

Study Guide



Watch **The Math Maniac** take your students to a new level of learning, keeping every child on the edge of their seat, eagerly participating in every **fun-framed minute!**

It's a fact!

Kids learn more and retain more when they're having **FUN!**

Every performance is audience interactive and specifically tailored to each grade level. **Max Millions** a.k.a. **The Math Maniac** helps students in grades K-6 master their skills in **Place Values, Arithmetic, Integers, Fractions, Geometry, Measurement, Money, and Basic Probability**. You'll find these subjects highlighted on the following pages, organized into upper and lower level. This Study Guide, which you may reproduce at your school, provides teachers with a way to take the assembly experience back into the classroom. This enables students to get more value from the program by **INCREASING their RETENTION.**

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Place Values

Lower Level

Numbers, such as 84, have two digits. Each digit is a different place value. The left digit is the **tens'** place. It tells you that there are 8 tens. The last or right digit is the **ones'** place which is 4 in this example. Therefore, there are 8 sets of 10, plus 4 ones in the number **84**.

Upper Level

Numbers, such as 6,495,784, have seven digits. Each digit is a different place value. The first digit is called the **millions' place value**. There are six millions in the number 6,495,784. The second digit tells you how many sets of **one hundred thousand** are in the number. The number 6,495,784 has four hundred thousands. The third digit is the **ten thousands'** place. There are nine ten thousands in addition to the six millions and four hundred thousands. The fourth digit is the **one thousands'** place which is five in this example. The fifth digit is the **hundreds'** place which is seven in the number 6,495,784. The next digit (8) is the **tens'** place. The last or right digit is the **ones'** place which is four in this example. Therefore, there are six sets of 1,000,000, four sets of 100,000, nine sets of 10,000, five sets of 1000, seven sets of 100, eight sets of 10, and 4 ones in the number **6,495,784**.

millions ten thousands hundreds ones

1,000,000



Arithmetic



The Magic Number 9

Lower Level

Fun Trick #1: Adding number 9

You can use a little trick to solve problems when adding with the number 9. For example: $25 + 9 = \underline{\quad}$. Change the 9 to 10, and in your head you can quickly figure out that $25 + 10 = 35$. Now, just subtract 1 from 35 (because 9 is 1 less than 10) and you get the answer, 34. So to add 9 in your head, a short cut is to add 10 then take away 1.

Upper Level

Fun Trick #2: Multiplying number 9

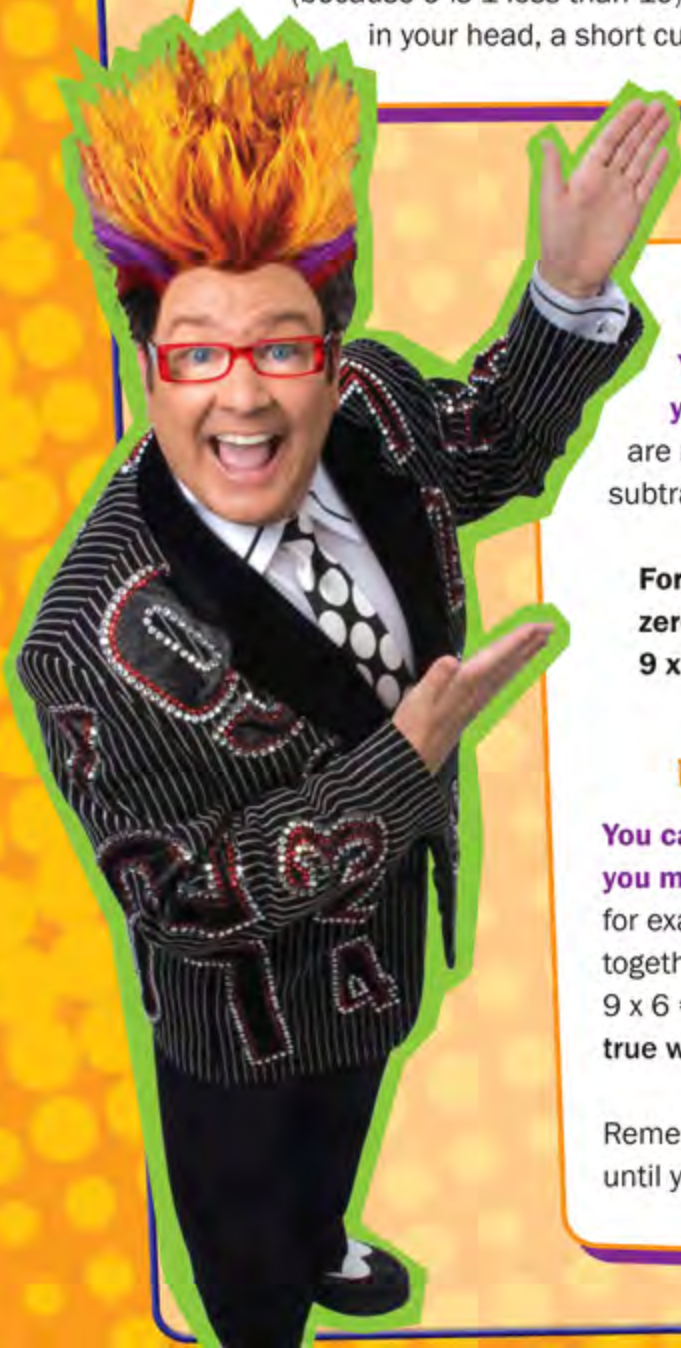
You can use a little trick to solve problems that ask you to multiply by 9. Take the one-digit number you are multiplying by nine, and insert a zero to its right. Then subtract that number from it.

