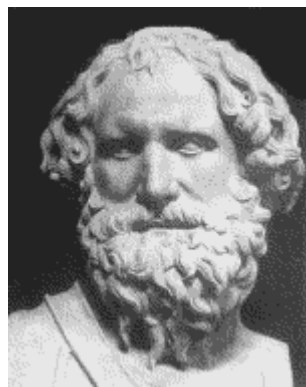


*Pythagoras*



*Archimedes*

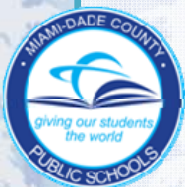


*Euclid*

# A MATHEMATICS Winter Number Land

Grade 7

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. The *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 assist you in applying the concepts you have studied. Additionally, each activity addresses a specific Next Generation Sunshine State Benchmark. 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 profound 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.

Included as part of this packet, is a link to the Miami-Dade County Public Schools Student Portal *Links to Learning* technology activities. Individualized student learning paths have been designed based on FCAT scores and are aligned to the District's Pacing Guides. These online activities are supplemental and, as such, are not to be assigned or graded. All online activities are provided as a resource to both parents and students to engage learning using technology. Please log on just as you do at your school.

### *Tips for A Mathematics Winter Number Land*

Read the activity and attempt to answer the questions that follow. The only rules are:

1. Make an earnest attempt to solve the problem. Record your attempts.
2. Be creative.
3. Don't give up. If you get stuck, look at the story and question a different way.
4. Discuss your story with your family.
5. HAVE FUN!

If you are in need of additional information about the *A Mathematics Winter Number Land* Winter Break Activity Packet, please contact the Division of Mathematics, Science, and Advanced Academics 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 ( $\pi$ ).

# Table of Contents

Welcome to <i>Mathematics Winter Number Land</i> .....	3
Who Were They? .....	4
Sensible Census Values .....	6
Density (Enrichment).....	11
Longitude and Latitude.....	14
Against the Odds?.....	17
My Food Pyramid .....	21

# Sensible Census Values

## World's Population Hits 6 Billion

By Robin Wright, Los Angeles Times Services

Reprinted from the Miami Herald July 17, 1999

Call this Y6B: The year of six billion, a milestone the world's population is expected to reach this weekend. The birth of the planet's six-billionth inhabitant, projected by the U.S. Census Bureau, also will mark another historic first: The world's population has doubled in less than 40 years.

Despite a gradual slowing of the overall rate of growth, the world population is still increasing by 78 million people a year. That's the equivalent of adding a city nearly the size of San Francisco every three days, or the combined populations of France, Greece and Sweden every year, according to a coalition of environmental and population groups.



"It took all of human history for the world's population to reach one billion in 1804, but little more than 150 years to reach three billion in 1960. Now, not quite 40 years later, we are twice that number," said Amy Coen, president of the coalition, called Population Action International.

Even with a decelerating growth rate, the number of humans on the planet could double again to 12 billion by 2050 if the current growth rate continues, the coalition projects.

The impact will be sweeping, the coalition predicts. "Every 20 minutes the world adds another 3,500 human lives but loses one or more entire species of animal or plant life—at least 27,000 species per year," it warns. In addition, at least 300 million people already live in regions with severe water shortages. By 2025 the number is expected to be three billion if current growth rates continue.

## Sensible Census Values

The population is expanding despite a “reproductive revolution” that has prompted half of the world’s married women to use family planning techniques, compared with an estimated 10 percent only 30 years ago, according to the International Planned Parenthood Federation in London. In 61 of the world’s 191 countries, women’s fertility rates have now dropped below the replacement level of 2.1 children per woman.

In the United States, the world’s third-largest country in population size after China and India, 71 percent of women use some form of family planning. The U.S. fertility rate, or average number of births per woman, has dropped to 1.96.

Yet the United States has the highest fertility rate among wealthy industrialized countries. And because of the “momentum” of population growth—it takes about 70 years for the population to stabilize after a nation reaches a replacement-level fertility rate of 2.1 births per woman—the United States is expected to double its population of 270 billion in 60 years if the current growth rate continues, according to Peter Kostmayer, national spokesman for Zero Population Growth and a former U.S. House member from Pennsylvania.

While the United States marks Y6B this weekend, the United Nations has designated Oct. 12 as the day for international commemoration of the population milestone. Despite the declining growth rate, so far the world has only reached about the halfway mark on the road to population stabilization, according to the coalition.



