

Cyber Security Shuffle Module
Team Grand Engineers

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Cyber Security Shuffle

Learning Objectives

This module addresses the grand challenge of cyber security by educating fourth and fifth grade students on cyberspace, its faults, and different ways to combat these weaknesses. The presentation will teach about the importance of keeping one's information safe and how, through the internet, the security of this information is jeopardized. In this game, students will draw different cards, simulating visiting web pages, and attempt to navigate the site without being attacked by a "virus." The activity will help convey the severity of viruses and how to take preventative measures to keep one's personal information secure. As a result of having completed this module, students will learn the principles of cyber security. This module also takes advantage of the Indiana Math Standard 2 for 4th and 5th graders as groups will use a mathematical formula to calculate their total score after playing the game.

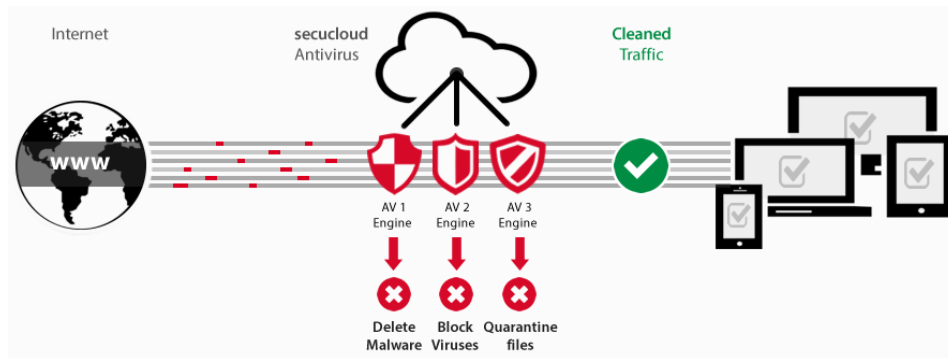


Figure 1: Cleaning Viruses

Technical Background

As technology quickly advances and users store more and more of their personal information, such as social security numbers and banking information, on their computers, securing computers has become crucial. Unfortunately, according to a Microsoft Security Intelligence Report, 32% of computers in the world are infected with some type of malware [1]. Malware can create a "backdoor" so that the user's personal information can be accessed from a remote location. Viruses make up 57% of this malware [1]. A virus is "a form of malware that is capable of copying itself and spreading to other files via many various user actions" [2]. Viruses can slow down the operations of computers and cause system crashes. The Consumer Reports Magazine estimates that the cost to US households from 2009 to 2010 from viruses, spyware, and other malware is \$4.5 billion [3].

Computers can get viruses when users download infected software or open links or attachments of a phishing email. Viruses can also appear as “clickbait,” which is prevalent on insecure websites. In order to help prevent viruses, many computers are equipped with antivirus programs and firewalls. These are like the guards and drawbridge of a castle, respectively, as shown below in Figure 2. Antivirus software checks programs before opening them and compares them to known viruses, worms, and other types of malware. This is analogous to the guards of a castle identifying personnel trying to enter. In addition to antivirus software, users can implement firewall systems on both software and hardware, filtering the information that passes through networks. This is similar to the drawbridge of a castle that is raised and lowered to allow access to the castle. In addition to firewalls and antivirus software, one of the most important methods of protection is education on cyber security, as viruses can still enter the “castle” by catapulting over the walls or climbing through a window. Teaching this necessary educational aspect of protection against viruses is the purpose of the Cyber Security Shuffle.

