

Jadie in Five Dimensions

Teaching Guide

Discussion Questions

1. Why does Jadie serve the Seers in the beginning of the story? When she says in Chapter 3, “My life isn’t a debt that needs to be paid. It’s an *obligation*,” what does she see as the difference between those two things?
2. “The butterfly effect” is an aspect of chaos theory which suggests that a small change in a system will eventually cause much larger changes. The name comes from a quote by the American mathematician Edward Lorenz: “If the flap of a butterfly’s wings can be instrumental in generating a tornado, it can equally well be instrumental in preventing a tornado.” How does the butterfly effect explain the “course corrections” assigned to the human Agents by the Seers?
3. Why is Jadie reluctant to show her adoptive parents J.D. Lowell’s baby album?
4. How does traveling through 4-space create a “short-cut” between any two locations on Earth? (If necessary, consult the lesson about the Transporter conducted by Miss Rose in Chapter 7.)
5. Why is it so important to Sam that he complete a multi-dimensional game landscape? How do his father’s mathematical theories help him to achieve his goal?
6. In Chapter 13, Ty reviews his plan to use the Transporter to acquire a fortune, but seems uncertain what his long term goal is. Why do you think Ty doesn’t know what he wants? Do you have a theory about what Ty really wants?

7. Why does Ty value Marius's friendship? Why do you think Marius goes along with Ty's schemes?
8. What feelings does Jadie have for her birth family at first? How and when does that change? Why does she resist thinking of Dr. Lowell as her father even while launching his rescue?
9. Is Miss Rose a trustworthy character?
10. Why do you think Ty immediately believes and joins forces with Dave and Steve?
11. Why is Ty so jealous of Jadie?
12. What kind of life might be possible in a 2-space universe? Do you think life would be possible in 1-space? What would 1-space look like?
13. Do you think the inhabitants of 4-space are more or less technologically advanced than humans? How do the 3-space universes serve as "petri dishes" for the Seers? Explain the hierarchy of the *clianthh* roles: Seer, Technician, Drone, and Breeder.
14. In Chapter 35, Dr. Lowell warns Jadie's adoptive parents, "You can't make a knot with 3-D rope tied to a 4-D structure in 5-space!" What does he mean by this?
15. Do you give any credence to Ty's theory at the end of the story that everything that happened was planned by the Seers? Why or why not?

Activities

ENGLISH LANGUAGE ARTS

- **Point of View:** Jadie's chapters are written in first person. Sam and Ty's chapters are written in third person. Discuss with students the technical differences between these viewpoints. (First person narration = I, me, my. Third person narration = He/She, him/her.) Assign the accompanying worksheet in which students identify the point of view.
- **Perspective:** While Jadie's perspective carries us most of the way through the story, select chapters are written from the perspective of Sam Lowell and Ty Rivers. Why? What do we gain from Sam and Ty's chapters that we could not get from Jadie?
- **Character Analysis:** Discuss the personality traits of the three POV characters, Jadie, Sam, and Ty. Use the 3-way Venn Diagram worksheet to compare and contrast their traits.
- **Plot and Character Reversals:** A reversal is when the plot appears to be going in one direction – or a character appears to be one thing – and new information is revealed that changes the direction of the plot or the nature of the character. Discuss character reversal in terms of Miss Rose, Dave, and Steve being viewed as good guys or bad guys over the course of the story. Discuss plot reversal in terms of how the Agents' mission assignments are believed to be 1) putting Earth on track for a brighter future, 2) a Las Vegas-type gambling enterprise, 3) a science experiment for the Seers.

