

The COMEDY of ERRORS By William Shakespeare

The Comedy of Errors and NASA Twin Studies Collide in Space and Genetics

Grade Level(s): 9-12

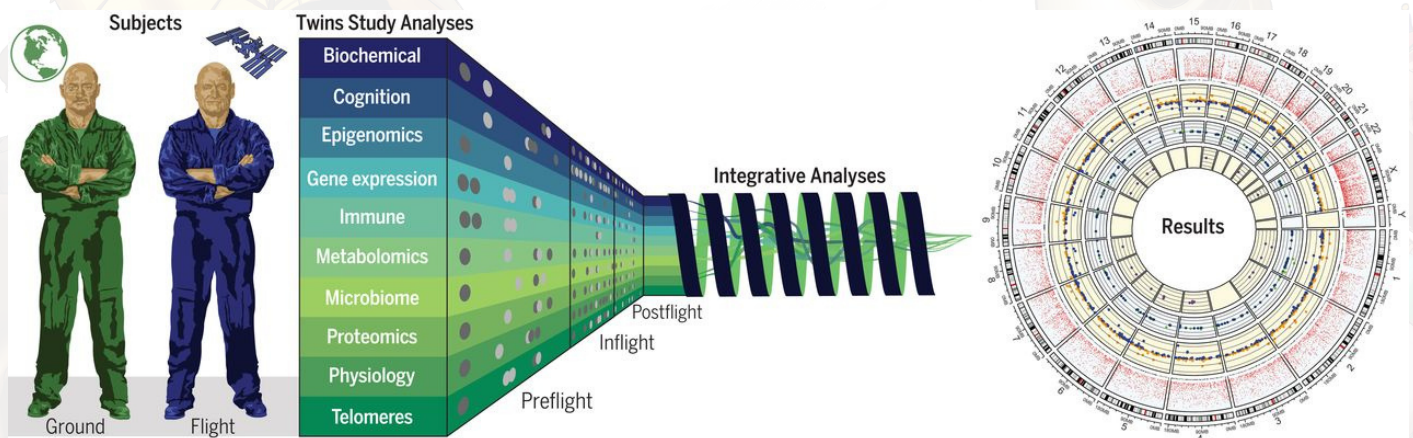
Subject: Life Science

Florida Standard: SC.912.L14, Organization and Development of Living Organisms

Objective: Students will be able to explore and understand the correlation of mistaken identity in *The Comedy of Errors* with the investigation of human genetics and health impacted by space travel in the 1-year **NASA Twin Studies** mission.

Duration: Three 45-minute classes.

Materials: Student laptops for research, Infographics for both *The Comedy of Errors* and the NASA Twin Studies.





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Vocabulary:

- **Monozygotic (MZ) twins** - Conceived when a single egg fertilized by a single sperm splits into two after fertilization. Such twins have nearly 100% of their genes in common. Identical twins share the same genomes, blood type, and are always of the same sex. Also known as monovular twins, share an identical genetic heritage because they are two individuals who derive from the same zygote. For this reason, they have been considered indistinguishable.

Helpful Resources:

- <https://www.coursehero.com/lit/The-Comedy-of-Errors/infographic/>
- <https://www.nasa.gov/humans-in-space/twins-study/twins-study-fun-facts-and-shareables/>

1. Introduction (5-10 minutes)

- Introduce the concept of the NASA twin studies and their significance in understanding the effects of space travel on human health and genetics.
- Discuss the play *Comedy of Errors* and its themes of mistaken identity, twins, and the interplay between nature and nurture.

2. NASA Twin Studies Overview (15-20 minutes)

- Present an overview of the NASA twin studies, including the unique aspects of studying monozygotic (identical) twins, Mark Kelly and Scott Kelly. Scott Kelly spent 340 days in space on the International Space Station, while Mark Kelly remained on Earth. Scott conducted many experiments including how space was affecting his health.
- Discuss the findings related to genetics, gene expression, and the impact of space travel on the human body, including how environmental stressors in different environments influence the activity of different genes, leading to a better understanding of physiological processes in space.

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3. *The Comedy of Errors* Character Analysis and Parallels (15-20 minutes)

- Analyze the identical twin characters in *Comedy of Errors*, Antipholus of Syracuse and Antipholus of Ephesus, along with their respective servants, Dromio of Syracuse and Dromio of Ephesus. Identify how the two sets of twins are similar to and different from each other. Ask students what “Errors” transpire due to the inability to tell the twins apart.
- Draw parallels between the confusion caused by mistaken identities in the play and the physiological changes observed in the NASA twin studies. Identify how their environment may have impacted their physiological and psychological similarities and differences.

4. Group Discussion, Comparison, and Mapping Project (45 minutes)

- Group Project Posters: Divide students into groups with instructions to discuss, compare and visually map out the mistaken identities in the play with the genetic and DNA changes observed in the twin studies. Students will use *The Comedy of Errors* character analysis and **NASA Twin Studies** infographics along with other applicable research.
- Instructions for this portion include students showing the impact of environmental factors on genetic expression in both contexts. Posters will highlight student collaboration and research on a specific aspect of the **NASA Twin Studies**, its implications for space travel and genetics. Maps/posters should also include an illustration from the play and from the NASA research.

5. Application and Conclusion (45 minutes)

- Group Posters will be set up for a Gallery Walk with opportunities for students to comment on each poster.
- Conclude the lesson by summarizing the connections between mistaken identity, genetics, and the real-world implications of space travel, highlighting the importance of ongoing research in these areas.