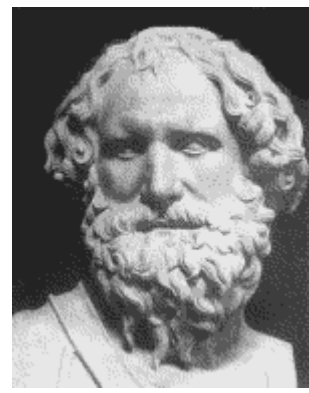


Pythagoras



Archimedes



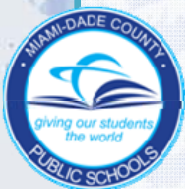
Euclid

A
MATHEMATICS
Winter
Number Land

ANSWER KEY

Grade 6

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 *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?

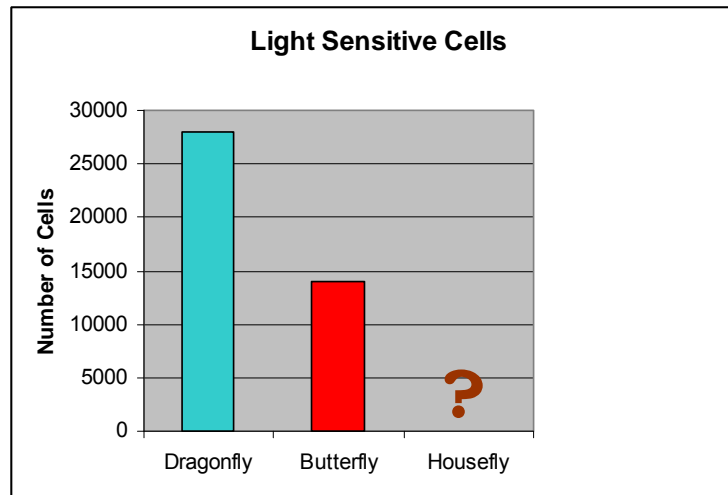
Pythagoras was a Greek mathematical genius and often described as the first pure mathematician. He invented the Pythagorean Theorem which states that: "In any right triangle, the area of the square whose side is the hypotenuse (the side of a right triangle opposite the right angle) is equal to the sum 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).

The Largest Animal Group – Arthropods



1. Centipedes have 2 legs per segment. The record number of legs on a millipede is 752. Find a range for the number of segments a centipede can have.

About 90 segments (millipedes have 4 legs per segment)

2. A dragonfly has 7 times as many light-sensitive cells as a housefly. How many of these cells does a housefly have?

3229 light sensitive cells

3. Find how many times more light-sensitive cells a dragonfly has than a butterfly.

About twice as many

4. A trapdoor spider can pull with a force that is 140 times its own weight. What other information would need to find the spider's weight? Explain.

The maximum weight of the object that the spider can pull

5. There are about 6 billion humans in the world. Scientists estimate that there are a billion billion arthropods in the world. About how many times larger is the arthropods population than the human population?

About 100 million times

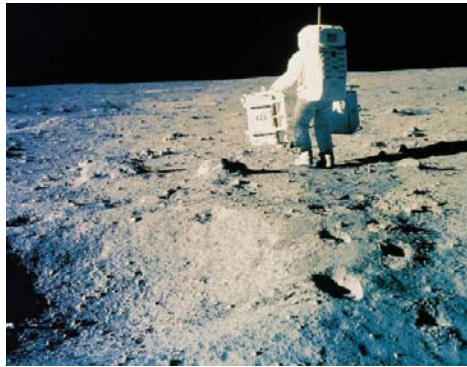
The Language of Algebra

ACTIVITY SHEET

1. In a certain rectangle, the length is 10 inches more than the width. Complete the table below:



Width (in.)	5	11	24	15	w	n - 10	x + 21
Length (in.)	15	21	34	25	w + 10	n	x + 31



2. Astronauts who travel to the moon weigh six times as much on Earth as they weigh on the moon. Complete the table below:

Weight on moon (pounds)	10	30	50	n	2n	$X \div 6$
Weight on Earth (pounds)	60	180	300	6n	12n	X

3. An apartment rents for \$800 a month. The monthly rent is expected to increase \$15 each year. What will be the rent at the end of 9 years?