GEOMETRY

- **Lines, Planes, Polygons, and Solids:** *Jadie in Five Dimensions* lends itself to paring with any standard geometry curriculum in which students study the characteristics of one-dimensional, two-dimensional, and three-dimensional objects. Imaginative discussion on the nature of hypothetical four-dimensional objects may be explored.
 - Worksheets can be found at <https://www.education.com/lesson-plans/geometry/>
 - Video: A Beginner's Guide to the Fourth Dimension:
<https://www.youtube.com/watch?v=j-ixGKZILVc>

- **Flips, Slides, and Turns:** When Jadie moves her bracelet to her other arm, the Transporter “flips” her body in 4-space so that she returns to Earth “reversed.” Explore the difference between flips, slides, and turns with polygons.
 - Alphabet symmetry: Students flip letters of the alphabet to see which ones remain unchanged.
 - Worksheets: <https://easyteaching.net/maths-resources/geometry-worksheets/2d-3d-shape-worksheets/flips-slides-turns-worksheets/>
- **Möbius Strips:** Easily constructed with a strip of paper and tape, this curious three-dimensional object has only 1 side and 1 continuous edge.
 - Möbius strip activities: <https://www.pleacher.com/mp/puzzles/tricks/mobistrp.pdf>

SCIENCE

- **Gravity:** One of the most important characteristics of 4-space is the overwhelming force of gravity. Students can explore the effects of gravity with several simple experiments.
 - Gravity experiments: <https://sciencing.com/simple-gravity-experiments-8555558.html>
- **Life in Two Dimensions:** Ask students to imagine living creatures who exist in a space as flat as a piece of paper. Have them design a two-dimensional world.
 - Two examples are included among the activity pages. 1) The author’s depiction of plants and amoeba-like creatures existing on a two-dimensional plane. 2) An illustration from the Victorian novella *Flatland* by Edwin A. Abbott. The drawing shows the two-dimensional residence of the main character, a square. Students can expand upon these ideas, or create something completely different.

ART

- **M.C. Escher:** The mind-bending art of M.C. Escher is referenced several times *in Jadie in Five Dimensions*. Escher’s art is known for its use of optical illusions, impossible geometry, and tessellations. Particular mention is made of *Belvedere*, which is modeled after the impossible cube.

- The official gallery of Escher artwork can be found here:
<https://mcescher.com/gallery/>
- Ask students to choose their favorite Escher work and write a haiku to accompany it.
- **Optical Illusion Art:** The eye can be fooled into perceiving three-dimensions in a two-dimensional drawing. Even the simple drawing of a cube can have this effect. Students will enjoy exploring more complex ways to produce the same effect.
 - The accompanying activity sheets include a simple drawing activity that produces a 3-D Illusion cube.
 - If the class is ready for a challenge – or if you have students who want to explore on their own – the following links provide instructions for more time-consuming or complicated art.
 - A 3-prong illusion: <https://www.tes.com/lessons/NxdPS1b-3-ZRFQ/optical-illusion-drawings>
 - The impossible cube: <https://easydrawingguides.com/how-to-draw-an-impossible-cube/>
 - Illusion spheres: <http://afaithfulattempt.blogspot.com/2011/01/op-art-spheres.html> (Note: This one takes patient coloring. It's a good activity for students to stick in a folder and work on when finished other work.)
- **Tessellation Art:** Tessellation is an arrangement of repeating polygons, closely fit without any gaps. Like the illusion spheres above, once the initial work is completed, this artwork involves a lot of patient attention. It makes an excellent folder activity, something to work on in spare moments or with substitutes.
 - Written explanation for tessellation art:
<https://stemactivitiesforkids.com/2019/10/08/create-a-simple-tessellation/>
 - Video demonstration for tessellation art:
<https://www.youtube.com/watch?v=WBVzoaFi90E>

Name _____

POINT OF VIEW

In the book, Jadie's narrative is told from a **first person** point of view, while Sam and Ty's narratives are told in **third person**. Can you identify which is which? For the passages below, identify whether they are written in **first person** or **third person**.

1. My target holds her phone against her ear, scurrying down the sidewalk in high heels. She's dragging a wheeled suitcase and carrying a tapestry bag over her shoulder. The bag has sunflowers on it, which is how I know I've got the right lady. _____

2. He doesn't want to feed Mom's paranoid delusions, but he has to admit it sometimes seems like the universe holds a grudge against the Lowell family. _____

3. Occasionally, Ty wonders what it would be like to have a sister of his own. Based on what he's observed of Jadie, he assumes she'd spend her time butting into his business. Telling him not to drop Dad in the shark tank and wanting to keep ponies on his secret island hideout.

