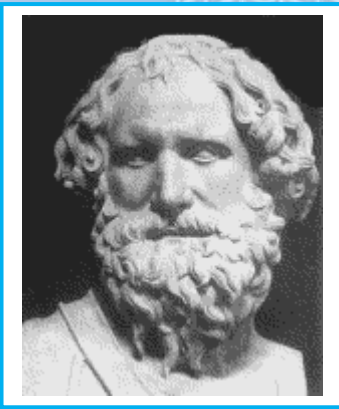


Pythagoras



Archimedes



Euclid

A
MATHEMATICS
Winter
Number Land

Grade K

Winter 2011-2012
Answer Key



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).

Beans Add Up!

Adapted from Education.com

Description:

In this simple game, children are writing number sentences and practicing addition.

Materials:

Activity 1: large lima beans, blue marker, small cup (3-ounce bathroom cups), small index cards or sheets of paper, pencil, 1 blue crayon, stapler or heavy string

Activity 2: two different color dry beans, small cup (e.g., 3-ounce bathroom cups), small index cards or sheets of paper, 1 black and 1 red crayon, and stapler or heavy string

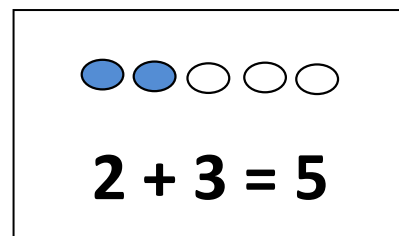
Directions:

Before starting the game, mark the lima beans with the blue marker on one side only. When you're finished, one side of each bean should be blue and the other side should be white. Here we go:

1. Ask your child to place five beans in the paper cup; shake the cup to mix up the beans, and then toss the beans onto the table.
2. Ask him to draw the total number of beans he sees on a piece of paper or index card, and then color them according to the beans' colors; for example, if the toss shows 4 beans facing blue side up, and 1 bean white side up, he should color 4 beans blue and leave one not colored in (representing white).



3. Repeat step 3, encouraging her to continue tossing the five beans from the cup, until he thinks he's discovered all the ways to make 5.
4. Stack the pages or index cards and bind them together with string or staples to make a book showing all the different ways to make the number 5.
5. For each page or index card, ask your child to write the number sentence that matches the picture on its bottom (# blue beans and # white beans, # beans in all). For example,



Answers: (six papers or index cards)

○ ○ ○ ○ ○ $0 + 5 = 5$

● ○ ○ ○ ○ $1 + 4 = 5$

● ● ○ ○ ○ $2 + 3 = 5$

● ● ● ○ ○ $3 + 2 = 5$

● ● ● ● ○ $4 + 1 = 5$

● ● ● ● ● $5 + 0 = 5$

Optional:

- You can repeat the above activity by changing the quantity of beans until you get all the way up to 10.

Part 2: Answers will vary, depending on what beans are scooped up.

First, place the two different color dry beans bags in a bowl. Mix the beans.

6. Ask your child to scoop up beans in the paper cup and then toss the contents onto the table.
7. Ask him to sort the two beans in two separate rows next to each other, leaving a space in between:



8. Give him a crayon and ask him to draw the total number of beans he sees on a piece of paper or index card, then color them in according to the beans' colors. For example, if your child's toss shows 8 black beans and 2 red beans, he should color 8 black beans and 2 red beans on the index card or paper.
9. Ask him to write the addition sentence that matches each picture on its bottom; for example, $8 + 2 = 10$.
10. Repeat step 3, encouraging him to discover other sums.

This activity touches upon some content of the following standards:

Common Core State Standards: Grade K; Domain, Cluster & Standards

Domain: Operations and Algebraic Thinking (**K.OA**).

Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.

1. Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations. (**K.OA.1**)
2. Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem. (**K.OA.2**)
3. Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g., $5 = 2 + 3$ and $5 = 4 + 1$). (**K.OA.3**)
4. For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or equation. (**K.OA.4**)
5. Fluently add and subtract within 5. (**K.OA.5**)

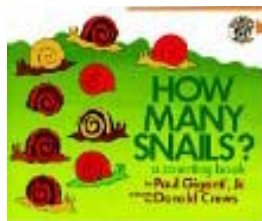
My Math Literature Connection

This activity has literature connections to enhance literacy and mathematics skills. The local public library is a good resource to find the recommended books.

Description:

You will have volumes of mathematics fun as you explore counting in the stories.

How Many Snails? by Paul Giganti, Jr.



