}{\square} \div \frac{\square}{\square} = \frac{\square}{\square}$ | $\frac{\square}{\square} \div \frac{\square}{\square} = \frac{\square}{\square}$

3rd attempt: $\frac{\square}{\square} \div \frac{\square}{\square} = \frac{\square}{\square}$ | $\frac{\square}{\square} \div \frac{\square}{\square} = \frac{\square}{\square}$

1.	What patterns do you see?

Activity 12-27: **Fraction Word Problems** Name:

Solve.

1.	Liz Ann and Bryan are running a race. Bryan only ran $1\frac{1}{4}$ miles before he dropped out. Liz Ann ran $3\frac{1}{2}$ times farther than Bryan. How far did Liz Ann run and how many more miles did Liz Ann run than Bryan?	A. B.
2.	George Bush was eating his daily jelly beans. He decided he would share his jar of $5\frac{2}{5}$ pounds of jelly beans amongst himself and seven other world leaders. How many pounds did each leader get?	
3.	Trent bought $6\frac{1}{2}$ pounds of tomatoes. An average tomato weighs $\frac{3}{8}$ of a pound. Approximately how many tomatoes did Trent buy?	
4.	The Honey Baked Ham Store is busy during the holiday season. The average ham they sell weighs $9\frac{1}{2}$ pounds. If they say each ham will make $23\frac{1}{4}$ servings, how much does one serving weigh?	
5.	Bob is very interested in knowing exactly how fast he drives. On his last trip, he figured he drove $42\frac{1}{4}$ miles in $1\frac{6}{7}$ hours. How fast was he driving?	
6.	Bill owns a bakery that makes really good sugar cookies. It takes $12\frac{1}{5}$ cups of sugar to bake 5 complete batches and $\frac{1}{3}$ of another batch. How many cups of sugar is used for each batch?	
7.	Garrett can make $3\frac{1}{2}$ pies in an hour. If he works for $7\frac{3}{4}$ hours, how many pies can Garrett make?	
8.	In a recipe you need $4\frac{1}{2}$ cups of milk and you want to use all 15 cups of milk in the refrigerator. How many batches of the recipe can you make?	
9.	Larry, who lives in London, won the equivalent of $2\frac{1}{2}$ million dollars in the lottery. If one dollar is equal to $1\frac{1}{2}$ pounds (money in England), how many pounds did he win?	
10.	Becky has $3\frac{1}{5}$ pizzas left over from a party. The next day each person who visits Becky's house eats $\frac{2}{5}$ of a pizza. How many people visit before the pizza is all gone?	

Activity 12-28: **Fraction Word Problems** Name:

Solve.

1.	Lizzy Lou had $\frac{3}{4}$ of a pumpkin pie. She decided to split it between herself, Emily Sue, Billy Bob, Joe Jill, and Danny Dude. How much of a whole pie will each person get?	
2.	Dorothy gives the munchkins $9\frac{1}{5}$ chocolate bars for Christmas. If there are 6 munchkins, how many chocolate bars does each one get?	
3.	There were 10 cakes at Johnny's birthday party. If each person was given $\frac{2}{5}$ of a cake and all 10 cakes were eaten, how many people attended the party?	
4.	There was $\frac{1}{2}$ of a pizza at Joe's Pizza, Pasta, & Subs. If each person at the restaurant was given $\frac{1}{16}$ of a whole pizza for free, how many people were at Joe's?	
5.	The Griswold's sat down for Christmas Eve dinner. They bought a 24 pound turkey, which amazingly enough they cooked correctly this year. There are 6 people in their family so how many pounds does each person get? If Rusty eats only one-half of a pound and they split up the rest for the other five people, how much extra turkey will each get?	A. B.
6.	If Emily practices band for $3\frac{2}{5}$ hours over 4 days, how many hours did she average each day?	
7.	Santa eats $\frac{1}{4}$ of a cookie because he is on a diet. The rest of the cookie was divided up amongst all of the seven reindeer. Then Comet stole Blitzen's serving. How much of a cookie does Comet get?	
8.	Taylor has $\frac{5}{7}$ of a pound of turkey and she has to make equal groups of $\frac{1}{3}$ of a pound each. How many groups are there?	
9.	You are on a $9\frac{1}{3}$ mile hike with $6\frac{2}{3}$ gallons of water. How many gallons of water can you drink every mile?	
10.	Scooby has $4\frac{1}{3}$ cups of dog food and needs to divide it up into serving sizes of $\frac{2}{3}$ of a cup each. How many servings can Scooby make?	