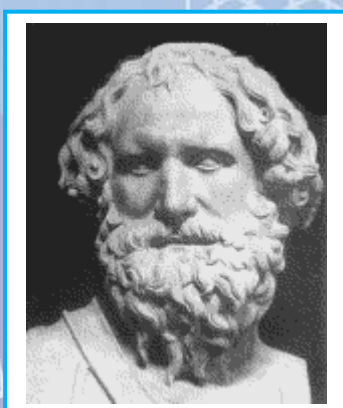


Pythagoras



Archimedes



Euclid

A MATHEMATICS Winter Number Land

Grade 3

Winter 2011-2012



Miami-Dade County Public Schools
Curriculum & Instruction

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Welcome to a Mathematics Winter Number Land

The realm of mathematics contains some of the greatest ideas of humankind. A *Mathematics Winter Number Land* activities included in this packet are a mathematical excursion designed to be read, fun to do, and fun to think and talk about. These activities will guide you in applying the concepts you have studied. Additionally, each activity addresses the Next Generation Sunshine State Standards for Mathematics Benchmarks. Each benchmark is listed at the end of the activity.

The journey to true mathematics understanding can be difficult and challenging but be patient and stay the course. Mathematics involves big ideas. As we make these ideas our own, they will empower us with strength, techniques, and the confidence to accomplish wonderful things. Enjoy working each activity.

Tip for Walking in a *Mathematics Winter Number Land*: the only rule is – HAVE FUN!

If you are in need of additional information about the Elementary Mathematics, A *Mathematics Winter Number Land*, Winter Break Activity Packet, please contact the Division of Mathematics, Science, and Advanced Academic Programs, at 305-995-1934.

Who Were They?

Pythagoras was a Greek mathematical genius and often described as the first pure mathematician. He invented the Pythagorean theorem which states that: "In any right triangle, the area of the square whose side is the hypotenuse (the side of a right triangle opposite the right angle) is equal to the sum of areas of the squares whose sides are the two legs (i.e. the two sides other than the hypotenuse)."

Euclid, the Greek mathematician, was known as the "Father of Geometry". He taught at the university in Alexandria, Egypt. While at the university, he compiled his famous 13 volume treatise called *Elements* that is still the basis of the geometry taught in schools to this day. He used axioms (accepted mathematical truths) to develop a deductive system of proof, which he wrote in his textbook *Elements*. Euclid's first three postulates, with which he begins his *Elements*, are familiar to anyone who has taken geometry: 1) it is possible to draw a straight line between any two points; 2) it is possible to produce a finite straight line continuously in a straight line; and 3) a circle may be described with any center and radius.

Euclid also proved that it is impossible to find the "largest prime number," because if you take the largest known prime number, add 1 to the product of all the primes up to and including it; you will get another prime number. Euclid's proof for this theorem is generally accepted as one of the "classic" proofs because of its conciseness and clarity. Millions of prime numbers are known to exist, and more are being added by mathematicians and computer scientists. Mathematicians since Euclid have attempted without success to find a pattern to the sequence of prime numbers.

Archimedes is one of the great scientists of antiquity also known for his mathematical work. It is believed he studied under followers of Euclid. He proved that an object plunged into liquid becomes lighter by an amount equal to the weight of liquid it displaces. Popular tradition has it that Archimedes made the discovery when he stepped into the bathtub, then celebrated by running through the streets shouting "Eureka!" ("I have found it!"). He also worked out the principle of levers, developed a method for expressing large numbers, discovered ways to determine the areas and volumes of solids, and calculated an approximation of pi (π).

Math Fact Family

Adapted from Education.com

Description:

At home, the practice of math facts is usually limited to flashcards. For your third-grader to want to practice math facts, these facts should at times be presented as a game. This activity makes working on multiplication facts fun!

Materials: paper, pencils, fact family strips

Sample of “fact family strips” for this game:



Directions:

1. Cut paper and make several (20-30) “fact family strips” that contain four numbers - three numbers in a fact family and one number that does not belong; see figure 1. For examples of fact families, see step 2.
2. Before beginning the game, review basic fact families with your third-grader. Explain that a fact family is a set of three numbers that are all “related” by multiplication and division. For example, 5, 8 and 40 are a fact family because $5 \times 8 = 40$, $8 \times 5 = 40$, $40 \div 5 = 8$, $40 \div 8 = 5$. Provide several examples of fact families before starting the game. Write down the fact family and ask your child to tell you the multiplication and division facts that can be made with the numbers.

Figure 1

Examples of Fact Families:

2, 4, 8	6, 7, 42	2, 5, 10	3, 5, 15
3, 6, 18	7, 8, 56	3, 9, 27	6, 8, 48
4, 5, 20	8, 9, 72	4, 6, 24	7, 9, 63
5, 6, 30	9, 10, 90	5, 7, 35	8, 12, 96

3. Explain the rules of the game to your child. He will be given a group of four numbers, three that make up a fact family and one that doesn't belong. He must correctly identify the number that doesn't belong and then state a multiplication fact using the numbers in the fact family. Set a timer for 2 minutes and begin. Encourage your child to work through as many “fact family strips” as possible in two minutes. At the end of two minutes, count the number of strips in which he correctly identified the fact family and stated a multiplication fact using the numbers.
4. Challenge your child to beat his record. For example, if he identified 8 fact families in 2 minutes, give him a new goal of identifying 10 fact families in two minutes. Set the timer and begin. Shorten the time to one minute and repeat the process. Continue shortening the time and setting new goals for your child.

