

## Mathematical Menu 1.1

Light items to wet your mathematical appetite!

- 1) Use the 0-99 chart to examine and describe different patterns. Clearly record each of the following on separate charts.
  - a) Color all the even numbers.
  - b) Color all the numbers with digits that add to eight.
  - c) Color all the numbers with digits that differ by one. (ex. 65)
  - d) Color the multiples of five.
  - e) Color the numbers with both digits the same.

Pick one of the patterns you colored and describe what it looks like. Try to explain why that sort of pattern happened.

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- 2) Play calculator wipe out! Enter the number 14,257,368 on a calculator. Experiment on the calculator and record what number you would need to subtract to make a zero appear in the following places:
    - a) the hundreds place
    - b) the hundred thousands place
    - c) the ten millions place
    - d) the ones place
    - e) the millions and tens places (at the same time)
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- 3) As part of his job, Fred the zookeeper records the weights of many animals. Yesterday he weighed so many animals that he forgot the weight of one of the elephants. He knew that the weight had four digits and that the digits were the even numbers 4, 6, 8, 0. What are all of the possible weights that the elephant might be? Explain how you know that you found all of the possibilities.

Of the numbers you found, make a list of weights that seem unreasonable. Explain why these are unreasonable weights.

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- 4) Here is a special pattern of numbers that is called "Pascal's Triangle."

$$\begin{array}{c} 1 \\ 1 \ 1 \\ 1 \ 2 \ 1 \\ 1 \ 3 \ 3 \ 1 \\ 1 \ 4 \ 6 \ 4 \ 1 \\ 1 \ 5 \ 10 \ 10 \ 5 \ 1 \end{array}$$

Explore a few of the many patterns in this triangle. If you added the numbers in each row (going sideways) what are the sums? Explain the pattern that these sums follow.

Try to write the numbers that would be written in the next two rows of the triangle. How did you figure out which numbers went in these rows?

## Mathematical Menu 3.2

- 1) You have just finished driving for six hours in your *sporty, red Corvette*. How far you have traveled depends upon the speed you were going. How far would you have traveled at the following common speed limits:

25 mph	35 mph	55mph	70 mph
30 mph	45 mph	65 mph	

If you were to travel 65mph in a 55mph speed zone, would the extra distance you cover be worth the many risks involved? Be sure to use mathematics to support your answer.

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- 2) It's the revenge of operation squiggly (§)!!!! You found him last time, but are you up to a new challenge? Use the problems below to figure out what § stands for. § stands for the same thing in every problem. (*Hint: This time § is 2 operations and a number.*)

$3 \text{ § } 1 = 9$	$5 \text{ § } 1 = 15$
$1 \text{ § } 3 = 9$	$3 \text{ § } 4 = \underline{\quad}$
$2 \text{ § } 2 = 12$	$\underline{\quad} \text{ § } 3 = 18$

Share what § stands for, share what numbers appear in the blanks, and create three of your own problems using §.

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- 3) Complete the table below based on the pattern throughout the table.

Number of crabs	1	2	4	8	?
Number of octopus	29	28	?	22	?
Total number of legs	238	?	232	?	?

Write how you discovered the values of the question marks in the table above. Explain at least two patterns that you observed throughout the table.

- 4) Time is something that can be recorded in many ways. For instance, our outside recess time is about  $\frac{1}{2}$  hour. This could also be expressed as 35 minutes. While both times are the same, doesn't 35 sound longer than  $\frac{1}{2}$ ? Can you imagine how long recess would sound if it was shared as a number of seconds? Try to find how many seconds recess lasts. Show all of your work.

Now find out how many seconds there are in one other school related event (gym, spelling test, roller skating, the whole school day...). Try to use the work you did in the first part of this problem to help you find the answer to this question.

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- 5) You will need a partner and a set of 20 multiplication problems to play "multiplication showdown". One person will use a calculator and the other person will use mental math/paper and pencil. Using the first set of multiplication problems, start at the same time on the first problem and see who finishes first. Do the same thing for the next nine problems.

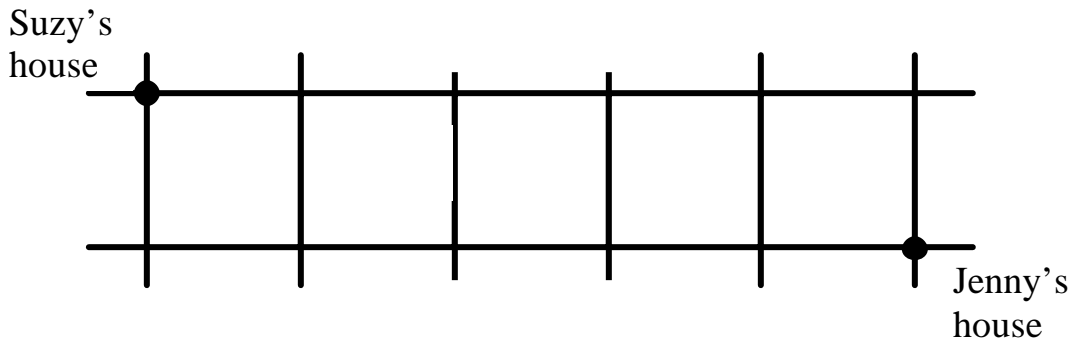
When you have finished the first ten problems, make a graph showing the results.