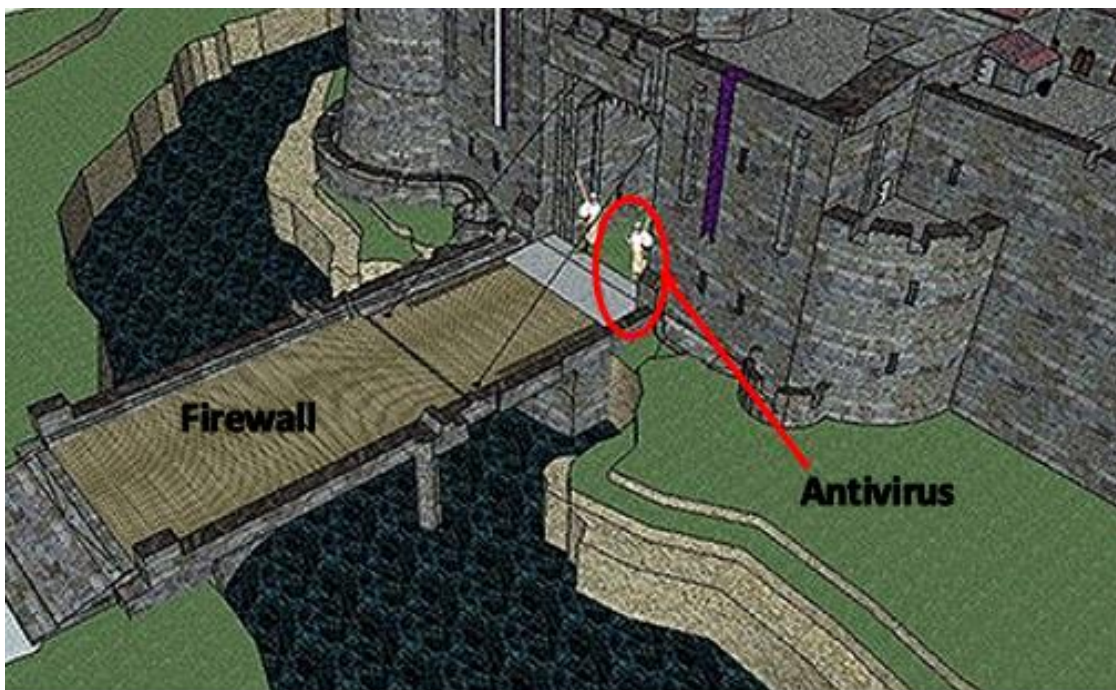


Figure 2: Castle Visual

Demonstration Materials & Budget

The calculated price of materials is based upon the cost of supplies from Walmart.com [4]. Overall, assuming that the game is played with cardstock cards printed with colored logos, the price would be approximately \$42, as seen below. This overall cost of this game is a

relatively onetime fee, due to the durability of the cardstock and assuming the die is kept in good condition. This is the worst case scenario price. This cost could be corrected by using a print shop to make the playing cards or by the teachers using printer paper and a laminator available at their school. This could reduce the budget of the game to approximately \$12.

150 sheet Cardstock	\$5.49
Epson DURAbrite Color Ink*	\$23.99
Large 6-sided die	\$1.97
3 bags of candy	2 X \$5.00
TOTAL	\$41.50

***If color is wanted for logos**

Game Preparation, Pregame Presentation, Instructions, Game Rules, and Game Scoring

I. Preparation (to be done prior to demonstration time):

1. Print one worksheet per student (Appendix A)
2. Print gameplay flowcharts (Appendix B)
3. Print the set of playing cards (Appendix C)
 - a. Cut cards along the thick, black border
4. Find a standard, or larger sized, six-sided die
 - a. A larger sized die more actively engages the students
5. Buy candy to provide to the students for participating in the game

II. Pregame Presentation

1. Briefly describe the effects of viruses on a computer
2. Elaborate on how viruses are downloaded
3. Explain to students the prevalence of viruses
 - a. 18% of computers worldwide are infected with viruses
 - b. Discuss this number with the students - is this more or less than they thought?
4. Display the castle visual and explain the analogy of firewalls and antiviruses to the gate and guard of the castle (Figure 2)

- a. The visual can be presented on a projector or printed and given to each student

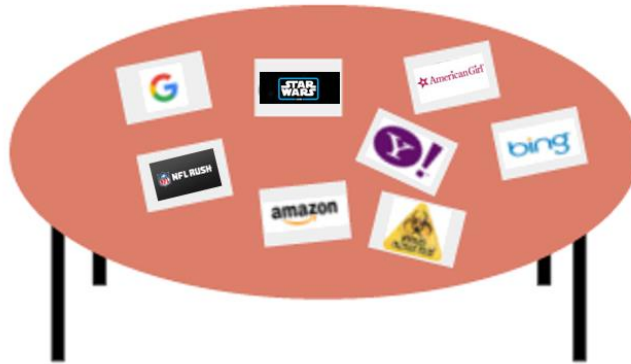


Figure 3: Table Set-Up

III. Instructions:

1. After the pregame presentation, divide students into groups of two or three
2. Give each student a worksheet (shown in Appendix A)
3. Have each team decide on a team name
4. Once a team name is decided, have students fill in the name, team name, and date portion of the worksheet
5. Walk students through the front of the worksheet and explain how to use the table
6. Hand each team one antivirus card and one firewall card
7. Place the rest of the cards spread out on the table face down (Figure 3)
8. A team will then send up one student to start the game (player)
9. The player will draw one of the facedown cards in the middle of the table
10. Depending on what card they draw, one of three things will happen (as shown in the flowchart in Appendix B)
 - a. If the card is an Antivirus card or a Firewall card they will go back to their seat and take the card with them.
 - b. If the card is a trap card (cards designed to simulate pop-up windows or other potential virus sources), they will be asked whether or not they wish to click on the link on the card. Based on their decision, follow the outline set in Section IV: Game Rules, Rule 4.
 - c. If they draw one of the Search Engines, Game/Interactive Websites, or Secure Websites cards, they proceed to Step 11.

