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8th Grade Math Culminating Project Menu B
Part #1 – DUE: MONDAY, MAY 9TH
Part #2 – DUE: MONDAY, MAY 16TH

You have your choice of the projects listed below. You may choose **any** combination of projects for a total of up to 50 points for each part (i.e. – Part #1 is due on Monday, May 9th. Select any combination of projects that total 50 points. Likewise, Part #2 is due on Monday, May 16th. Select any combination of projects that total 50 points.) The sum of the two parts will equal 100 points for the culminating project grade. (*Part #1 and Part #2 will appear in the grade book separately*.) The projects completed in Part #1 cannot be duplicated for Part #2.

All project choice descriptions and expectations are attached to this menu. If you have any questions, please ask. Please refer to all resources (i.e., handouts, resource library, textbook, etc.) used during the school year to help with concept ideas. **YOU ARE CONTINUEALLY REMINDED ABOUT THE CONSEQUENCE TO PLAGARISM THROUGHOUT EACH PROJECT CHOICE – YOU WILL RECEIVE A ZERO!**

Projects will be worked on in class daily. Please come to class prepared everyday. None of the projects require special supplies. The only requirements are those listed on the syllabus as school supplies you will use all year. You are not required to purchase any additional supplies.

LATE PROJECTS – Late projects will be accepted with a penalty of a 10 point deduction each day after the due date. ALL PROJECTS ARE DUE AS YOUR TICKET-IN-THE-DOOR. IF YOU TURN IN A PROJECT DURING THE CLASS PERIOD OR AT THE END OF THE CLASS PERIOD ON THE DUE DATE - THE PROJECT IS LATE!

Put a check in the box for the projects you are choosing.
This sheet must be returned with your projects.

Worth up to 30 points each:
- ☐ Famous Mathematician/Concept Presentation
- ☐ 8th grade math Review Game

Worth up to 20 points each:
- ☐ Raffalmania!
- ☐ Reading in the Dark
- ☐ Constructing the Irrational Number Line
- ☐ Connection Arithmetic Sequences and Linear Functions
- ☐ The Many Faces of Relations
- ☐ Window Pain

Worth up to 15 points each:
- ☐ 8th grade math Illustration
- ☐ Pythagoras Plus
- ☐ Let's Have Fun
- ☐ Acting Out
- ☐ Mineral Samples

Worth up to 10 points each (Can complete a MAX of two (2) of these.)
Textbook pages – must complete ALL problems on the page or pages listed and **If you do not show your work you will not receive credit)**
- ☐ Pages 792 – 793
- ☐ Page 790 – 791
- ☐ Page 805
- ☐ Page 806
- ☐ Page 807

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_______ TOTAL MENU SCORE

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Famous Mathematician/Concept Presentation PowerPoint *OR* PodCast *OR* Script

Create a Power Point presentation or video skit or write a script or present the script for a TV news reporter detailing the procedures, facts, over-arching process standards and how they are used to inform and enrich the 8th grade math content standards about a famous mathematician or concept. You must include at least 5 facts about the person or concept, and the following questions must be answered:

1) What is the background info on this person or concept?
2) What was going on in the world at this time?
3) Why is this person or concept important to the world of math?

Possible mathematicians/concepts (All others must be approved):

- Pascal's Triangle
- Number Systems
- History and Uses of the Pythagorean Theorem
- Golden Ratio
- Fibonacci Sequence
- Monies of the world and conversion
- Four Color Problem
- Magic Squares
- Archimedes
- Eratosthenes of Cyrene
- Agnesi, Maria
- DeMorgan, Augustus
- Barrow, Isaac
- Klein, Felix Christian
- Clavius, Christopher
- Halley, Edmond
- Kepler, Johannes
- Zeno of Elea
- Sir Isaac Newton
- Boyle, Robert
- Galilei, Galileo
- Russell, Bertrand
- Einstein, Albert
- Dodgeson, Charles Lutwidge
- Euclid of Alexandria
- Cartwright, Dame Mary Lucy
- Hilbert, David
- Plato
- Pascal, Blaise
- Aristotle
- Copernicus, Nicolaus
- Riemann, Georg
- Fibonacci, Leonardo Pisano
- Cantor, Georg Ferdinand
- Hippocrates of Chios

Copying and pasting information from the Internet is plagiarizing. Plagiarized work will receive a zero.