Then try the "showdown" again, but this time the other person gets to use the calculator. Once you have finished the second list of ten problems, graph the results again.

Write several things that can be learned by looking at the graphs.

### Mathematical Menu 4.3

- 1) Suzy visits her friend Jenny so often that she likes to take different routes each time. She can find many ways to get there without ever taking the same street twice on any trip. Below is a map that shows where Suzy and Jenny live. How many different routes can Suzy travel to Jenny's house?

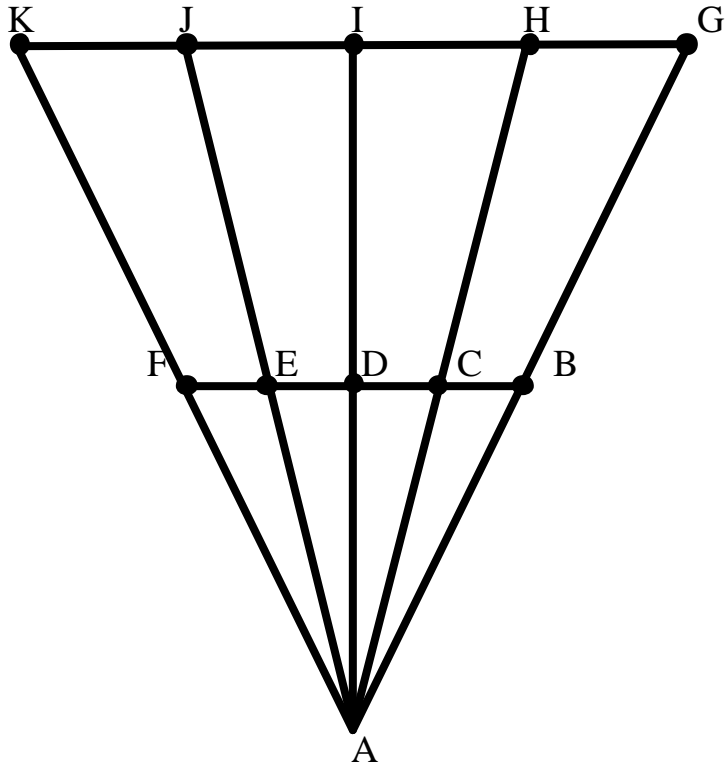


You must describe each route using the street names or make illustrations showing each route.

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- 2) Use the tangram pieces to make as many non-similar quadrilaterals as you can. You must record the arrangements of pieces for each quadrilateral you make and label each quadrilateral with its proper mathematical name.
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- 3) Snowflakes, both the real kind and the paper kind, illustrate some interesting mathematical ideas, like symmetry. Your challenge is to create three paper snowflakes. One should have only one line of symmetry, another should have two lines of symmetry, and a final one can have three or more lines of symmetry. Clearly indicate each line of symmetry on the snowflakes you create. Finally explain the relationship between the way you made a snowflake and its resulting number of lines of symmetry.
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- 4) Try using the tangram pieces to make each of the following: pentagon, hexagon, octagon, decagon, and some other \_\_\_\_\_gon of your choosing. You must record the arrangements of pieces for each shape you make and label each with its proper mathematical name.

5) How many triangles can you find in this figure?



You need to create an organized list sharing the names of the triangles you find. Finally, identify examples of the different types of triangles found within the figure. Explain how these examples fit the definitions of the different triangle types.

## Mathematical Menu 5.1

- 1) At Josephine's birthday party nine children ate all of the cookies that her parent bought for the party! They had one long package of sandwich cookies that had three rows with 25 cookies in each row. They also had a wide package of chocolate chip cookies that had 8 rows with 12 cookies in each row. If the cookies were given out equally, how many cookies did each child at the party get?

How many cookies would each child get if Josephine's parents bought twice as many cookies? What if they bought four times as many cookies?

