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Unit Cover Page

Unit Title: Numbers Make Sense! Grade Levels: 6th

Subject/Topic Areas: Mathematics/Number & Operations

Key Words: Prime, Composite, Decompose, Fractions, Factor, Multiple, Greatest, Lowest, Percent, Decimal

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Time Frame: 3-4 Weeks

Brief Summary of Unit (including curricular context and unit goals):

Students will understand the meaning of the four arithmetic operations as related to positive rational numbers and will apply these concepts and associated skills in real world situations.

Unit design status: Completed template pages – Stages 1, 2, and 3

Completed blueprint for each performance task Completed rubrics

Directions to students *and* teachers Materials and resources listed

Suggested accommodations Suggested extensions

Status: Initial draft (date _____) Revised draft (date _____)

Peer reviewed Content reviewed Field tested Validated Anchored

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Stage 1 – Identify Desired Results

Established Goals: “Big Idea” is underlined in the standard and highlighted in the elements.

Georgia Performance Standards-Mathematics

G

M6N1. Students will understand the meaning of the four arithmetic operations as related to positive rational numbers and will use these concepts to solve problems.

- a. Apply **factors** and **multiples**.
- b. Decompose numbers into their **prime factorization (Fundamental Theorem of Arithmetic)**.
- c. Determine the **greatest common factor (GCF) and the least common multiple (LCM)** for a set of numbers.
- d. Add and subtract **fractions and mixed numbers** with unlike denominators.
- e. Multiply and divide **fractions and mixed numbers**.
- f. Use **fractions, decimals, and percents** interchangeably.
- g. **Solve problems** involving fractions, decimals, and percents.

What understandings are desired?

Students will understand that...

U

1. All positive rational numbers have factors and multiples including GCF and LCM.
2. Composite rational numbers can be decomposed numbers into their unique prime factorization (Fundamental Theorem of Arithmetic)..
3. The greatest common factor (GCF) and the least common multiple (LCM) for a set of numbers related to positive rational numbers.
4. By using the four arithmetic operations they can solve real world problems involving fractions, mixed numbers with unlike denominators.
5. Rational numbers can be represented and used interchangeably as fractions, decimals, and percents to solve problems.

What essential questions will be considered?

Q

1. How do you determine which of the four arithmetic operations to use to solve problems and when it is appropriate to use fractions, percents, decimal representation for positive rational numbers?
2. How can knowing that all positive rational numbers have factors and multiples help you solve real world problems?
3. How do you and why is it important to decompose numbers into their prime factorization when solving real world problems?
4. How do you use greatest common factor (GCF) and least common factor (LCM) to solve real world problems.

What key knowledge and skills will students acquire as a result of this unit?

K

Students will know...

1. Fact families
2. The following vocabulary terms: concepts, factors, multiples, prime factorization, GCF, LCM, fractions, decimals, percents, positive rational numbers.
3. Divisibility rules
4. Place value
5. Identify and be able to use four arithmetic operations.
6. Know the Fundamental Theorem of Arithmetic.

S

Students will be able to...

1. To determine and apply factors and multiples for a given positive rational numbers.
2. Decompose numbers into their prime factorization.
3. Add and subtract fractions, decimals, and percents interchangeably.
4. Solve problems involving fractions, decimals, and percents.

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Stage 2 - Determine Acceptable Evidence

Performance Tasks* (summary in GRASPS form):

Factor and Multiple Task “How many Different Ways?”

Goal: Students will determine the different ways that different numbers of pictures can be arranged in a frame,

Role: Students will take on the role of the design engineer. They will be responsible for making a physical model of each package using pop stickle sticks and then finding the length, width, which they will associate with the factors.

Audience: The audience will include the students and the teachers, who will act as the engineering managers.

Situation: The students are researching the different ways that 6, 10, 12, 15, 18, 19, etc. pictures can be arranged in a frame.

Product: The students will produce research summaries for their particular number of pictures. They will also have sketches and models of the different ways that the pictures can be arranged.

Standards for Products: The engineering managers (teachers and students) will use a rubric to evaluate the students' research.