Review Game

Create a review game (like Jeopardy, Millionaire, etc…) that can be used to review one of the following units: Unit 1, Unit 3, Unit 4, or Unit 5.

- ✓ You must have at least 20 questions – in either multiple choice OR open response format.
- ✓ The questions must be ORIGINAL – created by YOU, NOT COPIED. (That would be plagiarism.)
- ✓ Each element from each standard in the unit must be covered. (See www.georgiastandards.org for a list of standards.)

A ZERO WILL BE ASSIGNED FOR PLAGIARISM OR COPIED PROJECTS!!

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8th Grade Math Concepts Illustration

Draw an illustration (cartoon) that represents an 8th grade math concept.

- ✓ Use ***one (1)*** of the task projects attached to present the 8th grade concept (See tasks worth 20 points or 15 points).
- ✓ The illustration or the characters in the illustration must accurately represent and/or explain the 8th grade math concept chosen.
- ✓ Every question in the project must be answered in the illustration.
- ✓ The illustration must be clear so that any reader can understand the concept.
- ✓ Correct math language must used in the illustration.
- ✓ A ZERO WILL BE ASSIGNED FOR PLAGIARISM OR COPIED PROJECTS!!

8th Grade Math Tasks

Raffalmania

The 8th grade class of City Middle School has decided to hold a raffle to raise money to fund a trophy cabinet as their legacy to the school. A local business leader with a condominium on St. Simon's Island has donated a week's vacation at his condominium to the winner—a prize worth $1200. The students plan to sell 2500 tickets for $1 each.

1) Suppose you buy 1 ticket. What is the probability that the ticket you buy is the winning ticket? (Assume that all 2500 tickets are sold.)

2) After thinking about the prize, you decide the prize is worth a bigger investment. So you buy 5 tickets. What is the probability that you have a winning ticket now?

3) Suppose 4 of your friends suggest that each of you buy 5 tickets, with the agreement that if any of the 25 tickets is selected, you'll share the prize. What is the probability of having a winning ticket now?

4) At the last minute, another business leader offers 2 consolation prizes of a week-end at Hard Labor Creek State Park, worth around $400 each. Have your chances of holding a winning ticket changed? Explain your reasoning. Suppose that the same raffle is held every year. What would your average net winnings be, assuming that you and your 4 friends buy 5 $1 tickets each year?

Reading in the Dark Task

In 1821, Frenchman Louis Braille developed a method that is used to help blind people read and write. This system was based on a more complicated process of communication that was formed by Charles Barbier due to an order from Napoleon who wanted soldiers to communicate in the dark and without speaking. Braille met with Barbier and decided to simplify the code by using a six-dot cell because the human finger needed to cover the entire symbol without moving so that it could progress quickly from one symbol to the next.

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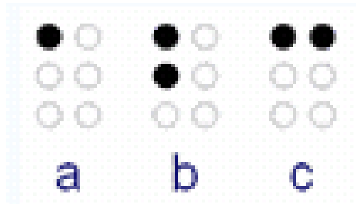
Each Braille symbol is formed by raising different combinations of dots. Below is a sample of the first three letters of the alphabet.