\$920



The Language of Algebra

ACTIVITY SHEET

4. In 2002, the first class rate was changed to 37¢ for the first ounce of mail and 23¢ for each additional ounce. A chart showing the postage for weight up to 5 ounces is shown below. What is the cost for an 8 ounce letter?



Weight	1 oz.	2 oz.	3 oz.	4 oz.	5 oz.	6 oz.	7 oz.	8 oz.
Postage	\$.37	\$.60	\$.83	\$1.06	\$1.29	\$1.52	\$1.75	\$1.98

5. The input and output values are listed in the table below. What is the rule for this set of values?

Input	3	4	5	6	7	8
Output	12	14	16	18	20	22

$$\underline{\text{Output} = 2 \times \text{Input} + 6}$$

6. Determine the pattern.

- a. 1, 2, 3, 4, 5, 6, 7
b. 1, 3, 5, 7, 9, 11, 13
c. 2, 4, 6, 8, 10, 12, 14
d. 7, 6.3, 5.6, 4.9, 4.2, 3.5, 2.8
e. 5, 13, 21, 29, 37, 45, 53
f. 24, 12, 6, 3, 1.5, .75, .375
-

FRACTIONS - DECIMALS – PERCENTS

Adopted from NCTM Journal "Mathematics teaching in the Middle Schools", August 2007

ACTIVITY SHEET

Use four or more colors to create a boat, car, ship or any other inanimate object in the grid of 100 squares below. Then use the Color Table to record the number of times you used a color in making your picture. Then change the value to its equivalent fractional, decimal and percent forms.

Reminder: Blank spaces are considered white.

PICTURES WILL VARY									

Color Table

Color	Number	Fraction	Decimals	Percent
ANSWERS WILL VARY				

FRACTIONS - DECIMALS – PERCENTS

Adopted from NCTM Journal "Mathematics teaching in the Middle Schools", August 2007

ACTIVITY SHEET

Fill in the missing percent, decimal, and/or fraction for each of the following:

	Number of Squares out of 100	Fraction	Decimal	Percent	Equivalent Dollar Amount
1	75	$\frac{3}{4}$	0.75	75%	\$0.75
2	20	$\frac{1}{5}$	0.2	20%	\$0.20
3	30	3/10	0.3	30%	\$0.30
4	48	$\frac{12}{25}$	0.48	48%	\$0.48
5	60	3/5	0.6	60%	\$0.60
6	37	37/100	0.37	37%	\$0.37
7	56	14/25	0.56	56%	\$0.56
8	44	11/25	0.44	44%	\$0.44
9	92	$\frac{23}{25}$	0.92	92%	\$0.92
10	70	$\frac{7}{10}$	0.7	70%	\$0.70
11	91	91/100	0.91	91%	\$0.91

Explain how you would change a fraction to a percent, decimal, and equivalent dollar amount:

Write a fraction as a percent is to divide its numerator by its denominator, then convert the resulting decimal to a percent.

To convert a fraction to a decimal, divide its numerator by its denominator.

TANGRAMS

Area and Perimeter with Tangrams

- 1) If the area of the composite square (all seven pieces -- see below) is one unit, find the area of each of the separate pieces in terms of the area of the composite square.

Piece #	area
1	$\frac{1}{4}$
2	$\frac{1}{4}$
3	$\frac{1}{8}$
4	$\frac{1}{16}$
5	$\frac{1}{16}$
6	$\frac{1}{8}$
7	$\frac{1}{8}$

- 2) If the smallest triangle (piece #4 or #5) is the unit for area, find the area of each of the separate pieces in terms of that triangle.

Piece #	area
1	2
2	2
3	1
4	$\frac{1}{2}$
5	$\frac{1}{2}$
6	1
7	1

TANGRAMS

Area and Perimeter with Tangrams (Continued)

- 3) If the smallest square (piece #6) is the unit for area, find the area of each of the separate pieces in terms of that square. Enter your findings in the table below.
- 4.) If the side of the small square (piece #6) is the unit of length, find the perimeter of each piece and enter your findings in the table.

