

The Cellular Phone**Inventions that Shook the World Series****Grade Levels:**

5-12

Subject Areas:

Technology

Engineering

Synopsis:

Marty Cooper worked at Motorola during a time when AT&T was trying to gain a monopoly over the mobile phone industry. In the 1970s, the only mobile phones were car phones, plugged in to large transmitter/receivers located in the trunk. Cooper uses new microprocessors to create a truly mobile phone that will operate on the first cellular networks.

Learning Objectives: Students will:

- Understand Marty Cooper's personality, including his challenges and what made him successful.
- Explain what new technology allowed for the creation of a mobile phone.
- Analyze how the mobile phone has changed our society since the 1970s.

Vocabulary:

Cell phone, cell network, Marty Cooper, microprocessor

Pre-Viewing Discussion:

What do you think inspired the creation of a truly mobile phone? How do you think competition may have factored in?

Do you have a mobile phone? How important is it to you? How do you use it? What do you do when you don't have your phone?

Post-Viewing Discussion:

Why is it more risky for a small company to take a big risk than for a large company?

What was AT&T doing that drove Motorola and Marty Cooper to create a mobile phone? How successful was Cooper in doing so?

What technology allowed for Cooper to make a small phone?

Further Activities:

Research the evolution of the mobile phone. How are today's phones the same, and how are they different, from those in the 1970s?

Analyze how mobile phones have changed our culture since the turn of the century. What are some of the benefits of having a mobile phone? What are some of the drawbacks?

The Bomb Disposal Robot
Inventions that Shook the World Series

Grade Levels:

5-12

Subject Areas:

Technology

Engineering

Synopsis:

In the 1970s, Lieutenant-Colonel Peter Miller works at the British Army's Weapons & Explosives Testing Center. He is charged with finding a way to keep bomb-disposal soldiers out of harm's way. He thinks he can do it with a remote-controlled device to move the car bombs to a safer place and then controlling the detonation of the device.

Learning Objectives: Students will:

- Understand why Peter Miller is spurred to create a bomb diffusing robot.
- Explain how his first prototype worked.
- Analyze how the bomb diffusing robot changed police and military operations since the 1970s.

Vocabulary:

Robot, robotics, Lieutenant-Colonel Peter Miller

Pre-Viewing Discussion:

How do you think bomb squads diffuse bombs today? How do you think that is different from how they operated in the past?

What areas of our lives are made easier or safer because of robots?

Post-Viewing Discussion:

What drove the British military to pursue a bomb-diffusing robot in the 1970s? What were some of the new risks they were facing?

How was Peter Miller's robot supposed to work? What was it supposed to do with the car bomb?

How did Peter Miller create a remotely-controlled device to help diffuse bombs? What kinds of robots do we use today?

Further Activities:

Research the evolution of bomb diffusing operations. How do we handle bombs differently today than we did in the past? How do we handle them the same? What has changed about the bombs themselves?

The Post-It Note

Inventions that Shook the World Series

Grade Levels:

5-12

Subject Areas:

Technology

Engineering

Synopsis:

Arthur Fry is singing in his church choir when his bookmark falls out of his hymn book. It strikes him that it would be helpful to have a sticky bookmark. He goes back to his lab at 3M and builds upon the work of a colleague, Spencer Silver, who had been trying to create a spray-able adhesive. When Fry sends a note to his boss on the back of his sticky bookmark, Post-It Notes are born.

Learning Objectives: Students will:

- Understand what sparks the idea for a sticky bookmark in Fry's mind, and how that leads to Post-It Notes as we know them.
- Explain what was different about Spencer Silver's adhesive.

Vocabulary:

Chemical engineering, Arthur Fry, Spencer Silver, Adhesive, Post-It Note

Pre-Viewing Discussion:

How do you use sticky notes? Where are they most useful for you? How do you think the sticky note was invented?