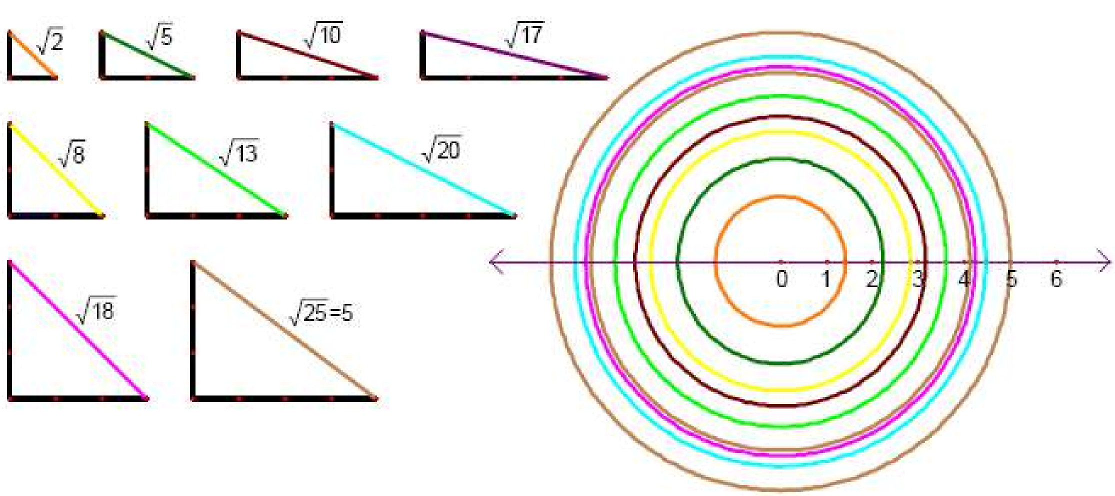


1) Using the six-dot Braille cell, how many different combinations are possible? Provide a detailed explanation of how you know using complete sentences and correct math language.
2) Do you think this is enough symbols for sight-impaired people to use? State why or why not?
3) What are some reasons that some of the possible combinations might need to be discarded? Use complete sentences.
4) An extension has been added to the Braille code that contains eight-dots with the two additional ones added to the bottom. How does this change the number of possible different combinations? Justify your answer by providing a detailed explanation of how you know using complete sentences and correct math language.

Constructing the Irrational Number Line

In this task, you will construct a number line with several rational and irrational numbers plotted and labeled. Start by constructing a right triangle with legs of one unit. Use the Pythagorean Theorem to compute the length of the hypotenuse. Then copy the segment forming the hypotenuse to a line and mark one left endpoint of the segment as 0 and the other endpoint with the irrational number it represents.

Construct other right triangles with two sides (either the two legs or a leg and a hypotenuse) that have lengths that are multiples of the unit you used in the first triangle. Then transfer the lengths of each hypotenuse to a common number line, and label the point that it represents. After you have constructed several irrational lengths, list the irrational numbers in order from smallest to largest.



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Connection Arithmetic Sequences and Linear Functions – Learning Task

YOU MUST USE GRAPH PAPER AND A RULER TO RECEIVE FULL CREDIT FOR GRAPHS!!

For each of the sequences given in questions 1-5, determine

a) a recursive definition,
b) an explicit definition, and
c) a graph of at least the first six terms of the sequence.

1) 5, 9, 13, 17, 21, …
2) 21, 18, 15, 12, 9, …
3) 1, 4, 9, 16, 25, …
4) 38, 30.5, 23, 15.5, 8, …
5) -4, -1.3, 1.4, 4.1, 6.8, …

6) Only one of the sequences in questions 1-5 was not arithmetic. Which sequences in questions 1-5 were arithmetic? For each sequence you identify, also state the common difference.
7) Compare the **recursive** definitions of the arithmetic sequences in questions 1-5. How are the recursive definitions of arithmetic sequences similar? How are the recursive definitions of arithmetic sequences different from those of non-arithmetic sequences?
8) Compare the **explicit** definitions of the arithmetic sequences in questions 1-5. How are the explicit definitions of arithmetic sequences similar? How are the explicit definitions of arithmetic sequences different from those of non-arithmetic sequences?
9) Compare the **graphs** of the arithmetic sequences in questions 1-5. How are graphs of arithmetic sequences similar? How are the graphs of arithmetic sequences different from those of non-arithmetic sequences?
10) In question 6, you identified the common differences for the four arithmetic sequences. How is the common difference for each arithmetic sequence represented in the **recursive** definition for that sequence?
11) How is the common difference for each arithmetic sequence represented in the **explicit** definition for that sequence?
12) In question 9, you should have identified the common characteristic of the graphs of arithmetic sequences as being linear. On the graphs you drew for questions 1-5, draw the extended lines through the scatterplots representing the sequences. Determine the slope of each line you drew in question 12.
13) What are the common differences for each arithmetic sequence in questions 1-5? Explain what this represents.

The Many Faces of Relations Task

1) Complete a survey of the students in your class. Expand the following table to include a row for every student and gather the requested information from every classmate.