## Sensible Census Values

Directions: Read the article “World’s population hits 6 billion.” Match each number below with its equivalent form shown in the article above. You can underline the words in the article to help you identify them with the equivalent form below. Write the number as it appears in the article on the line beside its equivalent form.

- |   |  |
|---|--|
| <p>_____ <b>A.</b> <math>\frac{2^4 3^1 5^1}{2^2}</math></p> | <p>_____ <b>K.</b> <math>\sqrt{1600}</math></p>      |
| <p>_____ <b>B.</b> <math>\frac{10,125}{5}</math></p>        | <p>_____ <b>L.</b> .1</p>                            |
| <p>_____ <b>C.</b> 6,000,000,000</p>                        | <p>_____ <b>M.</b> <math>7.8 \times 10^7</math></p>  |
| <p>_____ <b>D.</b> <math>5 \cdot 7 \cdot 10^2</math></p>    | <p>_____ <b>N.</b> <math> 150 - 2200 </math></p>     |
| <p>_____ <b>E.</b> <math>\frac{0}{270}</math></p>           | <p>_____ <b>O.</b> <math>3 + 10 \cdot 5</math></p>   |
| <p>_____ <b>F.</b> 71%</p>                                  | <p>_____ <b>P.</b> <math>\frac{21}{10}</math></p>    |
| <p>_____ <b>G.</b> <math>6 \cdot 10^9</math></p>            | <p>_____ <b>Q.</b> <math>30^3</math></p>             |
| <p>_____ <b>H.</b> 1,000,000,000</p>                        | <p>_____ <b>R.</b> twelve</p>                        |
| <p>_____ <b>I.</b> forty</p>                                | <p>_____ <b>S.</b> <math>\frac{4}{8}</math></p>      |
| <p>_____ <b>J.</b> <math>\sqrt{4900}</math></p>             | <p>_____ <b>T.</b> <math>\frac{14^2}{100}</math></p> |



## Sensible Census Values

1. In the year 2050, the population of the earth will be twelve billion people. Write this number in scientific notation.

- A.  $1.2 \times 10^9$
- B.  $1.2 \times 10^{10}$
- C.  $12 \times 10^9$
- D.  $12 \times 10^{10}$

2. Victor calculated the distance from his house to the movie theater. He found the distance to be  $\sqrt{50}$ . Which of the following is equivalent to this value?

- A.  $2\sqrt{5}$
- B. 5
- C.  $5\sqrt{2}$
- D. 25

3. Use the clues to decide which number is the secret number?

Clue 1: I am less than 0.5

Clue 2: I am not equal to 0.75

Clue 3: If you multiply me by 2, you get a number less than 1

Clue 4: My denominator is a prime number

What's the number? \_\_\_\_\_

# Sensible Census Values

## **BENCHMARKS:**

### **MA.7.A.1.2**

- Solve percent problems, including problems involving discounts, simple interest, taxes, tips and percents of increase or decrease.

### **MA.7.A.3.2**

- Add, subtract, multiply, and divide integers, fractions, and terminating decimals, and perform exponential operations with rational bases and whole number exponents including solving problems in everyday contexts.

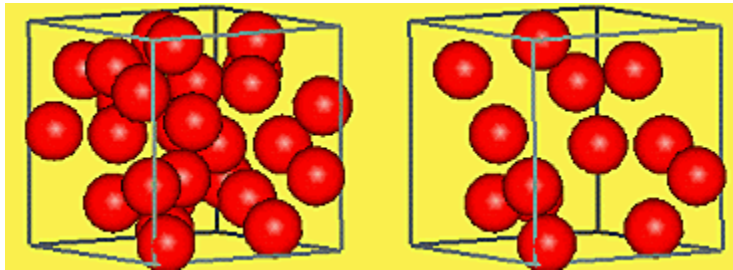
### **MA.7.A.5.1**

- Express rational numbers as terminating or repeating decimals.

# Density

*Adapted from Holt Mathematics Course 1*

Take a look at the two boxes below. Each box has the same volume. ***If each ball has the same mass, which box would weigh more? Why?***



The box that has more balls has more mass per unit of volume. This property of matter is called density. The density of a material helps to distinguish it from other materials. Since mass is usually expressed in grams and volume in cubic centimeters, density is expressed in grams/cubic centimeter.

**DENSITY** is a physical property of matter, as each element and compound has a unique density associated with it. Density defined in a qualitative manner as the measure of the relative "heaviness" of objects with a constant volume.