For example: if the problem is 9×6 , insert a zero to the right of the six, then subtract six:
 $9 \times 6 = 60 - 6 = 54$

Fun Trick #3: Checking your answer

You can use this fun trick to check your answers when you multiply by the number 9. Multiply any number by 9 for example: $9 \times 6 = 54$. Add the two digits of the product together and if the answer is correct they will equal nine: $9 \times 6 = 54$. To check your answer add $5 + 4 = 9$. This is true with all numbers multiplied by nine.

Remember to keep adding the digits in the product until you arrive at the number 9.



Integers

Whole numbers, as opposed to mixed numbers or fractions, are called integers. (The word integer means whole.) The set of numbers called integers is made up of the positive integers, the negative integers, and zero. This would include numbers such as; **3, 2, 1, 0, -1, -2, -3.**

Lower Level

Odd & Even Numbers

Any number that can not be divided exactly by 2 is an **odd number**. For example, all of the following numbers are odd numbers: 1, 3, 5, 17, and 29. If a number *can* be divided by 2 it is an **even number**. Examples of even numbers are: 2, 4, 6, 38, and 40.

Upper Level

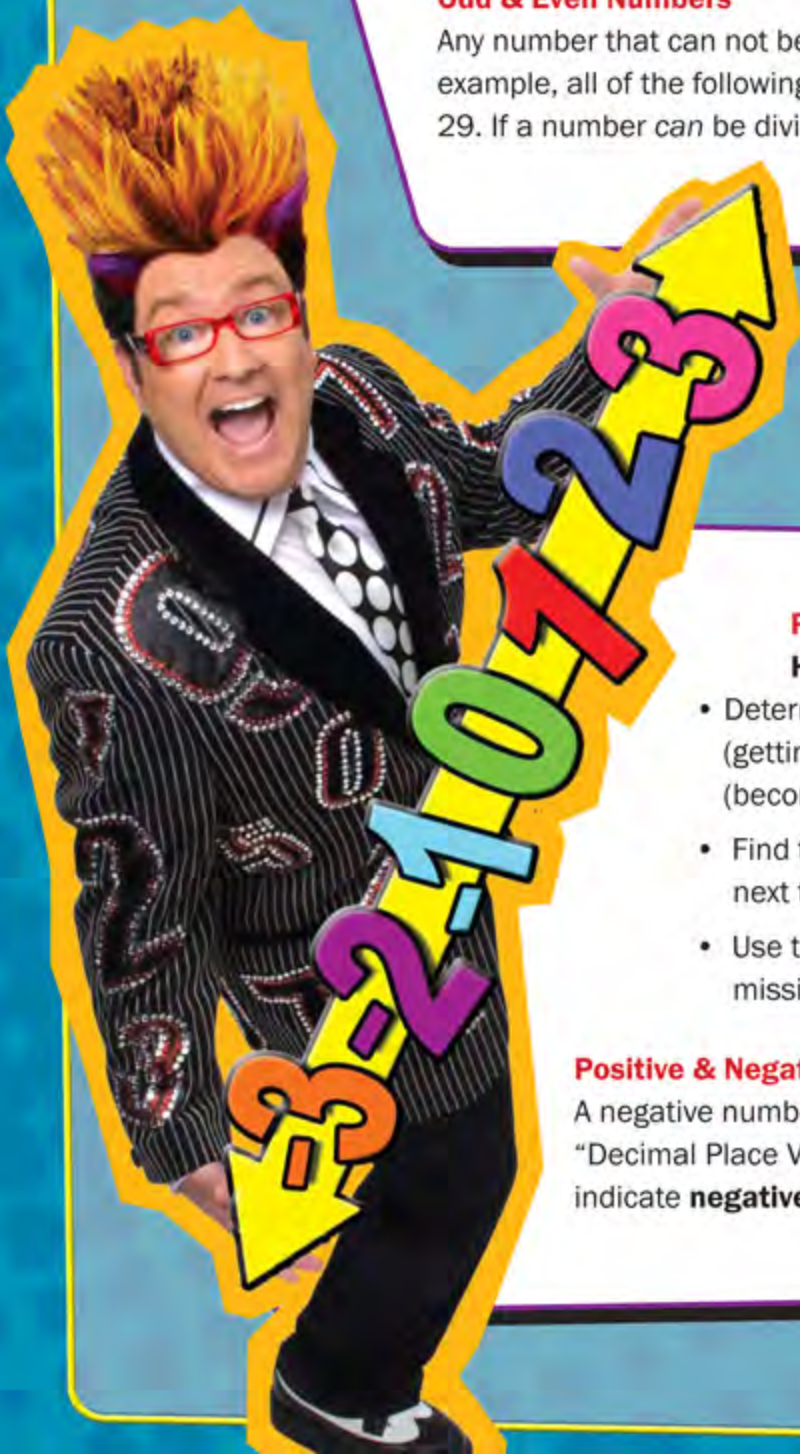
Patterns

How to find a missing number in a sequence:

- Determine if the order of numbers is ascending (getting larger in value) or descending (becoming smaller in value).
- Find the difference between numbers that are next to each other.
- Use the difference between numbers to find the missing number.

Positive & Negative Numbers