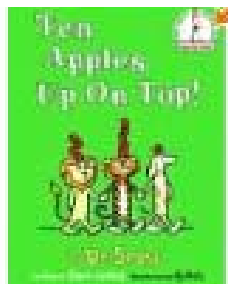
The author asks students to wander along with him in the meadow. He asks questions on each page, such as, "How many flowers are in the meadow?" and "How many flowers are yellow?" Simple questions ask children for specific details; you will explore different attributes, encouraging visual analysis.

Answers: will vary depending on questions.

Talking points-

- Your child can ask questions about pictures on the page.
- Explore the answers to the questions on each page.

Ten Apples Up On Top by Theodore Le Seig (Dr. Seuss)



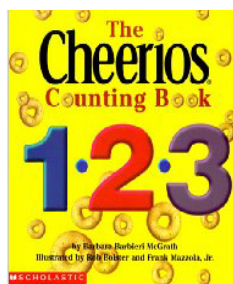
In the story, a lion, tiger, and a dog compete to have the most apples on top of their heads. Then the animals are chased by a variety of other animals, all of whom seem to want to take away the "ten apples up on top." Other math topics included are number sets, sorting, and graphing.

Answers: will vary depending on questions.

Talking points-

- Your child can ask questions about pictures on the page.
- Count with your child as the animals put the apples on their head. Who is ahead?

Cheerios Counting Book by Will Mcgrath and Barbara Mcgrath



Each page has a corresponding number of fruit pieces (banana slices, strawberries, blueberries, etc.) arranged around the borders.

Talking points-

Answers: will vary depending on questions.

- Your child can ask questions about pictures on the page.
- Count with your child the number of Cheerios displayed on the page. Count the number of fruit pieces around the border and see if it matches the counting number on the page.

See next page for Common Core Standards for Mathematics, Grade K, addressed by this activity.

My Math Literature Connection

This activity touches upon some content of the following standards:

Common Core State Standards: Grade K; Domain, Cluster & Standards

Domain: Counting and cardinality. **(K.CC)**

Know number names and the counting sequence.

1. Count to 100 by ones and by tens. **(K.CC.1)**
2. Count forward beginning from a given number within the known sequence (instead of having to begin at 1). **(K.CC.2)**
3. Write numbers from 0 to 20. Represent a number of objects with a written numeral 0-20 (with 0 representing a count of no objects). **(K.CC.3)**

Count to tell the number of objects.

4. Understand the relationship between numbers and quantities; connect counting to cardinality **(K.CC.4)**
 - a. When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object.
5. Count to answer “how many?” questions about as many as 20 things arranged in a line, a rectangular array, or a circle, or as many as 10 things in a scattered configuration; given a number from 1–20, count out that many objects. **(K.CC.5)**

Compare Numbers.

6. Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, e.g., by using matching and counting strategies. (Include groups with up to ten objects) **(K.CC.6)**

My Counting Book

Adapted from Education.com

Description:

Kindergarten students develop counting skills through repetition and practice. To master counting to ten, kindergarteners often count their fingers and toes. But here is a mini project that will give your kindergartener a little more practice: create a counting book!

Answers to this activity will vary.

Materials: Eleven sheets of white construction paper (regular white paper is good too), glue, stapler, and markers or crayons

Directions:

1. Work with your child to label the bottom of each of the pages of white construction paper with a numeral and a blank space. Begin with: 1 _____. On the next page, write, 2 _____. Ask your child what comes next, and proceed in the same manner until ten pages are labeled.
2. Create a title page for the book: "My Counting Book." Have your child decorate the title page as he likes.
3. Staple the pages along the left hand margin with the title page on the top, and the numbered pages in order from 1 to 10.
4. Have your child draw a picture (for example, a ball) in the construction paper book, beginning with page 1. After he draws the object on the page, use a marker to fill in the blanks at the bottom: "1 ball _____." Proceed to the next page and ask your child to draw as many of the same items as the number on the page indicates, followed by writing on the blank the name of the object.
5. Read the completed book with your child, and as the book becomes more familiar to him, have him read it to you!

Optional:

Make counting album book using family pictures (number of people on the picture match the number of the page), or pictures of objects found in the neighborhood.

Answers: will vary depending on drawings/pictures used, but all must show accuracy of count.

Sample: draw a one ball on page one, and fill in the blanks at the bottom: "1 ball _____." Proceed to page 2 and your child draws two kites, followed by writing on the blank the name of the object ("kite"), and so on.

See next page for Common Core Standards for Mathematics, Grade K, addressed by this activity.

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