



Flatland

PAP Geometry 3rd Six-Weeks Project

Objective: Explore the use of geometry in literature and in theology.

Important Note!! Although the Dover edition subtitles this book “A Romance of Many Dimensions,” the original version was subtitled “A Parable of Spiritual Dimensions” -- a title closer to the author’s intent (keep in mind that the author, E. Abbott, was a theologian first). Please be sure to read the dedication and preface to the second edition written by the “Editor” (the introduction is worth skimming as well).

DUE DATE:

If this project is turned in by the time I leave on December 21, you will receive 10 extra points (not including the 10 mentioned above)

The due date for this project is Wednesday, January 9. NO EXCEPTIONS and NO LATE WORK will be accepted.

Assignment:

There are 3 parts to this assignment. Each part will be weighted for your final grade.

Part 1 (35 Points)

Attached to this sheet are several comprehension questions that go with the story. They indicate which chapter they pertain to at the top of each sheet. Your task is to accurately answer each question completely. Each answer may be as succinct as you like, as long as the question is answered using a complete sentence. Each answer must be handwritten.

Part 2 (20 Points)

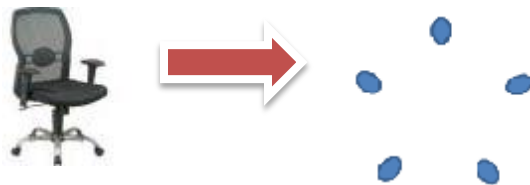
The main character of this story lives in a different world than us and therefore he sees the world differently than we do. Draw a top view of your room (or any room from **your house**) as he would experience it. Assume that he lives on the floor of this room. Example 1 below explains what we see as a chair would be viewed as 4 dots by the main character. Note: if it is not on the floor, a Flatlander wouldn’t be able to experience it! Also, provide a photograph of this room as we humans would see it. Points will be given for the following criteria:

3 pts – real-world picture of a room from your house.

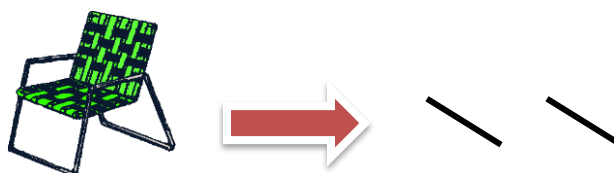
7 pts – picture is drawn neatly and items are labeled.

10 pts – a minimum of 5 objects from your room are accurately drawn as they would be perceived to a Flatlander.

Example 1:



Example 2:



Part 3 (35 points)

Now that you have read the book, I would like for you to write the introductory chapter of a sequel entitled "Spaceland." You, as a humble cube, should describe some of the aspects of society that you think we denizens of the fourth dimension need to understand. Don't try to invent an entire society, just choose some portion and see what you can come up with.

I found it very helpful for myself, in starting to generate ideas, to free myself from the floor. If the modest square could slide freely about in both of his dimensions, there is no reason why we modest cubes should be stuck to a two dimensional surface.

With that hypothesis, here are some suggestions which might help you get started:

- Spaceland might have an army consisting of pyramids, with the ranking corresponding to the number of sides the base of the pyramid has, and the highest ranking officer being almost indistinguishable from a cone. How would promotions happen? What would be some good fighting tactics?
- Males could have an odd number of vertices and females even. If being high class means having lots of faces, distinguishing genders could get tricky!
FACT: It is not possible to keep adding faces all of which have the same regular shape. The maximum number of faces for a polyhedron with regular polygonal faces is 20 (an icosahedron -- all the faces are equilateral triangles.) So would it be higher class to have many faces but not all of them the same shape, or to have 20, all of them regular? Or might society be divided between the two points of view and have different people admiring different characteristics?
- One could start from the opposite end of things and posit three different areas within which there are separate hierarchies (modeled on Society, Business and Academia.) Then figure three different types of polyhedra and how each might progress as the person "rises" through that particular society. Note that the fact that in Flatland the only way to achieve new sides is by being born that way does mean Spaceland has to have the same system.
- Instead of a Color Revolution one might have a Mirror Revolution in which some or all of the sides of some or all of the inhabitants acquired reflecting surfaces. What might be the advantages? The drawbacks?
- Where might stellated figures fit into the general scheme?

That's the batch that have leapt to my mind as I sit at the keyboard, leafing through Flatland or staring into space (all three dimensions of it.) Note that you should also feel free to ignore every word of this and come up with your own ideas.

NOTICE:

The points only add up to 90. In order to get a 100 on this project, you need to go above and beyond the minimum. Your project needs to be extraordinary to get those extra 10 points.

Comprehension Questions Chapters 1-6. Use complete sentences. All answers must be handwritten.

- 1) What is the difference between Flatland and Space?

- 2) Explain how people in Flatland appear to each other.

- 3) Explain two different ways that people in Flatland use to distinguish their positions (North and South).

- 4) Describe who is represented by the following geometric objects:
 - a. Lines
 - b. Equilateral Triangles
 - c. Isosceles Triangles
 - d. Squares/Pentagons
 - e. Polygons (>5 sides)
 - f. Circles

- 5) How is the shape of a child based on the parent's shape?

- 6) How many generations would be required to change an Isosceles with a brain size of 57 degrees to become a member of the Regular class?

- 7) What part of the object is examined when "feeling" is done? How do Flatlanders actually learn to feel this?

- 8) What natural occurrence helps the process of sight discrimination? Explain.

Comprehension Questions Chapters 7-12. Use complete sentences. All answers must be handwritten.

- 1) Why is it important for all people in Flatland to be regular?
- 2) What happens to a person who is born irregular? How are they treated?
- 3) Which people in Flatland were colorless centuries ago? Why were they?
- 4) Why did the coloration of priests and women cause objection in Flatland?
- 5) Why did women at first want the color bill to be signed, and then decided against it?
- 6) What was the eventual outcome of the color bill?
- 7) Why is it difficult to distinguish circles from high class polygons?
- 8) What laws of nature make it difficult for a polygon to become a circle?

Comprehension Questions Chapters 13-17. Use complete sentences. All answers must be handwritten.

- 1) Explain how Lineland differs from Flatland. What dimension is Lineland?

- 2) How do people distinguish amongst each other in Lineland?

- 3) What terms from Flatland caused difficulty for people to understand in Lineland? Explain.

- 4) How did the square attempt to show the monarch of Lineland that there was a different world besides Lineland?

- 5) Who was the mysterious visitor that arrived at the square's home?

- 6) What land did the mysterious visitor come from?

- 7) Explain how the visitor tried to prove that there was another world besides Flatland by using his body.

- 8) What did the square do to the visitor to try to get rid of him?

Comprehension Questions Chapters 18-22. Use complete sentences. All answers must be handwritten.

- 1) What happened to the square's brother during the meeting with the counselors?

- 2) How did the sphere construct a solid for the square? What kind of solid was it?

- 3) Where did the sphere take the square during his dream after returning from Spaceland? What did people look like in this land?

- 4) Why does the sphere feel that living a happy life is not enough?

- 5) Who did the square decide to tell about his encounter with Spaceland? Why did he choose to tell this person first? What success did the square have in explaining Spaceland?

- 6) What did the authorities require the square to do in order to prove that there was a 3-dimensional land? What eventually happened to the square because of his inability to do this?