For example: A rock is obviously more dense than a crumpled piece of paper of the same size.

A styrofoam cup is less dense than a ceramic cup.

Density may also refer to how closely "packed" or "crowded" the material appears to be - again refer to the styrofoam vs. ceramic cup.

The formal definition of density is mass per unit volume. Usually the density is expressed in grams per mL or cc. Mathematically a "per" statement is translated as a division. cc is a cubic centimeter and is equal to a mL Therefore,

$$\text{Density} = \frac{\text{mass}}{\text{volume}} = \text{g/mL}$$

# Density

Adapted from Holt Mathematics Course 1

The density of a substance is a measure of its mass per unit of volume. The density of a particular substance is always the same. The formula for density  $D$  is the mass  $m$  of a substance divided by its volume  $V$ , or  $D = m/v$

- 1) Find the volume of each substance in the table.

Rectangular Prisms					
Substance	Length (cm)	Width (cm)	Height (cm)	Mass (g)	Volume (cm <sup>3</sup> )
Copper	2	1	5	89.6	
Gold	$\frac{2}{3}$	$\frac{3}{4}$	2	19.32	
Iron pyrite	0.25	2	7	17.57	
Pine	10	10	3	120	
Silver	2.5	4	2	210	

- 2) Calculate the density of each substance.

Rectangular Prisms					
Substance	Length (cm)	Width (cm)	Height (cm)	Mass (g)	Density (g/cm <sup>3</sup> )
Copper	2	1	5	89.6	
Gold	$\frac{2}{3}$	$\frac{3}{4}$	2	19.32	
Iron pyrite	0.25	2	7	17.57	
Pine	10	10	3	120	
Silver	2.5	4	2	210	

- 3) Water has a density of 1 g/cm<sup>3</sup>. A substance whose density is less than that of water will float. Which of the substances in the table will float in water?

\_\_\_\_\_

- 4) A fresh egg has a density of approximately 1.2 g/cm<sup>3</sup>. A spoiled egg has a density of about 0.9 g/cm. How can you tell whether an egg is fresh without cracking it open?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

# Density

*Adapted from Holt Mathematics Course 1*

- 5) Alicia has a solid rectangular prism of a substance she believes is gold. The dimensions of the prism are 2 cm by 1 cm by 2cm, and the mass is 20.08 g. Is the substance that Alicia has gold? Explain.

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- 6) In a science lab, you are given a prism of copper. You determine that its dimensions are 4 cm, 2 cm, and 6 cm. Without weighing the prism, how can you determine its mass? Explain your answer.

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- 7) **Challenge** – A solid rectangular prism of silver has a mass of 84 g. What are some possible dimensions of the prism?

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**BENCHMARK:**

**MA.7.G.2.1**

Justify and apply formulas for surface area and volume of pyramids, prisms, cylinders, and cones.

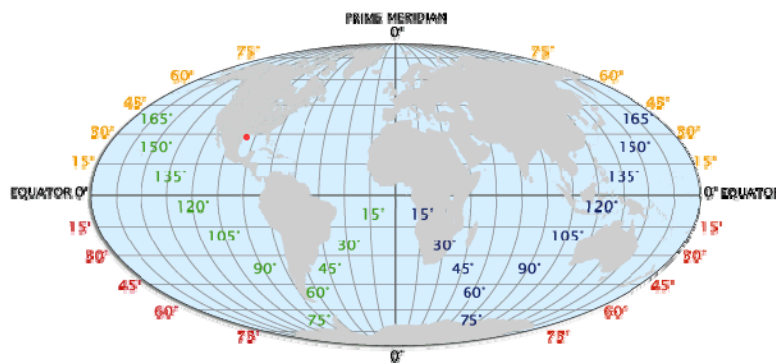
# Longitude and Latitude

*Adapted from Holt Mathematics Course 1*

A key geographical question throughout the human experience has been, "Where am I?" In classical Greece and China, attempts were made to create logical grid systems of the world to answer this question. The ancient Greek geographer Ptolemy created a grid system and listed the coordinates for places throughout the known world in his book Geography. But it wasn't until the middle ages that the latitude and longitude system was developed and implemented. This system is written in degrees, using the symbol  $^{\circ}$ .