A negative number represents a value less than zero. "Decimal Place Values" use a minus sign (-) to indicate **negative values**.



Fractions

Lower Level

A fraction represents a portion of a whole. It can be a part of one thing or a part of a group of things. For example, if something is divided into four equal parts, each part is $\frac{1}{4}$. The bottom number of a fraction, called the **denominator**, tells how many equal parts the whole was divided into. The top number of a fraction, called the **numerator**, tells how many of the equal parts you are talking about. When the parts are the same as the whole it equals ONE.

Upper Level

$\frac{1}{2}$.5

Percentages and fractions are related. A percentage is a fraction with a denominator of 100. When we write the percent, we are just writing the numerator of the fraction. The denominator of 100 is expressed by the percent symbol "%." Remembering that the percent symbol means "over one-hundred" can prevent a lot of confusion.

Fractions, decimals, and percentages are often used interchangeably: people sometimes use a fraction, sometimes a decimal, or sometimes a percent to mean the same thing.

Proper & Improper Fractions

A **proper fraction** has a numerator less than its denominator such as: $\frac{1}{2}$. When the numerator of a fraction is equal to or greater than the denominator, the fraction is called an **improper fraction**. Some examples of **improper fractions** are: $\frac{3}{2}$. When an improper fraction's denominator divides its numerator without a remainder, the fraction equals a whole number: $\frac{4}{4}$, $\frac{12}{4}$, $\frac{8}{4}$.