11. The player now rolls the die
 - a. If the value is anything other than a 1 or a 6, they can go back to their team with their card.
 - b. If the value is a 1 or a 6, they are given the three options outlined in Section IV: Game Rules, Rule 5. After they choose they go back to their team.
12. Once the player has returned to their seat, make sure the whole team puts a tally mark in the proper box based on what happened (i.e, got a search engine, downloaded a virus, stopped a virus, etc.)
13. The next team sends up a player and repeats steps 9-12
14. The game concludes after all facedown cards have been taken or a time limit is reached
15. Students then calculate their final score for the game as described in Section V: Game Scoring
16. Once all teams have their final scores, instruct students to turn to the back of the worksheet and answer the questions
17. After a few minutes, bring the whole group back together and have a group discussion on the questions on the back of the worksheet
18. A piece of candy is given to all participating students. For the team with the highest score, each team member gets an additional piece of candy

IV. Game Rules:

1. Each team starts with 1 antivirus card and 1 firewall card
2. Cards on the center table have different point values:
 - a. Search Engines = 1 pt
 - b. Game/Interactive Websites = 3 pts
 - c. Secure Websites = 5 pts
3. If a player draws an antivirus or firewall card from the center table, that card is added to their team's inventory
4. If a player draws a trap card they must respond to the pop-up on the card:
 - a. If they choose to not click on the link or 'x out, their team stops the virus
 - b. If they choose to follow the link, their team downloads a virus
5. If a player rolls a 1 or a 6 on the die they have two options:
 - a. Play their antivirus or firewall card and receive the card they drew off the table

b. Don't play an antivirus or firewall card and download a virus

V. Game Scoring:

1. Teams count the number of Antivirus/Firewall cards they have at the end of the game and put the total in the proper box of the table (Box 1)
2. Teams add up the tallies they have for each row and record the totals in the proper boxes of the table given on the worksheet
3. Use the equation at the bottom of the front of the worksheet to calculate the total score
4. Record the final total points value in the "Total Points" blank

Engaging Interest

To engage the students during the game, the worksheet in Appendix A will be given to each student. The worksheet provides a space where students mark the progress of their team as they play the game. This ensures each team member follows along in the game. The back of the worksheet contains follow-up questions for each student to answer concerning the game's relation to the real world. Dealing with these questions, students will evaluate the information they received from the module, how it relates to the game they played, and how they can take the information they learned and use it in the future. Since the worksheet will be theirs to keep, the follow-up questions will remind the students of what they learned during the module.

Extra Resources Related to STEM

Grand Engineers Demonstration Video

<https://youtu.be/dWQHjmongqQ>

Stay Safe Online

<https://staysafeonline.org/teach-online-safety/>

Protect Kids Online

<https://www.onguardonline.gov/topics/protect-kids-online>

Family Online Safety

<https://www.fosi.org/>

ConnectSafely

<http://www.connectsafely.org/>

Sources

[1] Microsoft. (2006). *Microsoft Security Intelligence Report* [Online]. Available:

<http://download.microsoft.com/download/f/d/a/fda5850e-269f-40a3-9708->

[c60eb837456f/MS_Security_Report_Jul-Dec06.pdf](http://download.microsoft.com/download/f/d/a/fda5850e-269f-40a3-9708-c60eb837456f/MS_Security_Report_Jul-Dec06.pdf). [Accessed: Jan, 9, 2016].

[2] Cloudtweaks.com. (2014). *Cloud Infographic - Computer Virus Facts And Stats* [Online].

Available: <http://cloudtweaks.com/2014/04/cloud-infographic-computer-virus-facts-stats/>.

[Accessed: Jan, 9, 2016].

[3] Consumer Reports Magazine. (June 2010). *Social Insecurity: What millions of online users*

don't know can hurt them [Online]. Available: <http://www.consumerreports.org/cro/magazine->

[archive/2010/june/electronics-computers/social-insecurity/overview/index.htm](http://www.consumerreports.org/cro/magazine-archive/2010/june/electronics-computers/social-insecurity/overview/index.htm). [Accessed: Jan,

9, 2016].

[4] Walmart. Available:

<http://www.walmart.com/>. [Accessed: Jan, 9, 2016].

Appendix A: Cyber Security Shuffle Worksheet





Cyber Security Shuffle

Name: _____

Team Name: _____

Date: _____

Use the table below to keep track of what cards your team draws during the game.