## Latitude

When looking at a map, latitude lines run horizontally. Latitude lines are also known as parallels since they are parallel and are an equal distant from each other. Each degree of latitude is approximately 69 miles (111 km) apart; there is a variation due to the fact that the earth is not a perfect sphere but an oblate ellipsoid (slightly egg-shaped). To remember latitude, imagine them as the horizontal rungs of a ladder ("ladder-tude"). Degrees latitude are numbered from  $0^{\circ}$  to  $90^{\circ}$  north and south. Zero degrees is the equator, the imaginary line which divides our planet into the northern and southern hemispheres.  $90^{\circ}$  north is the North Pole and  $90^{\circ}$  south is the South Pole.



## Longitude

The vertical longitude lines are also known as meridians. They converge at the poles and are widest at the equator (about 69 miles or 111 km apart). Zero degrees longitude is located at Greenwich, England ( $0^{\circ}$ ). The degrees continue  $180^{\circ}$  east and  $180^{\circ}$  west where they meet and form the International Date Line in the Pacific Ocean. Greenwich, the site of the British Royal Greenwich Observatory, was established as the site of the **Prime Meridian** by an international conference in 1884.

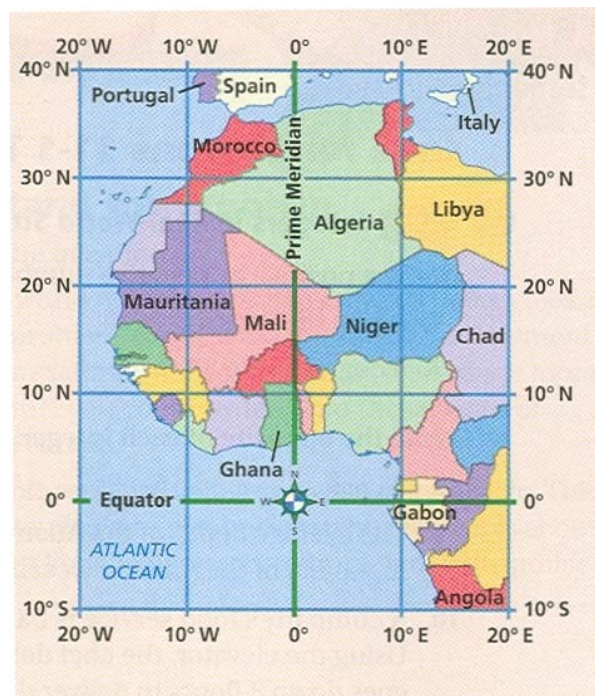
# Longitude and Latitude

*Adapted from Holt Mathematics Course 1*

We use a coordinate system on Earth to find exact locations. The *equator* is like the *x*-axis, and the ***prime meridian*** is like the *y*-axis.

The lines that run east-west are *lines of latitude*. They are measured in degrees north and south of the equator.

The lines that run north-south are *lines of longitude*. They are measured in degrees east and west of the prime meridian.



1. In what country is the location of  $0^\circ$  latitude,  $10^\circ$  E longitude?

\_\_\_\_\_

2. Give the coordinates of location in Algeria.

\_\_\_\_\_

3. Name two countries that lie along the  $30^\circ$  N line of latitude.

\_\_\_\_\_

4. Where would you be if you were located at  $10^\circ$  S latitude,  $10^\circ$  W longitude?

# Longitude and Latitude

*Adapted from Holt Mathematics Course 1*

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5. How is the coordinate system we use to locate places on Earth different from the coordinate plane? How is it similar?

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5. Begin at  $10^{\circ}$  S Latitude,  $20^{\circ}$  E longitude. Travel  $40^{\circ}$  north and  $20^{\circ}$  west. What country would you be in now?

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**BENCHMARK:**

**MA.7.G.4.3**

Identify and plot ordered pairs in all four quadrants of the coordinate plane.





# Against the Odds?

Adapted from PEARSON Prentice Hall

## ACTIVITY PAGE 1

Let's check that claim

### Steps Directions

1. Gather the following materials: compass, ruler, calculator  
Figure 1 (on activity page 2) shows the basket from above. Shots A, B, and C just barely touch the rim.
  - Copy Figure 1. Draw a circle centered on point P that connects the centers of the balls. A, B, and C. This is the landing zone. The center of the ball is within this circle for each shot.
  - Research: Find the radius of a men's basketball and of a basketball hoop. Calculate the area of the landing zone.
2. A "swish" shot passes through the net without touching the rim. Figure 2 shows ball D swishing through the net, falling just within the rim.
  - Copy Figure 2. Draw two more balls (E and F) that also fall just within the rim.
  - Draw a circle centered on point P that connects the centers of balls within the circle every time the ball "swishes" the net.
  - Calculate the area of the target zone.
3. Suppose you are shooting baskets at random. Find the probability that a ball hitting the landing zone will also be in the target zone as follows

$$\text{Probability of "swish"} = \frac{\text{Area of target zone}}{\text{Area of landing zone}}$$

Calculate the probability. Convert it to a percent.