4. I knew there'd be a price, but I thought he'd ask for a future alibi or my firstborn child, like Rumpelstiltskin. Clenching my teeth, I fantasize about hitting him over the head with that shark-in-a-jar. _____

5. He has two more weeks to turn in a working project, and if he can't meet that deadline, his teacher's friend will use a different landscape design. _____

6. My back slams against a solid surface, knocking the air from my body. The blow stuns me so much that it's a couple of seconds before I try to take a breath—and when I do, I fail. _____

7. I'm in Naples, Italy—my first international course correction. That I know of. I hate to admit it, but Ty was right. It was dumb not to be tracking my movements all along. _____

8. Sam wonders if his ears have failed him again. His program? Meaning, what—the video game landscape? Impossible! And surely this huge, horrifying creature is not named *Miss Rose*?

BONUS

“Take me!” Ty shouts. Stepping forward under the shimmering lights and the girl hanging midair, he raises his arms to the creature. “Let her go, and take me. I'm similar to Jadie. You can adapt to me. I *want* to stay!” _____

POINT OF VIEW

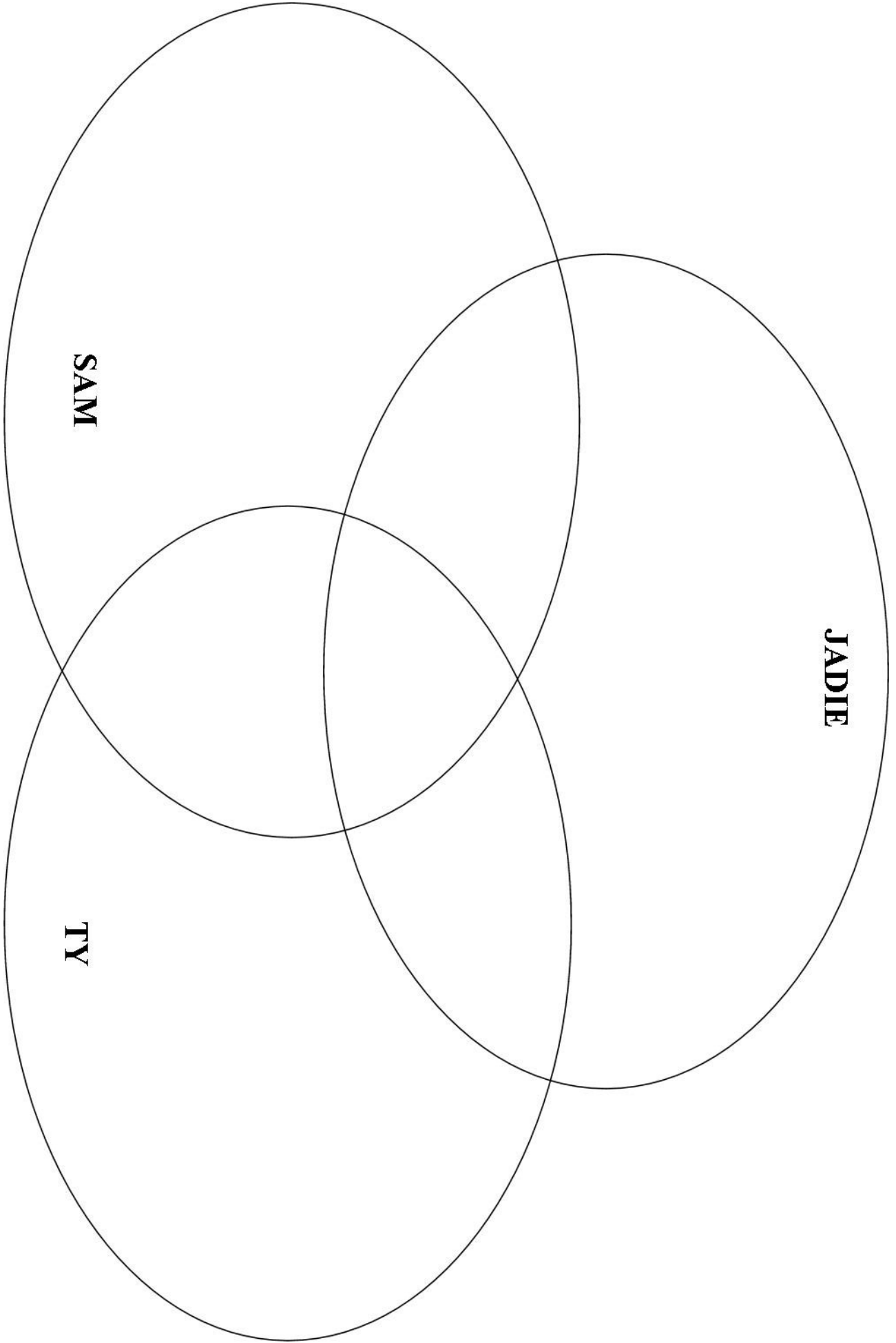
ANSWER KEY

1. First
2. Third
3. Third
4. First
5. Third
6. First
7. First
8. Third

BONUS: Third.

Although Ty's lines of dialogue are in first person ("*Take me! I want to stay!*"), the passage is written in third person. *Ty shouts. Stepping forward under the shimmering lights and the girl hanging midair, he raises his arms to the creature.*

Dialogue is often in first person. Therefore, caution students to always seek out narrative that is not dialogue when determining point of view.