Key Criteria: Accurate models and sketches of packaging, **relate frame dimensions to factors of a number, knowledge of prime and composite numbers**

*****ASSIGNMENT ATTACHED*******

T

Performance Tasks* (summary in GRASPS form): Science fair Task

Goal: The students will engage in an activity which will require them to divide the space in a gymnasium to have a science fair between three middle schools and 200 participants.

Role: The students will take on the role of architect and will determine how much space will be given to each school based on the amount of kids per school. Also, they will determine what percent of the cost will each school pay based on the entire cost to have the science fair.

Audience: The audience includes other students in the class and the teacher.

Situation: The students will conduct an experiment to see what fraction of space each school should receive.

Product: The students will explain and provide adequate support on what each school space should be and what the cost would be for each school to participate through the show of fractions, decimals, and percents.

Standards for Products: Justification on the findings.

*****ASSIGNMENT ATTACHED*******

T

Other Evidence (quizzes, tests, prompts, observations, dialogues, work samples):

Multiple choice tests and quizzes, teacher made quizzes, journal entries, class discussions, project work, teacher observation.
Have students research a historic or contemporary mathematicians and Eratosthenes, Galileo, Copernicus, Fibonacci, da Vinci, Einstein, and Hawking. When the projects are completed and presented to the class, display them and direct students to read and reflect on reports that interest them.

O
E

Student Self-Assessment and Reflection:

Journal Reflections
Tasks
Rubric
Creating graphic Organizers
Developing Models
Checklists
Academic Discourse
Mathematical Arguments

S
A

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Performance Task Blueprint Task #1

What understandings and goals will be assessed through this task?

G

Students will understand the importance of factors and multiples and how they are applied in real world situations.

- a. Apply factors and multiples.
- b. **Decompose** numbers into their prime factorization (Fundamental Theorem of Arithmetic).
- c. Determine the greatest common factor (GCF) and the least common multiple (LCM) for a set of numbers.

What criteria are implied in the standards and understandings regardless of the task specifics?
What qualities must student work demonstrate to signify that standards were met?

Demonstrate knowledge of factors by designing picture frames appropriately
Accurate visual and written explanation of work

Through what authentic performance task will students demonstrate understanding?

T

Students will complete the "How Many Different Ways?" performance task.

What student products and performances will provide evidence of desired outcomes?

The students will produce research summaries for their particular number of pictures.

They will also have sketches and models of the different ways that the pictures can be arranged.

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Performance Task Blueprint #2

What understandings and goals will be assessed through this task?

1. The students should understand how to add and subtract fractions and mixed numbers with unlike denominators.
2. Multiply and divide fractions and mixed numbers.

3. Use fractions, decimals, and percents interchangeably.

G

What criteria are implied in the standards and understandings regardless of the task specifics?
What qualities must student work demonstrate to signify that standards were met?

1. Student should be able to answer the questions as they relate to the above task.

2. The questions answered will show the breakdown of using the above standards because students will show all work.

Through what authentic performance task will students demonstrate understanding?

The students will take on the role of architect and will determine how much space will be given to each school based on the amount of kids per school. Also, the kids will determine what percent of the cost will each school pay based on the entire cost to have the science fair.

T

What student products and performances will provide evidence of desired outcomes?

The students will explain and provide adequate support on what each school space should be and what the cost would be for each school to participate through the show of fractions, decimals, and percents.

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Stage 3 – Plan Learning Experiences and Instruction

Consider the **WHERE TO** elements:

L

A. Apply Factors and Multiples.

Activity One: Finding Factors

- How can knowing that all positive rational numbers have factors and multiples help you solve real world problems?
 - The teacher will introduce the vocabulary, asking for definitions of a factor, multiple, positive, and rational number.
 - Teacher will ask students to compare and contrast factors and multiples. The teacher will guide the discussion until there are good definitions of the terms on the board, overhead, etc. (Make sure to include a word wall and to continuously add terms to it.)
 - Write $6 \times 4 = 24$ beneath the definitions. The teacher will ask the students which number is the factor and which is the product. Continue giving examples.
- Introduce the game "Bizz Buzz". Students will begin counting at 1, but when the students reach a multiple of 5, instead of saying the number, they will say the word "Bizz Buzz". Students count from 1 through 50. Repeat the game, this time using multiples of 3. Repeat for different numbers as desired.
- The teacher will place the numbers 1 through 100 on the board.
 - Ask a volunteer to circle the number 10, then place a square around the multiples of ten.
 - Ask another volunteer to place a triangle around the number 5, and then place a hexagon around the multiples of 5.
 - Ask the students to describe the numbers that have squares and hexagons around them?
- Teacher will ask "What are the factors of 12, 24? Students will use their prior knowledge to answer. "What numbers are repeated in each set?"
- Find the Factors Write on the board:
The letter F represents factor
 $1 \times 24 = 24$ $2 \times 12 = 24$ $3 \times 8 = 24$ $4 \times 6 = 24$

The factors of 24 are 1, 2, 3, 4, 6, 8, 12, 24, or $F_{24} = \{1, 2, 3, 4, 6, 8, 12, \text{ and } 24\}$

Have the students find the factors of the following numbers using the Fn model

- F_{24}
- F_{16}
- F_{10}
- F_{60}
- F_{100}
- F_{48}
- F_{22}
- F_{32}
- F_{12}
- F_{15}

Activity two: Playing "High Rollers" to find the products and multiples.

Students roll the dice to create multiplication expressions.

Materials: dice, paper, pencil

Die 1	Die 2	Product	Factors of Product	Multiples of Product
3	5	15	1,3,5,15	15, 30, 45

Step 1: Roll one die, record the number in the die1 column

Step 2: Roll the second die, record the number in the die2 column

Step 3: Multiply the two numbers and record the answer in the Product column

Step 4: Write all the factors of the product, and the multiples of the product

1. The teacher will write 4, 8, 12, 16, 20, __, __, __ on the board.

- Ask
- What patterns do you see?
 - Are the numbers increasing or decreasing?
 - What are the numbers increasing by?
 - What are the next 3 numbers in this pattern?
 - How else can you look at this? (I.e. 2×2 , 1×4 , 2×4 , 3×4 , 2×6 ,....)

2. After the students have explored (given all the multiples of the number), and the students have an understanding of factors, introduce the term multiple, definition: The multiples of a number are the answers that you get when you multiply the number by a sequence of whole numbers.

3. Tell the students " Multiples are another way of understanding factors, so today we are going to review our multiplication facts through 10.

4. $2 \times 2 = 4$, so 4 is a multiple of 2, $2 \times 4 = 8$, so 8 is a multiple 4. Ask " Is 8 a multiple of 2? What other number is 8 a multiple of? Hint: The student will learn that the product is a multiple of each of it's factor.

5. Ask "Count by 2's

write on the board 2, 4, 6, 8, 10,

Say "Counting by 2's is stating the multiples of 2

"Count by 3's

write on the board 3, 6, 9, 12, 15...

Say "Counting by 3's is stating the multiples of 3

Ask "Who can give me the multiples of 5?

Multiples

example: The multiples of 8: $8 \times 0 = 0$ $8 \times 1 = 8$ $8 \times 2 = 16$ $8 \times 3 = 24$ $8 \times 4 = 32$

$M_8 = \{0, 8, 16, 24, 32, \dots\}$

The three dots show that the set of multiples continues forever. We say that the set is infinite.

Do I know my multiples?

1. M_5 2. M_{12} 3. M_{10} 4. M_{20} 5. M_{25} 6. M_{15} 7. M_{35}

Add as many problems as necessary. Tailor to different levels.