- Calculate the probability of making a free-throw when the only baskets that count are swishes. Assume all shots hit the landing zone.

# Against the Odds?

Adapted from PEARSON Prentice Hall

## ACTIVITY PAGE 2

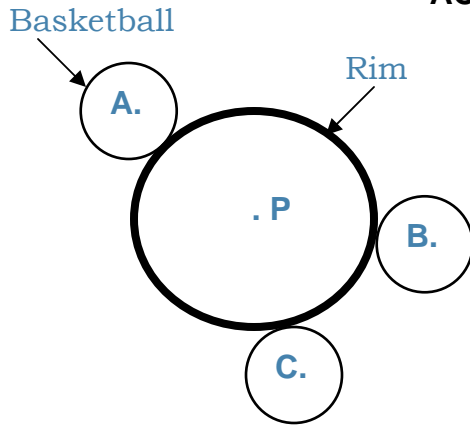


Figure 1

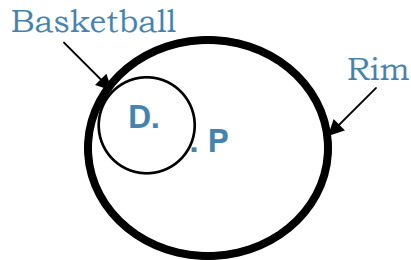


Figure 2

Your answer:

Is some one who has a 30% success rate great at making free throws? Explain.

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# Against the Odds?

*Adapted from PEARSON Prentice Hall*

## **BENCHMARKS:**

### **MA.7.P.7.1**

Determine the outcome of an experiment and predict which events are likely or unlikely, and if the experiment is fair or unfair.

### **MA. 7.P.7.2**

Determine, compare, and make predictions based on experimental or theoretical probability of independent or dependent events.

# MY FOOD PYRAMID

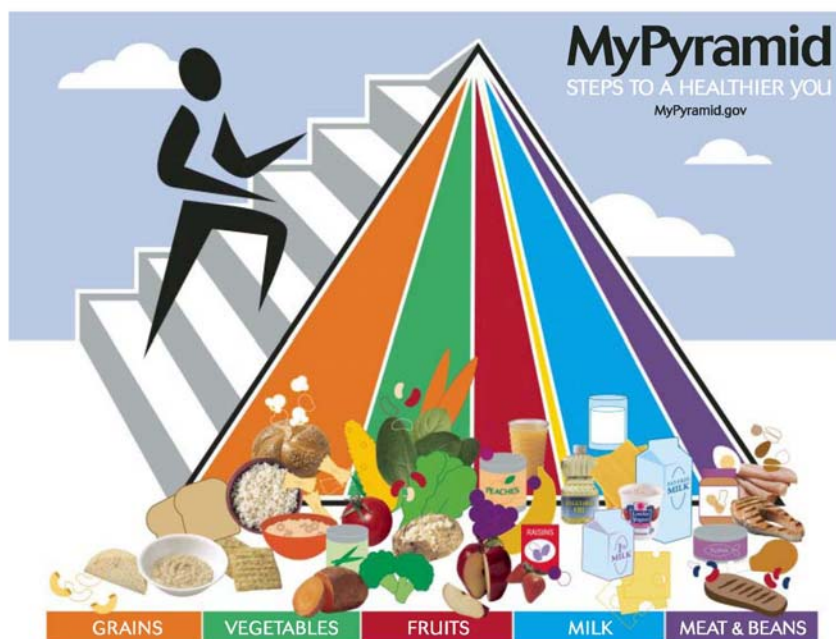
Your food and physical activity choices each day affect your health—how you feel today, tomorrow, and in the future. The Dietary Guidelines for Americans, 2005, gives science-based advice on food and physical activity choices for health.

## **What is a "Healthy Diet"?**

The Dietary Guidelines describe a **healthy diet** as one that

- Emphasizes fruits, vegetables, whole grains, and fat-free or low-fat milk and milk products;
- Includes lean meats, poultry, fish, beans, eggs, and nuts; and
- Is low in saturated fats, trans fats, cholesterol, salt (sodium), and added sugars.
- The recommendations in the Dietary Guidelines and in **MyPyramid** are for the general public over 2 years of age.