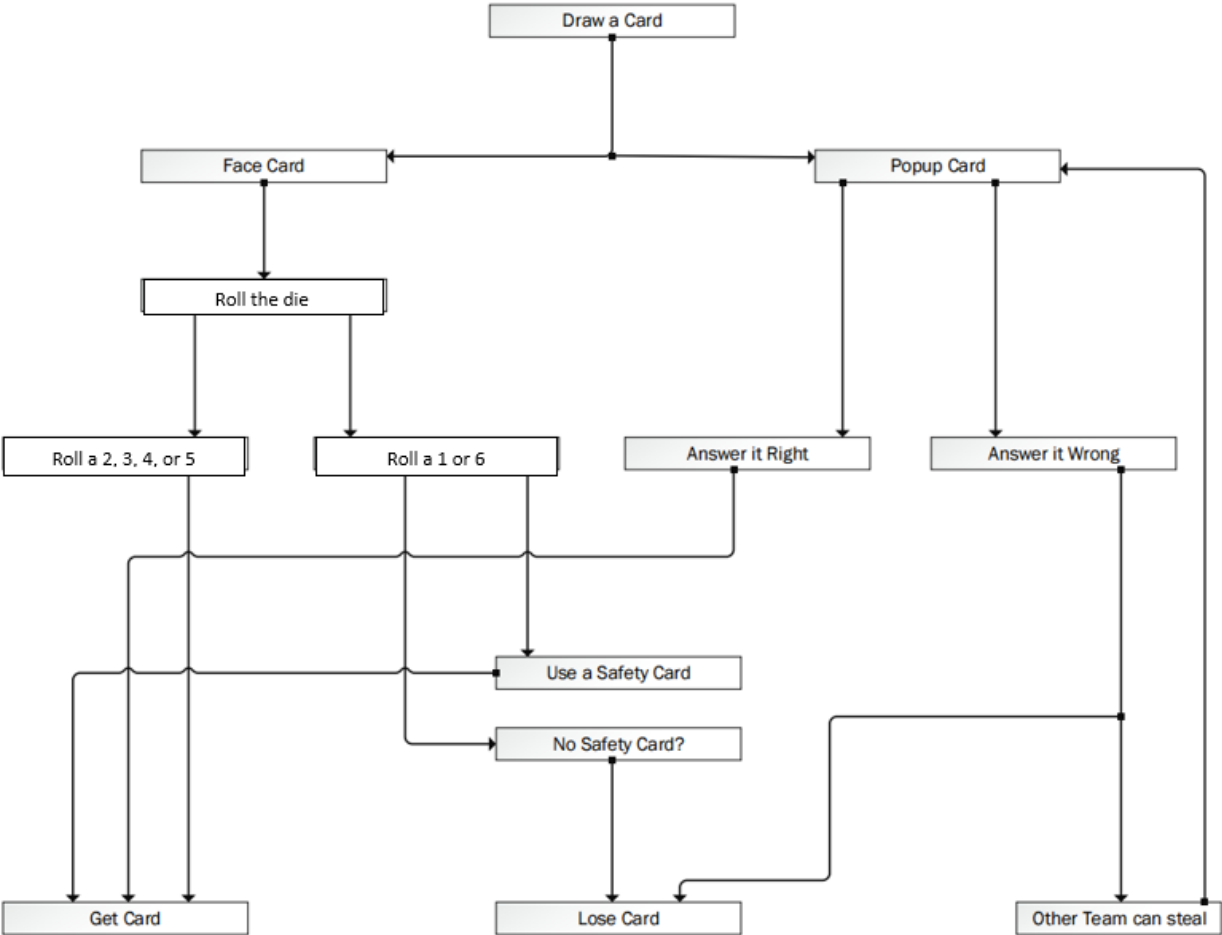
Card Type:	Tally:	Total:
Antivirus/Firewall 	(Tally how many you have left at the end of the game):	Box 1
Search Engines 		Box 2
Game/Interactive Websites 		Box 3
Secure Websites 		Box 4
Viruses Cards Stopped		Box 5
Viruses Downloaded		Box 6

Add up all the points from the points column and record the results below.

$$\text{Box 1} + \text{Box 2} + 3 \times (\text{Box 3}) + 5 \times (\text{Box 4}) + 2 \times (\text{Box 5}) - (2) \times (\text{Box 6})$$

Total Points: _____

Appendix B: Game Flowchart



Appendix C: Playing Cards

Coolmath-Games.com

STAR
WARS
COM

American Girl®

Toys R Us®

NFL RUSH

amazon.com



bing™



FREE iPad



FIREWALL WARNING

Hidden file transfer to remote host has been detected

Internet Security has detected a leak of your files through the Internet. We strongly recommend that you block the attack immediately





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