

# GEOMETRY

## Unit Three Project: "Logic"

**OBJECTIVE:**

- ✓ **Use logic and reasoning to write, create, and solve patterns and to come to conclusions based on various conditionals and data presented.**

*In this unit, you will be working to improve your reasoning skills. Logic is the science of reasoning. We use logic all the time both inductively and deductively without even knowing it. Inductive reasoning is reasoning based on observation and past experiences. Deductive reasoning is based on facts, theorems, postulates, and other rules set forth. Logic is used to determine the next thing done in our life. Each decision made has consequences to it. Logic is used in all of our decision making. Without logic, decisions would be made without thinking about consequences. Think of logic in our lives much like a video game. If you were to hit the "A" button on a controller, an action would take affect resulting in a positive or negative consequence. Our life is full of these buttons, but it's up to us to learn the game of life and figure out which buttons to push at what time.*

*This project will allow you to use some of the skills you will be exploring in this unit. You will continue to use a variety of intelligences while working to improve your reasoning skills. Throughout the unit, you will experience everything you need to learn to complete this project. Make sure to put your name on each item submitted. All elements of this project are due the day before the unit three exam. Do not procrastinate. Read through the project. As soon as you understand a part of it, begin to work on it and complete the task. **This project is worth 50 points with each mini-project worth 10 points.***

### **Item #1 (10 points): Patterns in Pascal's Triangle**

Using the copy of Pascal's Triangle provided, use a pencil and very lightly "x" out all numbers that are a multiple of \_\_\_\_\_. A pattern should exist. If a pattern doesn't exist, check to make sure you have "x"ed out the correct numbers. Color all of your multiples the SAME color! Color all of the remaining numbers ONE color OTHER than what the multiples are colored. Precisely cut out Pascal's Triangle. Put your name on the back of it AND the multiple number you were assigned.

- 5 Points: Correct multiples colored
- 1 Point: All multiples colored the same
- 1 Point: Other numbers colored the same
- 1 Point: Neatness..staying in the lines
- 1 Point: The triangle is precisely cut out
- 1 Point: Name and multiple number on the back

### **Item #2 (10 points): Fibonacci Numbers**

Fibonacci numbers are 1, 1, 2, 3, 5, 8, 13, 21, 34, ... Find a picture IN COLOR either in a magazine or online of something that is natural (not manmade) where the Fibonacci numbers are a part of it. It can be anything natural as long as the aspect of it can be counted. Cut it out or print it out. Tape or type a caption to the picture.



13 petals on a black-eyed susan

- 4 Points: Picture of a natural object found
- 2 Points: Picture is in color (not colored though)
- 2 Points: Fibonacci number is observable in the picture
- 2 Points: Caption with the number (1 point) and the description of the object (1 point)

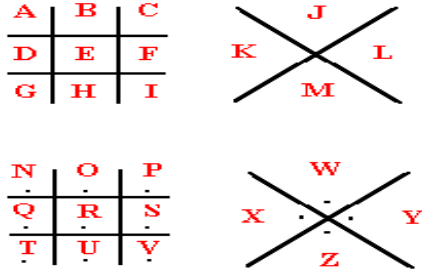
**Item #3 (10 points): Cryptography**

You are to encode a phrase using any tools that we have discussed OR another method that you have discovered. You can do any of the following with each assigned its own point value based on the difficulty:

**Scytale:** 8 Points (Minimum of 10 characters! Turn in your strip of paper and tell what type of cylinder was used. Give your decoded solution on the back of it.)

**Caesar Cipher:** 8 Points (Minimum of 20 characters! Use the wheels provided to create it. Write down your coded message. Below it, write your original message. State the shift in letters you used. For example, M and A match up on the wheel to get the message.)

**Diagrammatic Cipher:** 8 Points (Minimum of 20 characters! Use the set of letters and symbols below to create your own coded message. Below the code, write your original message.)



**Diagrammatic Cipher:** 10 Points (Minimum of 20 characters! Create your own diagram or set of symbols to represent each letter. Create a coded message. Below the code, write your original message. Make sure to include the diagram or set of symbols you used.

**Vigenere Cipher:** 10 Points (Minimum of 20 characters! Use the Vigenere Cipher sheet to assist you. First come up with a message you wish to code. Then come up with a key word that you will write repeatedly above the message you wish to code. Go to the table. Use the letter of the first line for the top value of the table with the letter below it from the second line for the left value of the table. Where the two intersect is the letter used in the code.)

For example: keyword: Beatrice

BEAT RICE	BEAT RICE	B	Keyword repeated
SPON GEBO	BISM YHER	O	"Spongebob is my hero"
TTOG XMDS	CMSF PPGV	P	Code

**Ratio Cipher:** 10 Points (Minimum of 20 characters! This involves paper-folding. You must fold your paper into at least thirds. Write your message on the folds vertically. Fill in words and sentences in between that go together.)

**Item #4 (10 points): Using Logic with Data (Driver's License)**

Complete the tasks on the back of the data sheet.

½ Point: Each correct item.

**Item #5 (10 points): Writing proofs**

Write a correct algebraic and geometric proof in two-column form for each. Provide the correct statements and reasons. Make sure to include the given.

5 Points Each Proof: Correct Statements and Reasons

**Proof #1**

Given:  $5x - 2(3 + 2x) = 7x + x$

Prove: the value of x that solves the equation

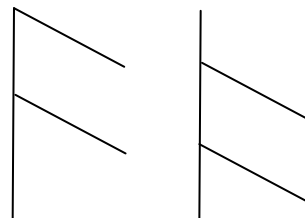
**Proof #2 (Use the diagram)**

Given:  $\angle 1$  and  $\angle 3$  are supplementary

$\angle 2$  and  $\angle 4$  are supplementary

$\angle 3 \cong \angle 4$

Prove:  $\angle 1 \cong \angle 2$



**Item #4: Using Logic with Data (Driver's License)**

1. Austin is a 16-year old living in New Jersey. Write a TRUE conditional (“If \_\_\_\_\_, then \_\_\_\_\_.”) as it applies to Austin getting his regular restricted driver’s license.
  
2. Write the converse of your conditional from Question #1.
  
3. Is the converse you wrote in Question #2 true or false?
  
4. The following states have been grouped: Alaska, Arkansas, Iowa  
  
What is the unique characteristic of this group of states as it applies to the data?
  
5. The following states have been grouped: Arizona, California, Delaware, District of Columbia, Hawaii, Idaho, Kentucky, Maryland, Massachusetts, Montana, Nevada, New Hampshire, New Mexico, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, and Wisconsin  
  
What is the unique characteristic of this group of states as it applied to the data?
  
6. Using the remaining states, create groups for the remaining states. Next to each group, state the characteristic of each group.

*For questions 7-10, determine the validity of each conditional.*

7. \_\_\_\_\_ If you live in Nevada and are 15 years and 9 months of age, then you can apply for a learner’s permit.
8. \_\_\_\_\_ If you live in Washington and are 15 years old, then you can apply for your restricted license in 6 months.
9. \_\_\_\_\_ If you live in New York and are 25, then you could obtain a learner’s permit or a restricted license.
10. \_\_\_\_\_ If you are classified as a ninth grader in South Carolina, then you could obtain a learner’s permit.