Post-Viewing Discussion:

What kind of personality traits did you find in Arthur Fry and Spencer Silver? Did you like them or find their commentary enjoyable? Why or why not?

What was Silver trying to create when he created the adhesive that would eventually be on Post-It Notes? How did Fry build upon what Silver had created? Do you think Post-It Notes would have been invented if either Fry or Silver had worked at a different company?

What kind of recognition have Fry and Silver received for their invention? How do you think they might feel about that?

Further Activities:

In the program, Post-It Notes are compared to "Twitter before computers." Using this concept, take a pad of Post-It Notes, and as a class, create a Twitter feed with them with Tweets relevant to your school or class.

The Hybrid Car**Inventions that Shook the World Series****Grade Levels:**

5-12

Subject Areas:

Technology

Engineering

Synopsis:

The hybrid car traces its innovation far beyond the Prius and today's vehicles. Back in the 1970s, Victor Wouk was working on a vehicle powered by electricity. When that proved unsuccessful, he started to think of ways to combine a gas engine with an electric one. He and Charlie Rosen worked to create a true, hybrid engine. Their car sips gas at half the rate of a regular car, but by the time they are finished, the energy crisis is over and the EPA is not interested in a hybrid vehicle.

Learning Objectives: Students will:

- Understand what made hybrid cars appealing during the energy crisis.
- Explain how a hybrid car operates differently from a conventional one.

Vocabulary:

Hybrid car, Victor Wouk, electrical engineering, Manhattan Project, Charlie Rosen, chemical engineering, Federal Clean Car Incentive Program, emissions, pollution, Environmental Protection Agency, Prius

Pre-Viewing Discussion:

Have you ever been in a hybrid car? Did you notice a difference from a conventional car?

Why do you think hybrid cars are popular in America today?

Post-Viewing Discussion:

What is the main problem with a purely electric car? Why did Wouk decide to try to build a hybrid car?

How did the conflict in the Middle East contribute to the appeal of a hybrid car? What Federal guidelines or incentives were initiated during this time?

How successful were Wouk and Rosen at creating a hybrid car? How is the hybrid different from a conventional car?

Why did Wouk and Rosen's car not catch on? Why do you think Wouk allowed Toyota to use his ideas in creating the Prius?

Further Activities:

Research the environmental impact of hybrid cars compared to conventional cars. How much better are they for the environment? What about a purely electric car? Do you think these vehicles will continue to increase in popularity? Why or why not?

The Digital Camera

Inventions that Shook the World Series

Grade Levels:

5-12

Subject Areas:

Technology

Engineering

Synopsis:

Steve Sasson is a junior engineer when his boss at Eastman Kodak gives him a camera and a CCD chip and asks what he can do with it. Sasson has the idea to replace the film in a camera with the CCD chip, creating a digital image. He builds a prototype and has a successful test, but Kodak doesn't jump on his invention right away because most of their business relates to selling and developing traditional film.

Learning Objectives: Students will:

- Understand how the CCD chip replaced the film in the first digital camera.
- Explain how the digital camera worked.
- Understand why Kodak did not jump on this new innovation.

Vocabulary:

Digital camera, photography, Eastman Kodak, Steve Sasson, Charge Couple Device, film

Pre-Viewing Discussion:

Do you have a digital camera? When do you find you use it the most? How does your digital camera differ from a traditional film camera?

Digital cameras allow us to see the images we are capturing in real time, rather than waiting for them to be developed. What are the advantages and disadvantages of this?

Post-Viewing Discussion:

Why was Steve Sasson given this assignment? What do you think his bosses thought when he showed them his digital camera prototype?

How did Sasson use materials around him to create the digital camera? How did that help him?

What insights did Sasson provide into his inventing process during the program? What does that reveal to you about Sasson as a person?

Further Activities:

Research how digital cameras have changed from the 1970s to now. Why do you think they did not catch on until the 1990s? How have digital cameras changed our culture since the 1970s?