Activity Three: Further Investigation of Factors in Packages of Goods

Teacher discusses with students how several consumer goods are sold in packages with particular numbers of items. Some examples include 6-pack of soda, package of 4 bars of soap, package of 2 batteries. Ask students why they think they are packaged this way. Have students calculate the total number of items in more than one of these packages. (three 6-packs of soda = 18 cans; two 4-packs of soap = 8 bars; three 2-packs of batteries = 6 batteries)

R- Reference book The Big Book of Reproducible Graphic Organizers, copyright 1999, pp. 74, 75

R- Reference book Fostering Children's Mathematical Power: An Investigative Approach to K-8, Mathematics Instructions, "Investigation 8.3, Comparing distinct Factors, p. 8-8

1. - Students will create authentic factor games with rules.

- Create rules
- Create a title
- Description

Student will share their games with the class.

2. For students the need help with the concept, have them review multiplication facts through 12.

Activity Four: Calculator, Multiples, Multiples, Multiples

Distribute a calculator to each student. Use a calculator to find the set of multiples of each number. List the first 10 numbers in each set.

Example: Find the multiples of 20. Write 0 because $20 \times 0 = 0$. Zero is the first multiple in each set. Press +, 20, =. The display reads 20. Write $20 \times 1 = 20$.

Press =, =, =, =, ..., and write the multiple after each

1. M13 2. M29 3. M27 4. M20 5. M8 6. M3

Add as many problems as necessary. Tailor to different levels.

Activity Five: Factor and Multiple Performance Task.

B. Decompose Numbers into their Prime Factorization

W - Student will understand that rational numbers can be decomposed into their prime factorization.

H- Create a Factor Tower using 4 digits numbers. Create a factor wall (Great Wall of Factors) using construction paper. Decompose the large number to test factorization.

Materials: Construction paper, markers or crayons, tape

- a. Have student write a 4 digit number on the construction paper.
- b. Students should decompose their number.

E - The teacher review factors and multiples. Ask " If all the numbers they explored had the same number of factors. Can you think of a number whose only factors are itself and 1? Say " This week you will learn to classify numbers according to the factors they have.

1. Say - A number that has exactly two factors, we call that a prime number, but a number that has more than two factors is called a composite number. Now let's look at some factors

1 5 9
1x1 Factors repeat, so we stop

F1 = {1}

1 x 5

2 x no numbers works

3 x no numbers works

4 x no numbers works

5 x 1 factors repeat, so we stop.

F5 = {1, 5}

1 x 9

2 x no numbers works

3 x 3

4 x no numbers works

5 x no numbers works

6 x no numbers works

7 x no numbers works

8 x no numbers works

9 x 1 Factors repeat, so we stop.

F9 = {1, 3, 9}

5 is a prime number because it has exactly two factors

9 is a composite number because it has more than two factors.

1 is neither a prime number nor a composite number because it has only one factor

E2: Activity One: Are you a prime number? Divide the student into groups. Write different numbers on an index card and give them to the groups. The students should factor their number and decide if the number is a prime or composite number.

Activity two:

Create a chart 1 through 100

Ask- How might you be able to identify all the prime numbers on the chart? Look at the chart and identify all the number patterns in the rows, columns, and diagonals.

For example the diagonal increase by 11.

Say - A Greek mathematician named Eratosthenes invented a way to find prime numbers. It is called the Sieve of Eratosthenes (ehr uh TAHStuh neez). You can use his method to find the prime numbers less than 100

Activity three: Prime number 1 through 10, using the 100 chart.

- Directions: To make a Sieve of Eratosthenes and find prime numbers the way Eratosthenes did. Can you find all 25 of them? The numbers that you do not cross out are the prime numbers less than 100. The first two steps are done for you.

Step 1 1 is not a prime number, so it is cross out.

Step 2 2 is the first prime number, so we circle it and cross out all of the other multiples of 2, like 4, 6, 8, ...

- Step 3 3 is a prime number. Circle it and cross out all of the other multiples of 3, like 6, 9, 12,

...

Step 4 Circle 5 and cross out the other multiples of 5.

Step 5 Circle 7 and cross out the other multiples of 7.