Name: Date: Period:

Class Survey

Student Number	**First Name**	**Last Name**	**Height**	**Number of Pets**
#1				
#2				
#3				
#4				

2) How many different types of ordered pairs can be created from this survey data? You must list all of the combinations of ordered pair to receive full credit. Use the complete list of ordered pair to explain your answer. *HINT:* One type of ordered pair you could create from the information you collected in your survey is (Student #, First Name).

3) If the first term of each ordered pair is the independent variable and the second is the dependent, then which of the ordered pairs you identified in question 2 are relations? Which are functions? Explain your answers using correct math language given the concept. *HINT:* Use the relations and functions hand outs given in Unit 4. If you do not have them go to the resource library or the homework handouts online.

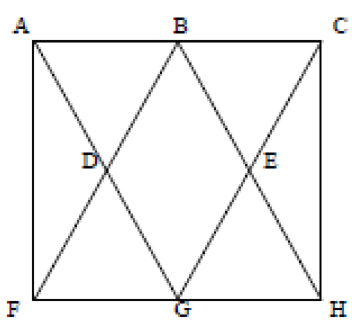
Window Pain Task

Part 1:

Your best friend's newest blog entry on MySpace reads:

> "Last night was the worst night ever! I was playing ball in the street with my buds when, yes, you guessed it, I broke my neighbor's front window. Every piece of glass in the window broke! Man, my Mom was sooooooooooooo mad at me! My neighbor was cool, but Mom is making me replace the window. Bummer!"

It is a Tudor-style house with windows that look like the picture below.



I called the Clearview Window Company to place an order. What was really weird was that the only measurements that the guy wanted were $\angle BAD$ (60°), $\angle BCE$ (60°), and $\overline{AG}$ = 28 inches. I told him it was a standard rectangular window and that I had measured everything, but he told me not to worry because he could figure out the other measurements. It is going to cost me $20 per square foot, so I need to figure out how to make some money real quick.

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How did the window guy know all of the other measurements and how much is this going to cost me?

Because you are such a good best friend, you are going to reply to the blog by emailing the answers to the questions on the blog along with detailed explanations about how to find every angle measurement and the lengths of each edge of the glass pieces. You will also explain how to figure out the amount of money he will need. **(TO RECEIVE FULL CREDIT YOU MUST SHOW YOUR WORK FOR EACH PIECE AND IDENTIFY EACH ANGLE RELATIONSHIP USED TO FIND THE ANGLE MEASUREMENT!!)**

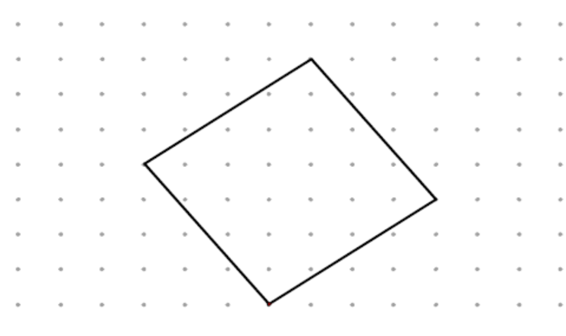
Part 2:
(Two weeks later)

You just received a text message from your best friend and were told that the order of glass had been delivered to the house by Package Express. Unfortunately, one of the pieces was broken upon arrival and needed to be reordered by Clearview Window Company. Because you are very curious, you think it would be a good idea to determine the probability of each piece of glass being the one broken.

Write another email to your friend that explains the probabilities and how you determined them. **(YOU MUST ALSO SHOW YOUR WORK!!)**

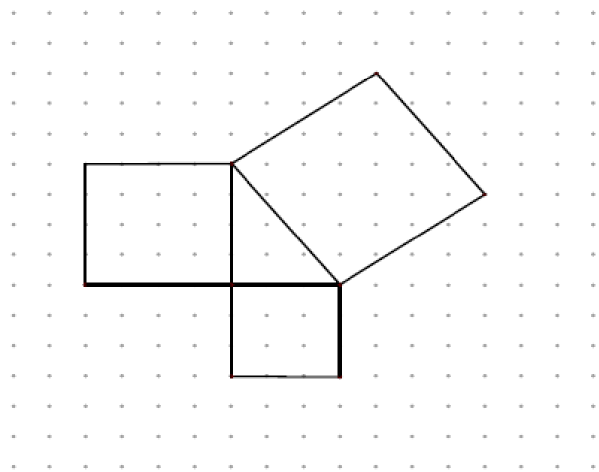
Pythagoras Plus

1) Find the exact area (in square units) of the figure below. Explain your method(s).



