

Teacher Guide for ODYSSEY

November/December 2009: Einstein: The E-Factor

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INTRODUCTION: Ask students who they think the smartest human is or was. Then ask them who they think are smarter...dogs, cats, or fish. At the end of reading the articles, ask them again.

WHOLE CLASS ASSIGNMENT:

Have the students read the articles

Spooked by Quantum Mechanics (p.2)

Volcanic Explosion! (p.3)

Mysterious Space Blob (p.4)

Robot Scientist (p.5)

The Einstein Effect: Personal Reflections on the Genius and the Man (p.9-12)

The E-Factor: What Kids Think (p.16-17)

Getting to Know Relativity (p.24-25)

Einstein's Toy (p.32-33)

Orion's Belt: Favorite Stars with Nifty Names (p.42-43)

Ask Dr. Cy Borg (p.46)

Who Wins the Einstein Award? Dogs, Cats, or the Nine-Spined Stickleback Fish (p.49)

AFTER reading the articles have students create a graphic organizer (trifolds), label each with a title of article, write 3 facts for each and illustrate.

DIVIDE students into groups of 3 or 4 students. Have them read assigned article and use the questions to guide their group discussion. Have students create a presentation with a visual (e.g. chart, poster, graph, power point) to explain the information from their articles. Make presentation to class.

The Mad Scientist's Mad Scientist (p.6-8)

1. Why was Einstein the mad scientist role model?
2. Why was he a mad science hero?
3. Explain his experiments.
4. Why wasn't injured by his mad escapades?
5. What are gedanken experiments?
6. What do they test?
7. Explain his light beam race with Sir Isaac Newton.
8. What 3 weird facts did he decide were true?
9. What did these facts prove according to Einstein?
10. What was Einstein's version of the universe?
11. What racer can challenge light beams?
12. Explain how this race happens.
13. Where is Einstein's weird laboratory?

One Awesome Equation: mc² (p.13-15)

1. What did Einstein use in his formula in 1905?
2. What did it change to in 1912?
3. Based on his relativity work, what did Einstein conclude?
4. Who else linked energy and mass?
5. Why does Einstein get the credit?
6. How did we know Einstein was right?
7. Explain how $e=mc^2$ has affected our life?
8. What is a direct result of $E=mc^2$?
9. What is the appeal?
10. What was Einstein's genius based on?
11. Can you do Einstein's equation? Try on p.15.

Beyond Einstein (p.21-23)

1. What did Einstein's theory explain?
2. How is NASA planning to test Einstein again?
3. What is gravity?
4. What did Einstein want to do away with?
5. Explain his general theory of relativity.
6. How did Einstein know he was right?
7. When applied to the whole universe, what did he predict?
8. What did this theory become known as? Explain it.
9. What are Big Black Holes?
10. What is in the future for Einstein fans?

Einstein's Refrigerator? The New Green Machine (p.26-27)

1. Why didn't Einstein have a refrigerator in 1925?
2. What is thermodynamics?
3. Why did Einstein want to help Leo Szilard?
4. What is refrigeration?
5. What did Einstein and Szilard want to find out?
6. What design showed promise?
7. What is a Kältemaschine and who was interested in it?
8. How did it work?
9. Explain the different design
10. Why did the AEG project end?
11. What did the new U.S. conventional refrigerator lead to?
12. What is going on now?

Parallel Universe: THEN: Eclipsing Tradition (p.28,30)

1. What are the astonishing consequences of Einstein's general theory of relativity?
2. What didn't seem possible in 1915?
3. What was the ray of hope astronomers offered?
4. What caused scientists around the world to turn on each other?
5. What would test the relativity?
6. When do stars near the Sun become visible?
7. What did the eclipse probe?

Parallel Universe: NOW: When Galaxies Align (p.29, 31)

1. How large is Dr. Bolton's telescope?
2. What is he an expert in?
3. What are Einstein's rings?

4. Explain the effects of relativity.
5. Where have we gone from the 1919 eclipse expedition?
6. What is gravitational lensing?
7. Why did Einstein doubt that the rings wouldn't be seen?
8. Where does the effect take place?
9. What are the requirements to see these natural telescopes in space?
10. What can you learn from his rings?

Mysterious Cells Found in Einstein's Brain (p.34-37)

1. Why did Dr. Harvey steal Einstein's brain?
2. What did he do with the brain?
3. What were the findings of Dr. Diamond?
4. What does glia do?
5. Describe what the new method to probe glia lead to?
6. Why is it impossible to prove any of the findings associated with the study of Einstein's brain?

When Einstein was Wrong (p.38-40)

1. Make a 4-column chart. Label the following:
Mistake #1: Your Math was Messy
Mistake #2: You Measured Wrong
Mistake #3: You Changed Your Correct Answer
Mistake #4: You Did the Wrong Problem
2. Under each column write information about his mistakes.
3. What were the outcomes for each one of his mistakes?

Read, Relax, and Enjoy

1. Read the story *Julie at the Fountain* (p.18-20).
2. What would you have said to the old man at the fountain?
3. Try to look at running water the way, he told Julie to look at the water in the fountain. Does it work?