Activity 4:

Pizzazz C, "Factor Tower", p. C-9

R -

Activity 5:

Fostering Children's Mathematical Power, An Investigative Approach to K - 8, "Investigation 8.4 A Number Trick", p 8-10

Activity 6:

Activities for Jr. High School and Middle School Mathematics Volume2, "Foxy Fives", p. 149

Activity 7:

Fostering Children's Mathematical Power, An Investigative Approach to K - 8, "Investigation 8.5 Prime Factors", p. 8-11

C. Determine the greatest common factor (GCF) and least common multiple (LCM) for a set of numbers.

W - How can knowing the Greatest Common Factor and the Least Common Multiple for a set of numbers relate to positive rational numbers.

H- There are careers that apply to Math. Can anyone name a particular career that is related to Math? The teacher will write down the information and validate students). The teacher will then tell the students that a mason or tile layer uses multiples on the job. Draw the following diagram on the board, explaining that it represents an alternating pattern of tiles 6 inches long with tiles that are 8 inches long.

Tell students that by knowing common multiples of 6 and 8, the tile layer can figure out the measurements at which the rows will align. (24 inches, 48 inches, 72 inches, etc.)

E - The teacher will ask the students the following questions. What is the least number of days in one month? (28) What do the month of January and March have in common? (Both have 31 days).

The teacher will review the following vocabulary words: Least, common, greatest, multiple, factor. Discuss the relationship between, comparative words such as greatest and least. Review the terminology and symbol for multiple (Mn) and factor (Fn).

The teacher will discuss with the students that there is always a smallest common multiple of two numbers. This number is called the least common multiple (LCM) of the two numbers. Zero is a multiple of every number. This is because 0 times any number is always 0.

E2 Activity one: Least common multiple

The teacher will have the students find the multiples of 4 and 6:

$M_4 = \{0, 4, 8, 12, 16, 24, 28, 32, 36, \dots\}$

$M_6 = \{0, 6, 12, 18, 24, 30, 36, 42, \dots\}$

These are the common multiples of 4 and 6: (12, 24, 36, ...). There is always a least (smallest) common multiple of two numbers. The LCM (4,6) = 12

Step 1 List the first few multiples of both numbers.

Step 2 Find the smallest nonzero number that is in both sets.

Step 3 If no nonzero number is in both sets, list more multiples both number

Find LCM (5, 8)

$M_5 = \{0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, \dots\}$

$M_9 = \{0, 9, 18, 27, 36, 45, 54, \dots\}$

LCM (5, 9) = 45

Find the LCM of these pairs of numbers

1. LCM (12, 18)

2. LCM (12, 15)

3. LCM (8, 20)

4. LCM (3, 9)

5. LCM (10, 8)

4. LCM (4, 6)

E3 Activity two: Finding the common factor

The teacher will discuss that for any two numbers, all the numbers that divide evenly into both numbers, and the Greatest Common Factor is the largest factor of the two numbers. List all of the factors of two numbers, 48 and 72.

<u>48</u>	<u>72</u>
1 x 48	1 x 72
2 x 24	2 x 36
3 x 16	3 x 24
4 x 12	4 x 18
5 x no number works	5 x no number works
6 x 8	6 x 12
7 x no number works	7 x no number works
8 x 6 factors repeat, so we stop	8 x 9 9 x 8 factors repeat so we stop.

$F_{48} = \{1, 2, 3, 4, 6, 8, 12, 16, 24, 48\}$

$F_{72} = \{1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 72\}$

These two sets have numbers in common:

$\{1, 2, 3, 4, 6, 8, 12, 24\}$

$GCF(48, 72) = 24$

Find the GCF of these pairs of number.