Measurement

**LENGTH,
WEIGHT,
VOLUME**

Lower Level

LENGTH

How long is it? Length is measured using different units dependent upon whether you are using U.S. customary or the metric system. The ruler and yardstick are used to teach the **inch, foot, and yard**. Similarly, the meterstick is used to teach centimeters and meters.

$$\begin{aligned}12 \text{ inches} &= 1 \text{ foot} \\3 \text{ feet} &= 1 \text{ yard} \\1760 \text{ yards} &= 1 \text{ mile}\end{aligned}$$



Upper Level

WEIGHT / MASS

How heavy is it? Weight and mass are not exactly the same. Mass is a measure of how much matter an object contains. Weight is the pull of gravity on mass. Weight and mass on earth are basically the same, but weight and mass on the moon could be different because of the difference of gravity.

$$\begin{aligned}16 \text{ ounces} &= 1 \text{ pound} \\2,000 \text{ pounds} &= 1 \text{ ton}\end{aligned}$$



CAPACITY / VOLUME

How much does it hold? Capacity and volume are not exactly the same. Capacity is the amount a container can hold. Units of capacity are used for liquids such as gallons (gal), quarts (qt), pints (pt) and cups (c). It takes 16 cups to equal 1 gallon.



$$\begin{aligned}2 \text{ cups} &= 1 \text{ pint} \\2 \text{ pints} &= 1 \text{ quart} \\4 \text{ quarts} &= 1 \text{ gallon}\end{aligned}$$

Geometry

Lower Level

LINES

A line that goes across is called a **horizontal** line. A line that goes up and down is called a **vertical** line. If lines run side by side and never meet, they are called **parallel** lines. Parallel lines always stay the same distance apart. They never cross each other. When two lines meet and form an exact L (either a forward or backward L), then those lines are called **perpendicular**.

You can find perpendicular lines in any square or rectangle. All rectangles and squares have four sides. All the sides of a square are the same length. A triangle has three sides. Figures that are the same size and shape are **congruent**.

