

Space Race.

Grades 6-8

Objectives:

- Students will understand what semiconductor wafers are and their role in making microelectronic chips.
- Students will learn about the atomic composition and structure of materials used in semiconductors.
- Students will be introduced to the process of manufacturing microelectronic chips from semiconductor wafers.
- Students will understand the analogy between semiconductor wafers and pizza bases.

Materials:

- Circular Surface
- Foam Squares
- Timer

Driving Question

- How are semiconductor wafers constructed, and microelectronic chips manufactured similar to a pizza is made?

Standards

- MS-PS1-1. Develop models to describe the atomic composition of simple molecules and extended structures.

Science and Engineering Practices

Developing and Using Models

Modeling in 6-8 builds on K-5 and progresses to developing, using and revising models to describe, test, and predict more abstract phenomena and design systems.

- Develop a model to predict and/or describe phenomena.

Crosscutting Concepts

Scale, Proportion, and Quantity

- Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small.

Vocabulary

- **Semiconductor Wafers-** thinly sliced crystals of silicon used in various technologies. They form the foundation for the creation of integrated circuits found in microchips, LED lights, and solar panels.
- **Microchips-** small electronic device that contains a large number of tiny electronic components.

Before Viewing

1. Introduce students to the term semiconductor wafers and microchips. Explain to students that semiconductor wafers are the foundation to create microchips. Explain to students that microchips are used in our everyday devices and that they are tiny but powerful that help the devices run smoothly.
2. Distribute the TWLH worksheet.
3. Have students complete the “T” (what they think they know) and the “W” (what they want to know) section.
4. While students are filling out that part, distribute the Space Race scavenger hunt worksheet.
5. *Optional, prompt students and explain that the pictures on the worksheets are clues to where to find where the answers are.

While Viewing

1. Encourage students to pay close attention. Students will complete the scavenger hunt worksheet.

After Viewing

1. Have students complete the “L” (What we learned) and “H” (How we know) of their worksheet.
2. Begin the **Space Race**
3. Divide students into teams giving each team a circular surface and equal amount of foam squares.
4. Explain the rules of the game: Within 90 seconds, each player gets a set of foam squares representing microchips (toppings on pizza) and the circular surface represents the semiconductor wafer (pizza crust). Chips must be placed flat on the

surface. Chips cannot hang off the wafer. The team that completes this task with the most squares on the wafer wins!

5. After the teams have competed in the Space Race, explain the pizza analogy.
 - Pizza base = Semiconductor wafer.
 - Explain that just like a pizza starts with a base, microchips start with a semiconductor wafer.
 - Toppings = Microchip components.
 - Compare adding the sauce, cheese, and toppings to placing different layers and components on a wafer.
 - Baking Process = Manufacturing Process
 - Relating to the baking of pizza to the process of doping, etching, and diffusion.

Discussion Questions

1. Why do you think that semiconductors are circular rather than square or rectangular?
2. Why are semiconductor wafers compared to pizza?
3. Why are multiple microelectronic chips produced at a time?
4. Think of some everyday devices that rely on microelectronic chips and explain their impact on your daily lives.