1. GCF (10, 16)
2. GCF (4, 6)
3. GCF (7, 12)
4. GCF (8, 20)
5. GCF (2, 5)
6. GCF (8, 15)

R1 - Activity three: Reference Fostering Children's Mathematical Power: An Investigation Approach to K-8 Mathematics Instruction, "Teaching: Fostering the Conceptual Groundwork for and the Meaning Instruction of GCF and LCM, pp. 8-12, 8-13

R2 - Activity five: Reference Math Olympiad Contest Problems for Elementary and Middle Schools, p. 261, "Venn diagram"

R3 - Activity six: Reference Math Olympiad Contest Problems for Elementary and Middle Schools, p. 262, "The LCM of Three Numbers"

R4 - Activity seven: Reference Math Olympiad Contest Problems for Elementary and Middle Schools, p. 261, "Relating GCF and LCM"

R5 - Activity eight: Reference Math Olympiad Contest Problems for Elementary and Middle Schools, p. 254, "Listing" and "Testing"

R6 - Activity nine: Reference Math Olympiad Contest Problems for Elementary and Middle Schools, p. 255, "Factoring", "The difference of two numbers", and "The GCF of Three Numbers"

Evaluate1: Activity ten: Reference Math Olympiad Contest Problems for Elementary and Middle Schools, p. 20, #2, p. 21, #1

D. Add and subtract fractions and mixed numbers with unlike denominators.

W- Student will understand that by using the four arithmetic operations they can solve problems involving fractions, percents, decimals and positive rational numbers.

H1 Activity One:

The teacher will introduce the day's lesson by asking students to take turns throwing ten-sided dice twice and forming a fraction using the smaller number for the numerator and the larger for the denominator. Player with the greatest difference earns 1 point.

Demonstrate how to add and subtract fractions on a calculator

E1. Give students a pre-test to gauge their mastery level. Grade these in class and ask students to raise their hand if they have a good understanding of the skill. Introduce the vocabulary: equivalent fractions, common denominators, greatest common multiple.

Students will make a multiplication table and cut them into slits. Give the students a set of problems and have them use the table strips to complete the activities.

1. Bring the students back together and have them write a reflection on the day's activities. Questions may include:

2. What terms are they still confused about?
3. How can you find common denominators?
4. Can you add or subtract a fraction if they have different denominators?

E2 Teacher will lead the discussion in how the students can find the common denominators without using the multiplication strips. Link prior knowledge of greatest common multiple and finding equivalent fractions.

1. Bring the students back together and have them write a reflection on the day's activities. Questions may include:

2. What terms are they still confused about?
3. How can you find common denominators?
4. Can you add or subtract a fraction if they have different denominators?

R1 - Activity two - Fostering Children's Mathematical Power, An Investigative Approach to K - 8, p. 10-11, 10-12, "Using Informal Knowledge to Invent Concrete Strategies for Operation on Fractions"

R2 - Activity three - Fostering Children's Mathematical Power, An Investigative Approach to K - 8, p. 10 - 15 "Investigation 10.2; Connecting Concrete and Symbolic Operations on Fractions Using Fraction Tiles as an Example, Part I: Fraction Addition and Subtraction"

E. Multiplying and Dividing Fractions.

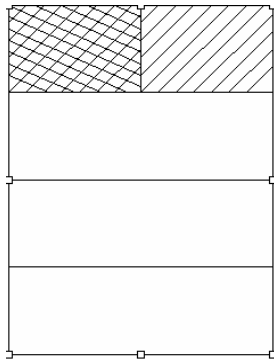
Where: Student will understand that by using the four arithmetic operations they can solve problems involving fractions, percents, decimals and positive rational numbers.

Hook: Begin lesson by showing students a model of a fraction times a fraction using grid paper.

See page 64 Basic Math Skills Introducing the Lesson. Equip: Basic Math Skills Pg. 64-69 Discuss the lesson, give more examples, allow students to give examples.

E1 Basic Math Skills (Teacher Edition) page 64-69. Begin lesson by allowing students to tell what they know about multiplying fractions. Ask questions after students explain the lesson. Talk about key vocabulary terms: Product, reciprocal. Students will take a short quiz to gauge their levels.

E2 The teacher will show the students a model of a fraction times a fraction, using grid paper. For example, show them $1/2 \times 1/4$, draw the picture on the board



Demonstrate how to multiply and divide fractions on a calculator

Explain that $1/4$ of the whole rectangle is shaded with diagonal lines. Then $1/2$ of this $1/4$ block is shaded with diagonal lines in the opposite direction.

