

# GEOMETRY

## Unit Four Project: "Lines & Angles"

**OBJECTIVE:**

- ✓ Follow directions to create string designs formed by the lines and the various angles in and around the lines.

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*In this unit, you are working with various types of lines and angles. You are learning that certain kinds of lines have special properties as do the angles in and around those lines. Lines in the same plane can be perpendicular, parallel, and intersecting. Angles formed could be alternate-interior, same-side interior, corresponding, vertical, supplementary, complementary, and even adjacent.*

*This project will allow you to see what the lines and angles together can create through string design. Math is very beautiful in the patterns that it creates. Math is seen all over in the skylines of cities, to the many elements of nature, and to the architecture and art that has been designed over centuries.*

*This project will allow you to see some of the skills you will be exploring in this unit. The project is due the day before the unit four exam. The directions are shown below. We will begin the project together in class but it will be up to you to finish it. **This project is worth 50 points.***

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### **SCORING**

- 4 Points .....Project is on a piece of heavy material painted on one side.  
3 Points .....Prime number of holes selected around the circle.  
3 Points .....Holes are created an equidistant apart from each other.  
12 Points Each (Max = 36 Pts) .....Circle correctly created using design directions.  
3 Points .....Rules you followed on the back of the finished project.  
1 Point .....Name and date on the back of the finished project.

\*The rules on the back should read similar to the following:

"I used 31 as my prime number on the outside. The distance between each hole on the outside of the circle was approximately \_\_\_\_ degrees. My first design began going by every 15<sup>th</sup> hole. I then decided to go down by 4 in my pattern. My second design then went every 11<sup>th</sup> hole. My third design went every 7<sup>th</sup> hole. My last design went every 3<sup>rd</sup> hole."

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### **DIRECTIONS**

1. Begin with a piece of heavy material (cardboard for example) that is a minimum of 10" x 10" and a maximum of 12" x 12". One side should be such that you can draw and measure on it. That side should be fairly plain.
2. Paint one side of the cardboard a solid color of your choice.
3. On the NONPAINTED side of the cardboard, find the center point. Using the center and a compass, create a circle that has a 4" radius.
4. Pick a prime number between 20 and 40.
5. Next you need to create dots on the circle equivalent to the prime number you selected. If you selected the prime number 23, you need 23 dots. Determine the number of degrees needed between each dot. A circle is 360 degrees.
6. Use a protractor to measure out your dots. They should be evenly spaced when done.
7. Carefully poke small holes in your dots.

8. Insert a brad in each hole so that the brad head is facing out of the PAINTED side of your cardboard.
9. Bend the back of the brad back so that the head of the brad can be moved up a little from the painted side. You will need enough room to string between the brad head and the painted side.
10. You will need approximately 12 or more meters of string. The amount of string will vary depending on some upcoming decisions. You can always tie more on if necessary.
11. Pick a number that is less than half of your prime number but close to half. If you chose 23 as your prime number, then half of 23 is 11.5 so you may want to choose 11 BUT NOT 12 since it is over half of 23.
12. Pick a point to start in which to start. Tie your string underneath the brad head to begin. Next count over the number of heads you selected in Step 11. If you chose 11, then count over 11. Attach the string around the brad head so it is tight but not so tight where the cardboard begins to bend. Do not cut it. Count over 11 heads again and attach the string around the brad head. Continue this until you get back to your original starting point. Once you get back to your original starting point, then leave enough string so you can cut it and tie it on to that brad. **YOU DO NOT NECESSARILY NEED TO CUT THE STRING THOUGH; YOU CAN CONTINUE ON AT THIS POINT TO THE NEXT STEP WITHOUT CUTTING. THAT IS ENTIRELY UP TO YOU!**
13. Next, pick an interval of space between your next set of dots and string. The smaller the interval, the more of a design you will achieve. The bigger the interval, the less of a design you will achieve. If you choose an interval of 3 and your first set of dots were counted by 11s, then this round would be counted by 8s ( $11 - 3 = 8$ ). The round after that would be counted by 5s ( $8 - 3 = 5$ ). The last round could be counted by 2s ( $5 - 3 = 2$ ). **YOU NEED A MINIMUM OF 3 ROUNDS.** So you could do 11, 8 and 5. The more rounds you go the more string. It would be up to you if you wanted to do another round of 2. If you chose an interval of 4, you could do 11, 7, and 3. You could choose an interval of 2 also and go 11, 9, 7, 5, 3 if desired.
14. String your next round from the same starting point or you can choose a different starting point. Continue to string each round until you get back to the starting point for the round. Make sure you have done at least 3 rounds. You can do more if you wish.
15. Tie off your last round of string.
16. Bend the backs of the brads down so they are flush with the back.
17. Place your rules you used on the back side.
18. Write your first and last name and date on the back side.
19. Keep it upside down or place something heavy on it so it does not begin to bend in.
20. Turn it in on or before the given deadline!