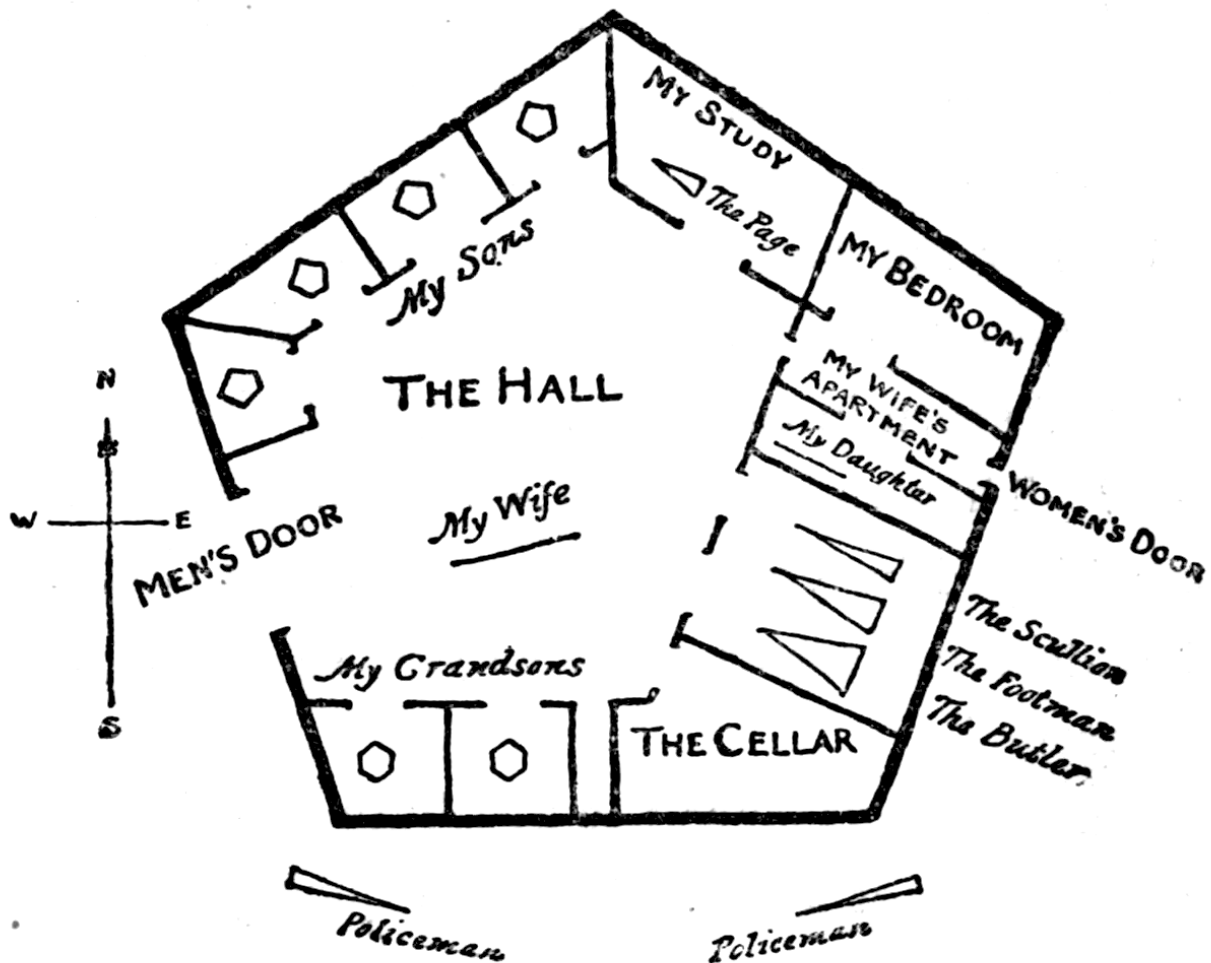
A Two-Dimensional World



FLATLAND

By Edwin A. Abbott

Published 1884



This is the residence of the main character, a Square.

His wife and daughter are line segments.

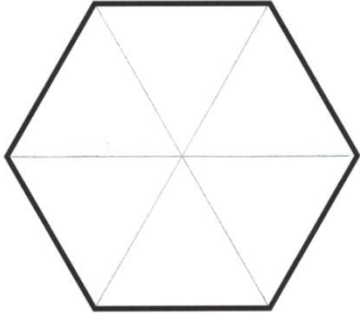
His sons are pentagons; his grandsons are hexagons.

The servants and policemen are triangles.

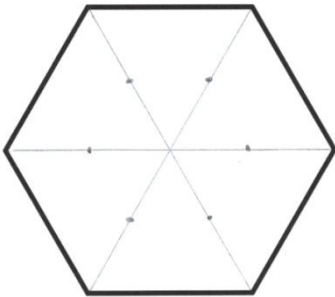
The story was written to poke fun at Victorian prejudices about men and women and social classes.

3D Illusion Cube

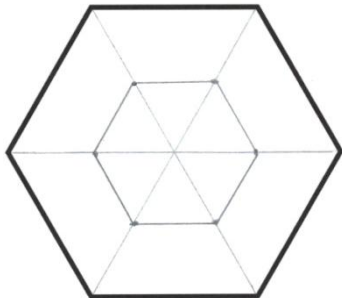
1. Use a ruler to connect the opposite vertices of the hexagon shape provided.