The teacher has the students work in groups to solve the following problem. A fabric store has $7/8$ yard of blue silk left on a bolt. Miko wants to buy $2/3$ of the piece. If the silk costs \$12 a yard, then how much will Miko pay for her piece? ($2/3 \times 7/8 = 7/12$; $7/12 \times 12 = \$7$)

E3 - Activity one - Fostering Children's Mathematical Power, An Investigative Approach to K - 8, p. 10-15 - 10-17 "Investigation 10.2; Connecting Concrete and Symbolic Operations on Fractions Using Fraction Tiles as an Example," Part II: Multiplication, Part III Division

E4 - Activity two - Math Olympiad Contest Problems for Elementary and Middle Schools, p 238, "Reciprocal of a Number"

F-G. Use fractions, decimals, and percents interchangeably and in problem solving.

Where: How would you choose which of the four arithmetic operations to solve problems involving fractions, percents, decimals, and positive rational numbers.

Hook: Begin lesson by having students play “Percents, Decimals, and Fractions Bingo”. The first student to cover a row/column/diagonal is the winner.

Equip:

Rethink: Review lesson on changing fractions to decimals to percents. Ask students to reflect on what they have learned. Students will use fraction pies (strips or other manipulatives) to reinforce skills.

Evaluate: Give Lower level group will use manipulatives and technology.
www.aaamath.com, www.funbrain.com

Organize: Have a class project involving students choosing 3 items from Walmart. They then have to find the final price a) after 0.22 savings, b) $\frac{1}{3}$ off, c) 49% off.

Factor and Multiple Performance Task

You are a packaging engineer working for a picture frame company. You are responsible for designing different frames for different number of pictures. You and your team of fellow engineers (4 in a team) are responsible for investigating ways to frame 2-20 pictures. **The only catch is that your design can only be in the shape of a rectangle!!**

For example, 2 pictures can be arranged like this:

a)



b)



The dimensions (length, height) are for:

a) 2 x 1

b) 1 x 2

This is the only way to put two pictures in a frame. You are responsible for sketching the different ways you can package each picture. Include the sketches on a separate sheet paper. Record all the different dimensions in the chart below.

Number of Pictures	Dimensions
2	1 x 2
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	

Factor and Multiple Performance Task Page 2

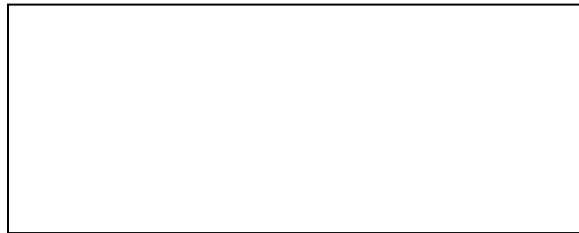
Now, you are responsible for answering these questions individually.

- 1) What is the smallest number of pictures that you can use with dimensions of 2×3 ?
- 2) What relationship is there between the length and width and the actual number of pictures?
- 3) Find a larger number with 1, 2, and 3 as factors. If possible, find additional numbers with 1, 2, and 3 as factors.
- 4) You could multiply 1, 2, and 3 to get the smallest number that has 1, 2, and 3 as factors. Could you multiply 1, 2, 3, and 4 to get the smallest number with all four as factors? If not, tell why not?
- 5) Find the prime factorization of 24. The factors of 24 are 1, 2, 3, 4, 6, 8, 12, and 24. Find their prime factorizations and compare them to the prime factorization of 24. What do you notice?
- 6) The number 5 and another number less than 40 have a *common multiple* of 40. What could the other number be? Could there be other answers? If so, list as many as you can. Tell how you know.
- 7) The number 5 and another number less than 40 have a *least common multiple* of 40. What could the other number be? Could it be more than 1 number? If so, list as many as you can. Tell how you know.
- 8) The number 7 is a factor of 35 and of another number. What could the other number be? Could it be more than one number? If so, list as many as you can. Tell how you know.
- 9) The number 7 is the greatest common factor of 35 and another number. What could the other number be? Could it be more than one number? If so, list as many as you can. Tell how you know.