Piece #	area
1	2
2	2
3	1
4	$\frac{1}{2}$
5	$\frac{1}{2}$
6	1
7	1







TANGRAMS

SAMPLE ANSWERS

Spatial Problem Solving with Tangrams

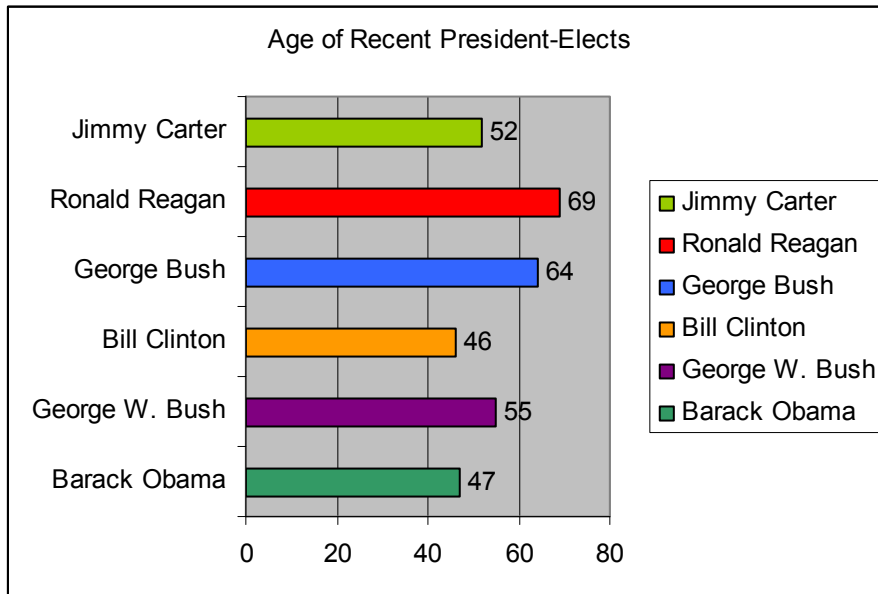
Use the number of pieces in the first column to form each of the geometric figures that appear in the top of the table. Make a sketch of your solution(s). Some have more than one solution while some have no solution.

Make These Polygons

Use this many pieces	 Square	 Rectangle	 Triangle	 Trapezoid	 Trapezoid	 Parallelogram
2	1 & 2 or 4 & 5		1 & 2 or 4 & 5	5 & 6	5 & 7 or 4 & 7	1 & 2 or 4 & 5
3	3, 4, & 5					
4						
5						
6						
7	1, 2, 3, 4, 5, 6, & 7		1, 2, 3, 4, 5, 6, & 7			1, 2, 3, 4, 5, 6, & 7

WHAT'S MY MEAN?

The chart below shows the age at which each winning candidate for President of the United States was elected.



1. Find the measures of central tendency for the data above:

Mean 55.5

Median 53.5

Mode None

Range 23

2. Jorge says that the mean of the data set below is 23.5. Describe Jorge's Error.

Age of Miami Hurricane Students	25	20	21	22	25	25
---------------------------------	----	----	----	----	----	----



Jorge calculated the median which is 23.5 instead of the mean which is 23.

WHAT'S MY MEAN?

3. The four states with the longest coastlines are Alaska, Florida, California, and Hawaii. Alaska's coastline is 6,640 miles. Florida's coastline is 1,350 miles. California's coastline is 840 miles and Hawaii's 750 miles. Find the mean, median, and modes of the lengths with and without Alaska's coastline and explain the changes.

With Alaska's Coastline:

2,395

Mean

1,095

Median

None

Mode

Without Alaska's Coastline:

980

Mean

840

Median

None

Mode

Explain the changes:

Both the mean and mode were reduced with the removal of Alaska.

4. In the Super Bowl from 1997 to 2007, the winning team won by a mean of $12\frac{1}{6}$ points. By how many points did the Green Bay Packers win in 1997?

Year	Super Bowl Champion	Points Won By
2002	New England Patriots	3
2001	Baltimore Ravens	27
2000	St. Louis Rams	7
1999	Denver Broncos	15
1998	Denver Broncos	7
1997	Green Bay Packers	?

Green Bay Packers points: 14

Explain how you calculated Green Bay Points :

With G as a variable, write the sum of G and the other scores and divide by 6 (total teams). Set the expression equal to $12\frac{1}{6}$ and solve for G .

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