Name: Date: Period:

2) Find the areas of the squares on the sides of the triangle to the right. (Hint: How does the large square below compare to the square in problem 1 above?)



a) How do the areas of the smaller squares compare to the area of the larger square?
b) If the lengths of the shorter sides of the triangle are a units and b units and the length of the longest side is c units, write an algebraic equation that describes the relationship of the areas of the squares.
c) This relationship is called the Pythagorean Theorem. Interpret this algebraic statement in terms of the geometry involved.

3) Does the Pythagorean relationship work for other polygons constructed on the sides of right triangles? Under what condition does this relationship hold?

4) Why do you think the Pythagorean Theorem uses squares instead of other similar figures to express the relationship between the lengths of the sides in a right triangle?

Let's Have Fun

Part 1

A survey was given to a group of eighth graders. They were each asked what their plans were for the upcoming holidays. From the clues, determine how many eighth graders were surveyed.

- Thirty-two students planned to visit relatives.
- Twenty-three students planned to go shopping.
- Thirty-one students planned to travel.
- Twelve students planned to travel and visit relatives.
- Eight students planned travel, visit relatives, and go shopping.
- Seven students planned to travel but did not plan to visit relatives or go shopping.
- Thirty students planned to do more than one of the three activities.
- Eleven students did not plan to visit relatives, go shopping, or travel.

How many students were surveyed? Show how you know.

Name: Date: Period:

Part 2

Five of the students were talking about their travel plans. Their names were Albert, Donna, Fred, Sam, and Victoria. They happened to noticed that each one was going to a different place and were using a different type of transportation. The places that were to be visited were New York, Miami, Anchorage, Boston, and San Diego.

- The means of transportation were the family car, a recreational vehicle, a rented van, an airplane, and a cruise ship. Where was each person going and how were they planning on getting there?
- The person that was going to New York in a rented van was best friends with Albert and Victoria.
- The person who was going to Anchorage was not in math class with the person that was traveling by airplane, the person that was going to Miami, nor with Fred or Victoria.
- The person planning to travel by airplane was not going to Boston; Sam was not going to Boston either.
- The person going to Miami was on the math team with Albert's sister who tutored Donna.
- Donna and Victoria were not going to travel by land.
- Albert and Fred noticed that their methods of transportation were both two words with the same first letters.

Acting Out Task

Erik and Kim are actors at a theater. Erik lives 5 miles from the theater and Kim lives 3 miles from the theater. Their boss, the director, wonders how far apart the actors live.

On grid paper, pick a point to represent the location of the theater. Illustrate all of the possible places that Erik could live on the grid paper. Using a different color, illustrate all of the possible places that Kim could live on the grid paper.

1) What is the smallest distance, *d*, that could separate their homes? How did you know?
2) What is the largest distance, *d*, that could separate their homes? How did you know?
3) Write and graph an inequality in terms of d to show their boss all of the possible distances that could separate the homes of the two actors. REMEMBER TO USE GRAPH PAPER.

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Mineral Samples Task

Last summer Ian went to the mountains and panned for gold. While he didn't find any gold, he did find some pyrite (fool's gold) and many other kinds of minerals. Ian's friend, who happens to be a geologist, took several of the samples and grouped them together. She told Ian that all of those minerals were the same. Ian had a hard time believing her, because they are many different colors. She suggested Ian analyze some data about the specimens. Ian carefully weighed each specimen in grams (g) and found the volume of each specimen in milliliters (ml).

1) Can the data be represented as an equation or inequality? If so, write it.
2) Graph the data in the chart below.
3) Write your analysis of his data given below.

Specimen Number	Mass or weight (g)	Volume (ml)
1	17	7
2	10	4
3	13	5
4	16	6
5	7	3
6	24	10
7	5	2