1 Introduction

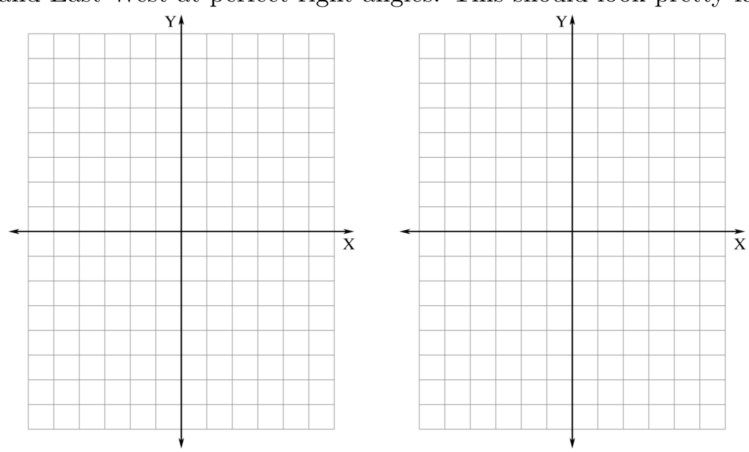
Geometry may seem complicated, but it's just shapes and their characteristics!

2 Tangrams

The tangram is a puzzle game where you get seven shapes, called tans, which you have to put together to form a shape. The objective of the puzzle is to form a specific shape using all seven pieces, which can not overlap. Let's try some!

3 Taxis and Crows

Imagine you're driving a taxi in a big big city. This perfect city is made out of many many streets stretching out both North-South and East-West at perfect right angles. This should look pretty familiar (it looks just



like a normal graph!).

1. Let's say you are driving a customer from the origin (0,0) to point (3,5)? What is the taxi distance? How many different paths of shortest length can you take? Remember, it's as the taxi drives, not as the crow flies.

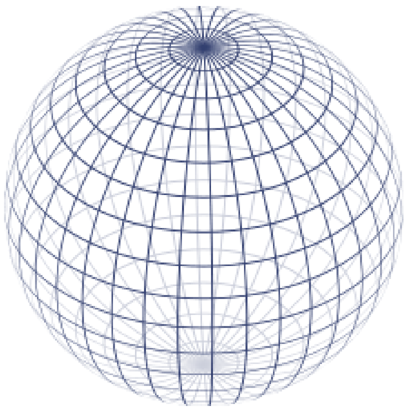
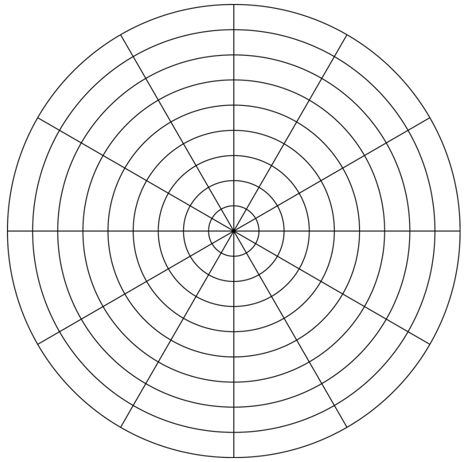
2. Now, a crow wants to know all the places it can go that are four units away. Try drawing all the points the crow can go on the left graph.

3. Let's do the same for the taxi. What are all the places it can travel with enough gas to drive 4 units?

4. If π can be calculated in the crow's map as circumference divided by diameter, what is the "π" of a taxi?

4 It's a Ball World After All

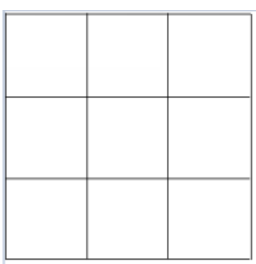
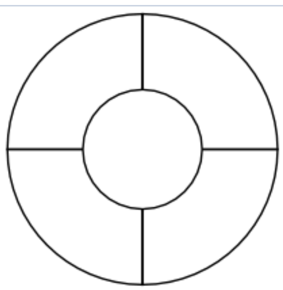
Maybe you're not a bird, or even a taxi driver. You're and astronaut! And the earth is round. Like this:

1. Can you make two parallel lines?
2. Make a triangle on both maps. How do you even make a triangle on a sphere?
3. How do you calculate the side lengths?

5 Color Theorem

This activity is about coloring, but don't think it's just kid's stuff. This investigation will lead to one of the most famous theorems of mathematics and some very interesting results. Have you ever colored in a pattern and wondered how many colors you need to use? There is only one rule: Two sections that share a common edge cannot be colored the same! Having a common corner is OK, just not an edge. Let's try! The goal is to find the minimum number of colors that you need to color in each picture.


6 SUPER Cool Trick: Shoelace Theorem!!

This is a really cool (and relatively easy) way to find the area of a polygon if you have the coordinate points of its vertices! Here's how:

1. Plot the points on a graph.
2. Choose any point and call it the starting point. Choose either clockwise (cw) or counterclockwise (ccw). Make sure that once you choose, you do not change either of these for the rest of the steps.
3. Starting at the starting point and going either cw or ccw, write all the x-values in a column and all the y-values in a column (to the right of the x column).
4. At the end, rewrite the x- and y-values of the starting point. THIS IS VERY IMPORTANT!
5. Now, starting with the first x-value, connect each x-value with the y-value that is one space below it. Multiply each pair together and add these values.
6. Now, starting with the first y-value, connect each y-value with the x-value that is one space below it. Your diagram should now look like shoelaces! Once again, multiply each pair together and add these values.
7. Subtract the second sum from the first. If you get a negative number, make it positive.
8. Finally, divide the value by 2. This is the area of the shape!!

Now, using the steps, find the area of the polygon with vertices at the following points: (3, -3), (-5, 1), (2.3), (5, 5), (-2,5), (1,-4).