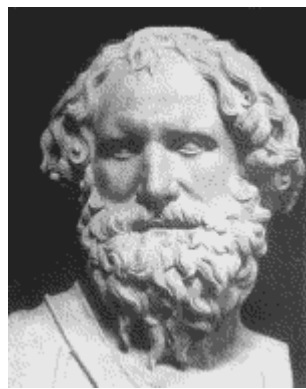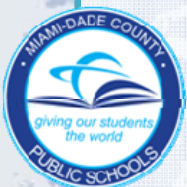Pythagoras   Archimedes   Euclid

A
MATHEMATICS
Winter Number Land

ANSWER KEY

Grade 7

Winter 2011-2012

Miami-Dade County Public Schools
Curriculum & Instruction

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 (π).

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 from below. Write the number as it appears in the article on the line beside its equivalent form.

In 60 years
_____

A. $\dfrac{2^4 3^1 5^1}{2^2}$

By 2025
_____

B. $\dfrac{10,125}{5}$

Six billion
_____

C. 6,000,000,000

3500 human
_____

D. $5 \cdot 7 \cdot 10^2$

zero
_____

E. $\dfrac{0}{270}$

71 percent
_____

F. 71%

6 billion
_____

G. $6 \cdot 10^9$

1 billion
_____

H. 1,000,000,000

less than 40
_____

I. forty

about 70 years
_____

J. $\sqrt{4900}$

40 years later
_____

K. $\sqrt{1600}$

10 percent
_____

L. .1

78 million
_____

M. 7.8×10^7

2050 (year)
_____

N. $|150 - 2200|$

53
_____

O. $3 + 10 \cdot 5$

2.1 births
_____

P. $\dfrac{21}{10}$

27,000 species
_____

Q. 30^3

12 billion
_____

R. twelve

two
_____

S. $\dfrac{4}{8}$

dropped to 1.96
_____

T. $\dfrac{14^2}{100}$

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. 1.2×10^9
   B. 1.2×10^{10}
   C. 12×10^9
   D. 12×10^{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? _____ **1/3** _____

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 (cm³)
Copper	2	1	5	89.6	**10**
Gold	²/₃	¾	2	19.32	**1**
Iron pyrite	0.25	2	7	17.57	**3.5**
Pine	10	10	3	120	**300**
Silver	2.5	4	2	210	**20**

2) Calculate the density of each substance.

Rectangular Prisms					
Substance	Length (cm)	Width (cm)	Height (cm)	Mass (g)	Density (g/cm³)
Copper	2	1	5	89.6	**896**
Gold	²/₃	¾	2	19.32	**19.32**
Iron pyrite	0.25	2	7	17.57	**5.02**
Pine	10	10	3	120	**0.4**
Silver	2.5	4	2	210	**10.5**

3) Water has a density of 1 g/cm³. A substance whose density is less than that of water will float. Which of the substances in the table will float in water?

Pine

4) A fresh egg has a density of approximately 1.2 g/cm³. A spoiled egg has a density of about 0.9 g/cm³. How can you tell whether an egg is fresh without cracking it open?

Divide the mass by the volume to find the density. If the volume is less than 1 g/cm³ the egg is spoiled

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.

The mass of gold is 19.32 g/cm^3. Alicia's substance is not gold because it is

5.2 g/cm^3

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.

Calculate the volume and multiply by the density of copper (896 g/cm^3)

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

The approximate volume is 8 cm^3 so the dimension could be:

**2 cm, 2 cm, and 2 cm or 4 cm, 2 cm and 1 cm.**

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.
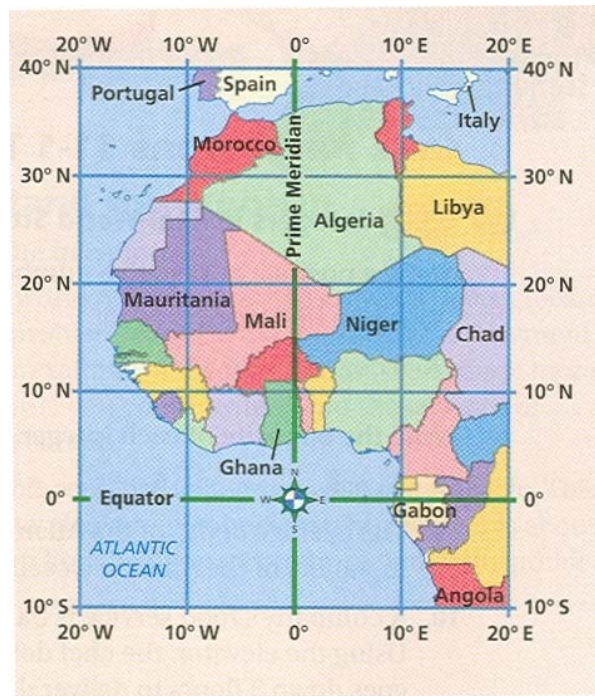
1.   In what country is the location of 0° latitude, 10° E longitude?

      Gabon

2.   Give the coordinates of location in Algeria.

      0° latitude, 30° N longitude

3.   Name two countries that lie along the 30° N line of latitude.

      Morocco, Algeria, and Lybia

4.   Where would you be if you were located at 10° S latitude, 10° W longitude?

      The Atlantic Ocean

Longitude and Latitude
Adapted from Holt Mathematics Course 1

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

Answers will vary

Similar: Grid, Two points to locate a point

Difference: Degrees, North, South, East, West

5. Begin at 10° S Latitude, 20° E longitude. Travel 40° north and 20° west. What country would you be in now?
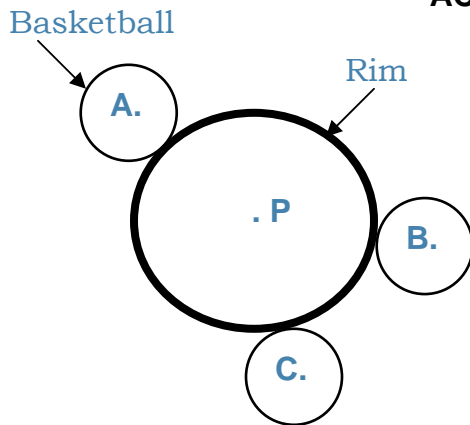
Algeria

Against the Odds?

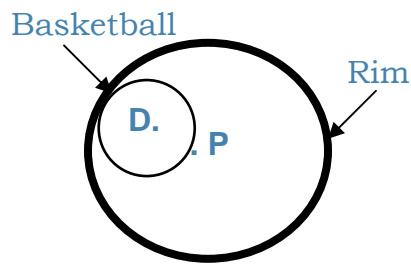Basketball

Rim

A.

. P

B.

C.

Figure 1

Basketball

Rim

D.

. P

Figure 2

Your answer:

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

No. Explanations will vary.

_____

_____

_____

_____

_____

MY FOOD PYRIMAD

ANSWERS WILL VARY

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.

SAMPLE ANSWER

Name of Cereal	Total Fat
Cherrios	2 g
Froot Loops	1 g
Lucky Charms	1 g
Honey Nut	1 g
Total	1 g

Stem	Leaf
	1, 1, 1, 1, 2

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

Mean: **1.2**   Median: **1**   Mode: **1**   Range: **1**

Stem	Leaf

Name of Cereal	Cholesterol

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

Mean: _____   Median: _____   Mode: _____   Range: _____

MY FOOD PYRIMAD

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.

Stem | Leaf

Name of Cereal	Dietary Fiber

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

Mean: _____ **Median:** _____ **Mode:** _____ **Range:** _____

Stem | Leaf

Name of Cereal	Sugar

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

Mean: _____ **Median:** _____ **Mode:** _____ **Range:** _____

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