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- 2) On Friday Georgia earned half as much money as she did on Thursday. On Saturday she earned twice as much as she earned on Thursday. If her total earnings at the end of those three days was \$63.00, how much did she earn each day?
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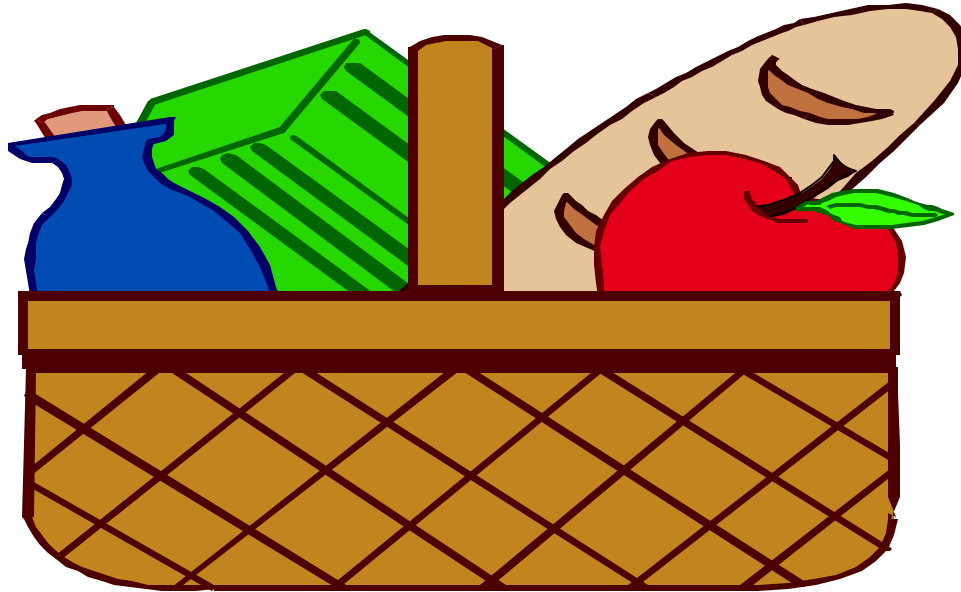
- 3) Rudy has just discovered that his computer software is making mistakes that are costing his kite company quite a bit of money. The computer is supposed to let him know correct payment owed to each business from which he buys products. Instead of dividing the payments, the computer multiplied them. Show the corrections that he will need to make based on the table below.

Product	Total Cost of Shipment	Number of Payments	Payment Amount
Strong String	\$60	6	\$360
Rainbow Flyer	\$100	4	\$400
Spirit of Redford	\$64	2	\$128

How much money has he saved his company by finding the mistake?

**Bonus:** Look at the Strong String information. How many times larger than the real payment amount is the amount given by the computer? Is there a similar pattern when you look at the information for the Rainbow Flyer and the Spirit of Redford?

- 4) A family decides to paint a design on a long kitchen wall. They will do this by painting the figure and then painting it again where the first one ended until there is a stripe of these drawings all along the wall. Here is the pattern they have decided to paint:



They measured the wall and found that it was 96 inches long. How many times will they need to paint the stencil?

If they decide to put a three-inch space between each stencil painting, show how that will effect the answer.

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- 5) Study the scores from the NCAA Tournament on Sunday. People are often interested in statistics related to the games. One sort of statistic that you could find is one that shares the score a person could expect for a team playing in the tournament. Use the following mathematical ideas to describe the scores.
- Mode- What team score happened the most often in the games?
  - Median- When team scores are arranged from highest to lowest, what number is in the middle of the list?
  - Mean- When the total number of all points scored is found and split equally among the teams that played, what number is found?

After you find these numbers, which would you use to answer the question, “How many points could I expect a team to score in a game at the tournament?” Explain why you chose that number.

## Mathematical Menu 6.2

1) Is it possible to make each of the following shapes on a sheet of 8 ½" x 11" paper?

- A triangle with a perimeter of 17 inches
- A square with a perimeter of 60 centimeters
- A pentagon with a perimeter of 2 ½ feet
- An octagon with a perimeter of 1000 millimeters

Construct pictures of the shapes when possible and prove that they have the correct perimeter. If the shape is impossible explain why.

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2) Scientists are exploring a new breed of plant and want to compare the data for the height of their largest plants. They are having a hard time because everyone is using different units. Here is their data:

<b>Professor</b>	<b>Largest plant height</b>
McGrady	29 inches
Scriven	Two feet
Doogle	70 centimeters
Trelane	½ meter
Hagor	700 millimeters
Karkor	½ yard

Share who has the largest plant and explain how you know. Also explain what unit they should all use in the future to make comparison easier.

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3) Using only a balance and five objects, can you determine which object is the second heaviest? Explain your method. Record the mass of each object in grams on either a chart or graph. Was your prediction about the second heaviest object correct?



4) The perimeter of a rectangle shaped plot of land is forty-two meters.

What are the dimensions of the plot when the following are true?

- A. The length of the plot is twice the width.
- B. The length of the plot is three meters longer than the width.
- C. The length of the plot is three meters less than twice the width.
- D. Five plot widths would make the length.

Draw and label diagrams with your solutions.

Which rectangle was the most difficult to find? Why was it challenging?

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5) Which of the following road signs would take the least metal to make? Feel free to trace the signs on graph paper and count the number of squares that each sign covers. Make a chart or graph showing the amount of metal needed to make each sign.