Science Fair Task

Three middle schools are going to have a science fair in a gymnasium. The amount of space given to each school is based on the number of the students participating. McKenzie Middle School has 100 participants, Wesley Middle School has 60 participants, and Thomas Middle School has 40 participants.

- A. Draw a rectangle that represents the floor in the gymnasium. Divide the rectangle to show the amount of space each school should get based on the number of students participating. Label each section MM-McKenzie Middle, WM-Wesley Middle, or TM-Thomas Middle.



- B. What fraction of the space should each school get based on number of participants? Show how you know.
- C. Does McKenzie Middle get more space than the other two schools combined? Use fractions to explain.
- D. How many times more space does McKenzie Middle get than Thomas Middle? Show how you know.
- E. If the schools share the cost of the science fair based on the number of students, what percent of the cost should each school pay? Show how you figured these percentages.

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F. If the cost of the science fair is \$300.00, how much should each school pay based on the number of students? Tell how you know.

G. Kita tried to figure out the difference in the amounts that Wesley Middle and Thomas Middle paid and got \$26,940. She knows that's too much. Help her find her error.

Cost for Wesley Middle-Cost for Thomas Middle=

$$60/200 * 300 - 40/200 * 300 =$$

$$(60/200 * 300) - 40/200 * 300 =$$

$$(90 - 40/200) * 300 =$$

$$89.8 * 300 = 26,940$$

H. What fraction of the cost should each school pay based on number of schools, rather than participants? Show how you know.

I. Do you think it is fair to charge the schools based on the number of schools or on the number of participants per school? How would you convince someone who disagrees?

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Monday	Tuesday	Wednesday	Thursday	Friday
<p>Hook students by asking how can knowing that all positive rational numbers have factors and multiples help you solve real world problems. 2. Introduce vocabulary. 3. have students to compare and contrast factors and multiples (what number have some common factors</p> <p>www.aplusmath.com</p> <p>Pros and Cons/ Review of today's lesson</p>	<p>Introduce the game "Bizz Buzz" to students where they will begin counting at 1 and when they reach a multiple of 5 they will say "Bizz Buzz" instead of the number. 2. The students will be asked the factors of a set of numbers and will use prior knowledge to give the answers.</p> <p>www.superkids.com</p> <p>Class Discussion</p>	<p>Students will be given a dice to create a multiplication expression. This is called High Rollers" to find the product and multiples. They will make a chart and record the answers. 2. The teacher will write 4, 8, 12, 16, 20, __, __, on the board and they will have to show the pattern, if the numbers are increasing or decreasing and other related questions to the lesson.</p>	<p>Students will be introduced to some additional vocabulary words multiple definition and will explain what it means. Teacher will discuss and give examples. Have students count by 2's, 3's 5's. Continue adding problems. 11</p>	<p>The students will be assessing. Peer tutoring. Will take place if necessary. An additional activity will be extended to the lesson if necessary. Use Mountain Math to Review skills.</p>
<p>Distribute calculators to students. Use calculators and multiples. 2. Homework to find the set of multiples of each number through 12.</p>	<p>Decompose numbers into their prime factorization. Create a factor using 4 digit numbers. Create a factor wall. Review factors and multiples.</p>	<p>Activity Are you a prime number. Students will be divided into groups. Different numbers will be written on index cards. Students will factor their numbers.</p>	<p>Create a chart 1 through 100. They will use Eratosthenes (Mathematician) method for finding prime numbers</p>	<p>Activity 4 Pizzazz C _ Factor Tower p.-9 Use Mountain Math to Review skills.</p>
<p>Activity: Pizzazz C Factor Tower Pg. C-9</p>	<p>Activity: Fostering Children's Mathematical Power "Number Trick" p 8-10</p> <p>Literature I hate Mathematics Book</p>	<p>Activity: For Jr. High School and Middle School Mathematics "Foxy Fives" pg. 149</p>	<p>Activity: Fostering Children's Mathematical Power Prime Factors pg 8-11 www.mathlinks.com</p>	<p>Use Mountain Math to Review skills.</p>