You are trying to help your child be quick with these math facts, so that stating them becomes second nature to him.

This game can be on-going over several days. Keep track of the time and records your child sets identifying fact families. Each time, challenge him to beat his record. Reward him for beating his record. The key is to also challenge him enough so that beating his record has an intrinsic value.

Next Generation Sunshine State Standards: Grade 3, Big Idea/Supporting Idea & Benchmarks

BIG IDEA 1: Develop understandings of multiplication and division and strategies for basic multiplication facts and related division facts.

- **MA.3.A.1.1:** Model multiplication and division including problems presented in context: repeated addition, multiplicative comparison, array, how many combinations, measurement, and partitioning.
- **MA.3.A.1.2:** Solve multiplication and division fact problems by using strategies that result from applying number properties.
- **MA.3.A.1.3:** Identify, describe, and apply division and multiplication as inverse operations.

My Math Literature Connection

Description:

You will have volumes of mathematics fun as you explore fractions in the story.

Fraction Fun by David A. Adler and Nancy Tobin



The story reviews the definition of a fraction using the example of dividing a pizza, weighing coins to determine how many make one ounce and what the fractional value of each coin is.

Things to do:

- Work with your child in dividing all kinds of things into equal portions. You should work with fractions with a denominator of 2, 3, 4, 5, 6, 8, and 10 (see Math SSS benchmark listed below).

Next Generation Sunshine State Standards: Grade 3, Big Idea/Supporting Idea & Benchmarks

BIG IDEA 2: Develop an understanding of fractions and fraction equivalence.

- **MA.3.A.2.1:** Represent fractions, including fractions greater than one, using area, set and linear models.

At Grade 3, this benchmark will be assessed using multiple choice (MC) items, with the following distribution: 1/3 of the items represent fractional parts of an area model, 1/3 of the items represent fractional parts of a set of objects, and 1/3 of the items represent fractional parts of a linear model.

- Area models may include shapes such as circles and rectangles.
- Set models may include groups of objects such as counters or other objects familiar to Grade 3 students.
- Linear models may include number lines and fraction strips.
- Items may include fractions and mixed numbers up to and including the whole number 5.
- Items may include fractions with denominators from 1 through 10, 12, or 16

How Much Time Do You Spend on . . . ?

Adapted from Education.com

Description:

Have you ever wondered why you run out of time in the day? Do you want to get a better understanding of the daily activities of your family members and the amount of time they spend on them? Challenge your third-grader to help you figure out where the time goes by surveying members of your household and then use the data to create bar graphs representing each member's day. The results will probably surprise all of you!

Materials: paper, pencil, colored pencils or markers, graph paper (optional), markers (optional)
Family members and/or friends

Directions:

1. Explain to your child that she is conducting an "investigation" to determine the amount of time each member of the household spends on daily activities. With your third-grader, create a short survey to be completed by each family member. Help her brainstorm questions, such as:

How much time do you spend:

sleeping? _____
bathing / grooming? _____
eating? _____
driving? _____
working? _____
in school? _____
talking on the phone? _____
shopping? _____
watching television? _____
doing homework? _____
reading? _____
cooking? _____
cleaning? _____



Help type up the questionnaire and make enough copies for each person being interviewed. Beginning the next day, family members should accurately record the number of minutes they spend on each activity.

2. After all family members have completed their surveys, help your child tally the results and create bar graphs. Begin by making one bar graph for each family member. Label the horizontal axis with the activities from the survey and label the vertical axis with minutes (in ten-minute intervals). Encourage your child to shade in each activity with a different color and use the same colors on all of the graphs. For example, if "talking on the phone" is shaded in red on one person's graph, shade it in red on all of the graphs.
3. Extend the activity by asking your child to create one bar graph for each activity. Label the horizontal axis with names of family members and/or friends and the vertical axis with minutes (in ten-minute intervals). Use a different color for each family member.
4. Conclude the activity by holding a "family/friends meeting" during which your child will present the bar graphs and discuss the results of the investigation. It will now be revealed just who uses up all those cell phone minutes!

Extension:

Asked the people surveyed to predict who spends the most/least amount of time on each activity. They can write their predictions on the survey sheet next to each activity. At the family/friends meeting, everyone can check to see if their predictions were correct.

Next Generation Sunshine State Standards: Grade 3, Big Idea/Supporting Idea & Benchmarks

Supporting Idea 7: Data Analysis

- **MA.3.S.7.1:** Construct and analyze frequency tables, bar graphs, pictographs, and line plots from data, including data collected through observations, surveys, and experiments.

At Grade 3, this benchmark will be assessed using multiple choice (MC) items.

- Students may identify the correct display of a given set of data.
- Students will analyze and draw conclusions about data displayed in the form of frequency tables, bar graphs, pictographs, and line plots.
- Students will analyze data to supply missing data in frequency tables, bar graphs, pictographs, and line plots.

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