



CLASSROOM ACTIVITY

Cyber Solutions

OBJECTIVES

Students will be able to:

- **Describe** the ways in which electronic computing and messaging is essential to many of our everyday business, education, and societal interactions
- **Perform** research to explain how cybersecurity systems assess and improve their security
- **Design** a model of a low-tech security system and compare components of this system to key cybersecurity measures
- **Assess** another security design and integrate these ideas in order to optimize their own design

OVERARCHING QUESTION

How can we ensure that our personal information is secure online?

ACTIVITY SUMMARY

Students will step into the role of a security employee at a technology company and explore the importance of cybersecurity. They will research various measures that contribute to cybersecurity, and they will ultimately create a model that explains these measures to the public in a creative way.

MATERIALS

- Chart paper, six pieces
- Markers (or other bold writing materials), one per student
- Firewalls [article](#), for one-fifth of the class
- Spyware [article](#), for one-fifth of the class
- Antivirus [article](#), for one-fifth of the class
- Passwords and Security Habits [article](#), for one-fifth of the class
- Social Media [article](#), for one-fifth of the class
- Designing Solutions Handout, one per student
- Poster board, for one-fifth of the class

CHALLENGE

1. Before the beginning of the class session, prepare six pieces of chart paper to place around the classroom. Title two pieces of chart paper with each of the following headers: "Technology: Education," "Technology: Business," and "Technology: Social."
2. Distribute a marker to every student as class begins. Bring students' attention to the chart papers and explain that they are about to rotate around the classroom and write notes on each piece of chart paper describing how technology is used in education, business, and social situations. Encourage students to read what other students



have already written before adding their own thoughts so ideas aren't repeated on the same piece of paper. Set a timer for five minutes and instruct students to start brainstorming.

3. When the timer goes off, read the students' thoughts aloud. Then instruct the class to think-pair-share* their answer to the following question: Does their brainstorming support or refute the idea that it is important to protect our personal information online?

*In a think-pair-share, students think about the question independently, discuss their answers with a partner, and then share their thoughts with the larger class.

4. Introduce the term *cybersecurity* and explain that cybersecurity focuses on protecting the technology we use from attacks and unauthorized access, so our personal information stays safe. Explain that with so much of our lives is online, cybersecurity is extremely important!
5. Tell students that today they will each pretend to be a member of the security team. Share the career description, and students can choose to put themselves in the role of one of the following careers:
 - Security Software Engineer: You design, build and operate security solutions.
 - Security Research: You conduct research about how the design of systems can guarantee strong security and privacy.
 - Security Analyst: You perform investigations in response to security alerts.
 - Cyber Security Architect: You analyze customers' problems and design solutions.
 - Security Incident Responder: You provide leadership during security incidents and help design solutions to emerging threats.
6. Distribute one Designing Solutions Handout to each student and elaborate on the challenge by reading aloud the bullets listed under *Step 1: Define the Challenge*.
7. After answering clarifying questions, divide students into cybersecurity teams of four or five. Then prepare student groups to conduct research to better understand the challenge:
 - Write the following terms on the board, and explain that each team member will be responsible for researching a different term:
 - Passwords
 - Firewalls
 - Spyware
 - Antivirus
 - Social Media
 - Give every group an article about each of the security areas and explain that these resources come from the Cybersecurity and Infrastructure Security Agency (CISA), which is part of the Department of Homeland Security.
 - In order to help the public better understand the security area they have been assigned, students should take notes as they read in the space provided.

DESIGN

1. Bring the class back together and explain that it's now time to develop a solution to the challenge. Call on a student to read the handout's *Step 2: Create a Design* section aloud. Students are tasked with working in teams to select three cybersecurity measures that they believe are most important for the public to understand. Then will then brainstorm connections between these measures and security used in an ancient or imaginary castle. (You or your students can also suggest another facility to construct their security system.)
2. Tell the class that each security team will have about 15 minutes to create their design. Quickly recap and encourage students to:
 - Use their research notes and collaboration skills to decide which cybersecurity measures to focus on.
 - Approach the challenge from the perspective of a career on the security team.
 - Use a poster board to sketch a draft of their castle's security system, complete with callouts that explain how its security elements are similar to those used in cybersecurity.
 - Be ready to explain and justify the decisions they made when constructing their castle's security system!

SOLVE

1. When there are about 15 minutes left in the class period, pair each student group with another student group.
2. Instruct groups to pretend that they are participating in a presentation that explains cybersecurity to the general public. During their presentation, they must explain the castle security system that they have developed, as well as how each part of the castle security system equates to cybersecurity components. Encourage groups who are listening to put themselves in the shoes of the general public and ask questions if anything is unclear.

Explain that once both security systems have been shared, groups should complete the *Step 3: Communicate + Evaluate Solutions* portion of the handout and consider how they can apply each other's ideas to make their own castle even more secure. If time permits, they may edit their design to illustrate these security updates.

STANDARDS

Next Generation Science Standards

- Engineering Design
 - Disciplinary Core Idea - ETS1.B: Developing Possible Solutions: Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors. (MS-ETS1-3)

ITEEA Standards for Technological Literacy

- Standard 4: Students will develop an understanding of the cultural, social, economic, and political effects of technology. In order to recognize the changes in society caused by the use of technology, students should learn that:
 - D. The use of technology affects humans in various ways, including their safety, comfort, choices, and attitudes about technology's development and use.
 - E. Technology, by itself, is neither good nor bad, but decisions about the use of products and systems can result in desirable or undesirable consequences.

STEP 1: DEFINE THE CHALLENGE

Your challenge is to work with your cybersecurity team to:

1. Identify at least three steps the public can take to increase their cybersecurity measures.
2. Explain why these steps are important from the perspective of a cybersecurity professional.
3. Design a model for the public that demonstrates how these cybersecurity measures are similar to a castle's security. Comparing your high-tech security system to a low-tech security system will help the public better understand cybersecurity. (For instance: Which part of cybersecurity is most like a castle's moat?).

As you research, write notes that could help you tackle the challenge:

STEP 2: CREATE A DESIGN

Work with your team to select three cybersecurity measures that you believe are most important for the public to understand. Then use the space below to brainstorm connections between these measures and security used in an ancient or imaginary castle.

Once you have made at least three connections, work as a team to draw a model of the castle's security system. Include call-outs to explain how this imaginary system relates to the cybersecurity measures you selected.

STEP 3: COMMUNICATE + EVALUATE SOLUTIONS

Once you have shared your security system with another security team, consider how you can combine elements from both designs to create an even stronger security system.

Work as a group to describe at least two design changes or additions below. If time allows, you may also edit your design to illustrate these security updates!