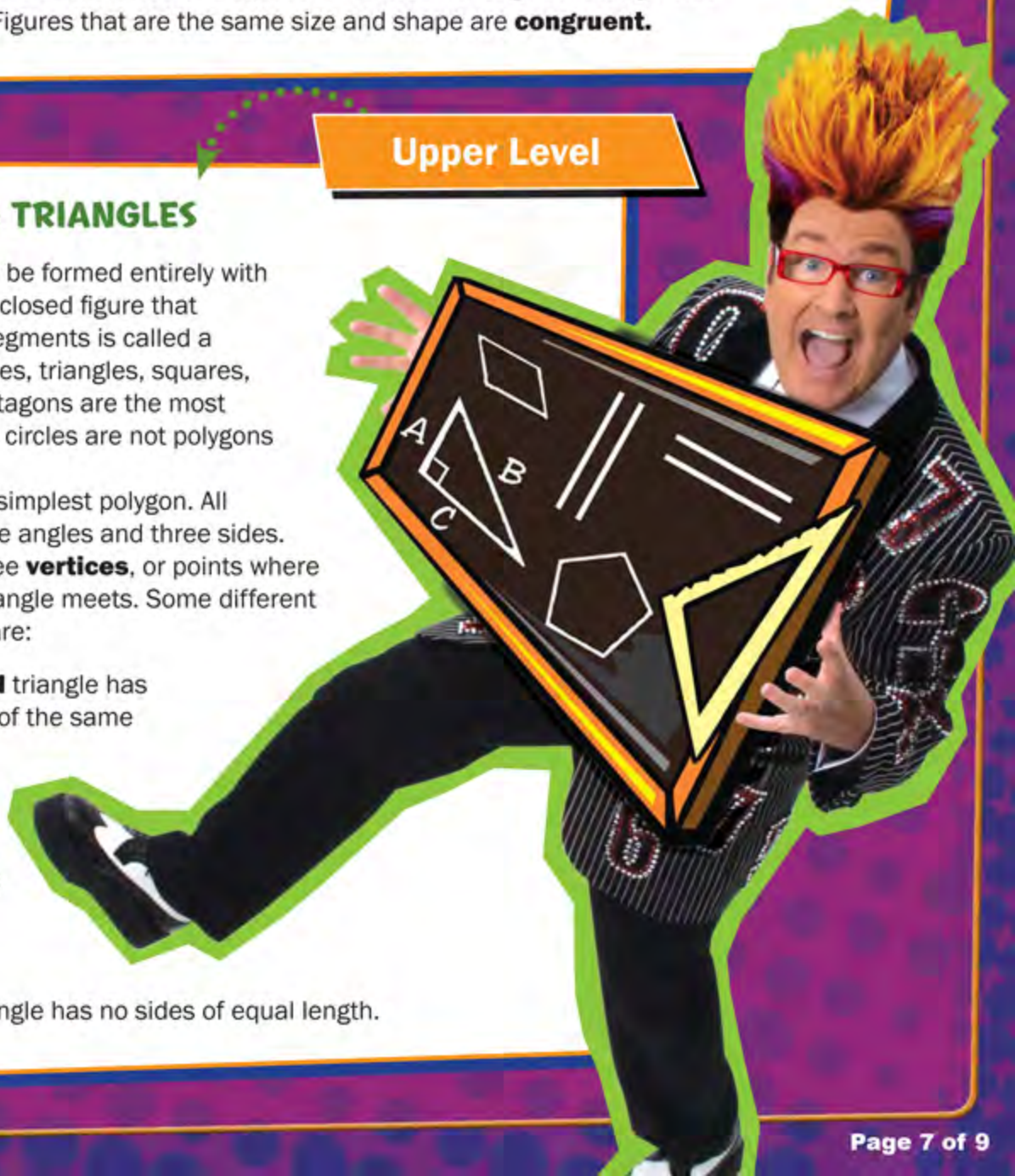
Upper Level

POLYGONS & TRIANGLES

A closed figure can be formed entirely with **line segments**. A closed figure that is formed by line segments is called a **polygon**. Rectangles, triangles, squares, pentagons, and octagons are the most common polygons; circles are not polygons

The triangle is the simplest polygon. All triangles have three angles and three sides. They also have three **vertices**, or points where the sides of the triangle meet. Some different kinds of triangles are:

- An **equilateral** triangle has all three sides of the same length.
- An **isosceles** triangle has at least two sides of the same length.
- A **scalene** triangle has no sides of equal length.



Money

Lower Level

Money helps us buy goods and services in our everyday lives. Putting your money in the bank is a great way to save your money. Banks pay you free money or **interest** for keeping your money in their bank. The longer you leave your money in the bank the more interest the Bank will pay you. Interest is what makes your money grow.

100 pennies are the same as a one dollar bill. It takes 100 one dollar bills to equal a one hundred dollar bill.



Upper Level

SIMPLE INTEREST

Interest may be thought of as rent paid on borrowed money. Simple interest is calculated only on the beginning principal. For example, a \$100 investment in a savings account earning 5% per year would grow to \$115.00 in three years. In each year only \$5.00 in interest is earned.

Basic Probability

Upper Level

Probability is the measure of how likely an event is. We write the probability or chance that an event will happen as a ratio: The number of desired outcomes over total number of outcomes possible. The probability of an **impossible** event is 0. The probability of an event that is **certain** is 1. Any event with a probability below 50% is **unlikely**. Any event with a probability above 50% is **likely**.



Reading List



It's Alive and Kicking ...Math the Way it Ought to Be - Tough, Fun, and a Little Weird

Asa Kleiman
Published by Prufrock Press, 1996

Arithmetricks: 50 Easy Ways to Add, Subtract, Multiply, and Divide Without a Calculator

Edward H. Julius
Published by Jossey-Bass, 1995

Math the Easy Way

Anthony Prindle and Katie Prindle
Published by Barron's Educational Series, Inc., 2003

Pickles, Problems, and Dilemmas-Situations for Problem Solving

Dianne Draze
Published by Prufrock, Press, 2005

Knowing Mathematics First Edition

Liping Ma and Cathy Kessel
Published by Houghton Mifflin, 2003

Perplexing Puzzles and Tantalizing Teasers

Martin Gardner
Published by Dover Publications, 1988

Rapid Math Tricks & Tips: 30 Days to Number Power

Edward H. Julius
Published by Wiley; 1 edition, 1992



Links

www.funbrain.com
www.brainpopjr.com
www.aaamath.com
www.mathforum.org/dr.math