The recommendations in the Dietary Guidelines and in **MyPyramid** are for the general public over 2 years of age.



A healthful lifestyle is easier than you might think. The path to good health isn't the same for everyone and yours may change over time. To travel down your personal path, take small steps that are right for you, one at a time. Every step adds up, so you'll reach your health goals before you know it. One easy step is to know what is in the nutritional facts about your favorite cereals. Nutrition facts such as total fat, cholesterol, dietary fiber and sugars are printed on the side of every cereal box.

In this activity, you will record the nutrition facts of several cereals and create stem-and-leaf plots. You will then find the measures of central tendencies for the nutrition facts that you record.

# MY FOOD PYRAMID

## ACTIVITY SHEET

Use at least five cereal boxes to complete the tables about the nutritional facts found on the side of the boxes. Then use the information to find the measures of central tendencies, mean median, mode and range.

Name of Cereal	Total Fat

**Stem** | **Leaf**

Find the mean, median, mode and range for the total fat.

**Mean:** \_\_\_\_\_ **Median:** \_\_\_\_\_ **Mode:** \_\_\_\_\_ **Range:** \_\_\_\_\_

Name of Cereal	Cholesterol

**Stem** | **Leaf**

Find the mean, median, mode and range for the Cholesterol.

**Mean:** \_\_\_\_\_ **Median:** \_\_\_\_\_ **Mode:** \_\_\_\_\_ **Range:** \_\_\_\_\_

# MY FOOD PYRAMID

## ACTIVITY SHEET

Record the nutritional facts found on the side of the boxes and then find the measures of central tendencies, mean median, mode and range.

Name of Cereal	Dietary Fiber

**Stem** | **Leaf**

Find the mean, median, mode and range for the dietary fiber.

**Mean:** \_\_\_\_\_ **Median:** \_\_\_\_\_ **Mode:** \_\_\_\_\_ **Range:** \_\_\_\_\_

Name of Cereal	Sugar

**Stem** | **Leaf**

Find the mean, median, mode and range for the sugar.

**Mean:** \_\_\_\_\_ **Median:** \_\_\_\_\_ **Mode:** \_\_\_\_\_ **Range:** \_\_\_\_\_

# MY FOOD PYRAMID

**BENCHMARK:**

**MA.7.S.6.2**

Construct and analyze histograms, *stem-and-leaf plots*, and circle graphs.



## **ANTI-DISCRIMINATION POLICY**

### **Federal and State Laws**

The School Board of Miami-Dade County, Florida adheres to a policy of nondiscrimination in employment and educational programs/activities and strives affirmatively to provide equal opportunity for all as required by law:

**Title VI of the Civil Rights Act of 1964** - prohibits discrimination on the basis of race, color, religion, or national origin.

**Title VII of the Civil Rights Act of 1964**, as amended - prohibits discrimination in employment on the basis of race, color, religion, gender, or national origin.

**Title IX of the Educational Amendments of 1972** - prohibits discrimination on the basis of gender.

**Age Discrimination in Employment Act of 1967 (ADEA)**, as amended - prohibits discrimination on the basis of age with respect to individuals who are at least 40.

**The Equal Pay Act of 1963**, as amended - prohibits gender discrimination in payment of wages to women and men performing substantially equal work in the same establishment.

**Section 504 of the Rehabilitation Act of 1973** - prohibits discrimination against the disabled.

**Americans with Disabilities Act of 1990 (ADA)** - prohibits discrimination against individuals with disabilities in employment, public service, public accommodations and telecommunications.

**The Family and Medical Leave Act of 1993 (FMLA)** - requires covered employers to provide up to 12 weeks of unpaid, job-protected leave to "eligible" employees for certain family and medical reasons.

**The Pregnancy Discrimination Act of 1978** - prohibits discrimination in employment on the basis of pregnancy, childbirth, or related medical conditions.

**Florida Educational Equity Act (FEEA)** - prohibits discrimination on the basis of race, gender, national origin, marital status, or handicap against a student or employee.

**Florida Civil Rights Act of 1992** - secures for all individuals within the state freedom from discrimination because of race, color, religion, sex, national origin, age, handicap, or marital status.

Veterans are provided re-employment rights in accordance with P.L. 93-508 (Federal Law) and Section 295.07 (Florida Statutes), which stipulates categorical preferences for employment.

Revised 9/2008