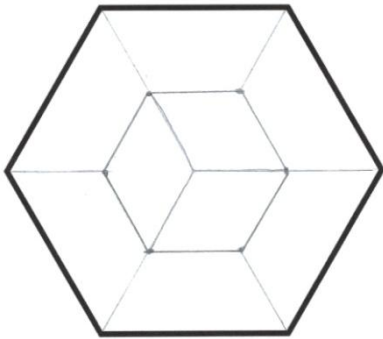
2. Draw a dot on each line 4 cm (1.5 in) away from each vertex.



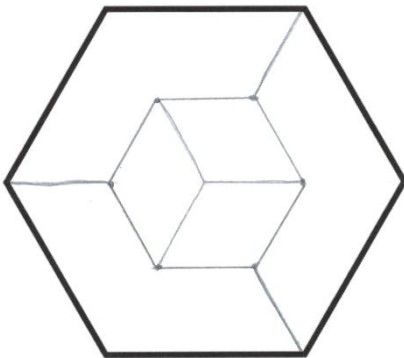
3. Using a ruler, connect the dots to form a smaller hexagon.



4. Starting with the top **right** of the **small** hexagon, erase **every other** line inside that hexagon.



5. Starting with the top **left** of the **large** hexagon, erase **every other** line.



6. Using three contrasting colors, match the opposite sections of the large and small hexagons. For a finishing touch, darken the remaining interior lines.

