Activities for Password Posters For Middle and High School Students

Overview
There are three password posters for this grade span. We recommend that these be hung together, either vertically or horizontally, in the order noted below and in a location you can easily point to. The bite-sized activities associated with each poster require 10-15 minutes offline and are structured to encourage discussion among students. They can easily be reused yearly.

Goal
To provide students with a simple checklist of what makes a strong password, while engaging them in creative and critical thinking to explore the concepts behind each tip on the checklist.

Introduce: *It's important to have a strong password to protect us online. The stronger our password, the harder it is someone to guess it and* pretend to be us. *Plus, the stronger our password the more defensible it is against mass computer attacks that could steal our identity information.*

Each poster (point to three posters) reminds us of one way to check if our password is strong.
Let's look at one today and explore why experts say it is important.

Using the Poster "My password has eight characters or more." (15 minutes)

Display the poster and ask: *Experts have determined that a password should have a minimum of eight characters. Why eight and not seven? Why not 25? What is magical about the number eight?*

Guide students in creative exploration.

Explain: *Experts have found that the more characters a password has, the harder it is to crack. The number eight is based on research about human short-term memory, which can, on average, remember between five and nine characters. So eight characters is long enough to make a password strong but short enough that you can memorize it.*

Conclude: *A strong password must get not just one check, but all three checks shown on the posters. Today we learned that to get this check (point to poster) our password should have at least eight characters.*

Probe and Discuss: *Which do you think is a stronger password: one with 20 characters or one that is more complex in it use of seemingly random combination of upper and lower case letters, numbers, and symbols)?*

Allow students to critically consider this question.

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Conclude: *Most of us probably think that additional complexity is more important than length. But many security experts disagree and would answer that password length is more important for security than complexity. The reason is that experts have discovered that most people still rely on dictionary words, words spelled backwards, repeated characters, or famous quotations, as the basis of their "complex" password. So what we think is complex, isn't so complex. Truly complex passwords, say those made by a random-password generator, are too difficult for most of us to remember. So we write them down for others to see and copy!*

The length of the password creates more characters which creates more possible combinations needed to guess. By increasing the length of your password you can increase its strength.

Using the Poster "My password mixes upper and lower case letters, numbers, and symbols." (15 minutes)

Display the poster and ask: *Experts say that passwords using a combination of upper and lower case letters, numbers, and symbols are harder to crack than those that are all letters or all numbers. Why does this strategy make a password stronger? Let's dissect some examples first and then consider what the experts say.*

Write: On the board write these two passwords:
A1b2c3d4
R4c7x3E1f

Have students consider why the bottom password is the stronger. Encourage creative thinking. Guide students to consider that because the top password is an easy pattern, it would take fewer guesses to figure out than the bottom password, which has no apparent pattern.

Write:
Go!jets#1!!
Applesauce1212**
M^s1ster|$ alw4ysf1ne!

Have students consider which these three passwords is the strongest. Point out that *all* the passwords mix numbers, letters and symbols. The top password's use of a favorite sports team connection is easy for someone to guess. Similarly using your name or your birth month or date, are all easy for someone to guess.

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The middle password uses a word from the dictionary followed by repeated sequential numbers and then repeated symbols. Dictionary words and repeated characters weaken a password's strength.

The bottom password uses length, random capitalization and random simple substitutions, both making the password strong and easy to remember.

Ask: *Why is a password stronger when we combine upper and lower case letters AND numbers AND symbols?*

Explain: *Experts determine the strength of a password by the average number of guesses the attacker must make to find the correct password. Increasingly, they see evidence of sophisticated computer hacking attacks that try to crack open thousands of passwords each second. So we aren't talking about just protecting ourselves from ordinary individuals, we're talking about creating a strong password that can withstand a computer hacker's assault. Using letters, both upper and lower case, numbers and any of the symbols on our computer keyboards increases the number of characters that must be guessed.*

Optional Probe and Discuss: *How might you mathematically illustrate the fact that we can increase the number of guess required (i.e. increase the strength of the password) to find our password by including a combination of upper and lower case letters and numbers and symbols?*

Allow students to critically consider this question in small groups and then share their results of the number of different possibilities (guesses) of:
- passwords using only the 26 alphabetic letters, lower case
- as above but including upper case
- as above but including 10 digits
- as above but including roughly 30 non-alphanumeric symbols on keyboard.

Conclude: *A strong password must get not just one check, but all three checks shown on the posters. Today we learned that to get this check (point to poster) we need a mix-up of letters, numbers, and symbols.*

Using the Poster "My password is complex and creative!" (15-30 minutes)

Materials: Paper and pencil

Display the poster and ask: *How can you create a password that is easy enough for you to remember without writing down, but complex enough that no one could easily guess it? What if you first took the name of a favorite book, or a favorite movie or part of a funny joke that you could easily remember and then wrote it in a creative code?*

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Explore this example on the board: Show how a student whose favorite book is *The Phantom Tollbooth* uses this to make a password. " PhantomTollbooth " becomes the password Ph@n+0m+0!!600+h. Guide students to explore how you have taken an easy phrase to remember and substituted letters with symbols and numbers. Also point out the use of upper and lower case letters .

Students explore: Have students create their own private codes. Instruct them to draw a table with two rows and eight columns. In the eight boxes on the top have the students write a letter. In the eight boxes below, have them come up with a corresponding symbol or number that replaces commonly used letters Show students the example below and encourage creativity.

A	O	L	B	T
@	Number 0	!	6	+

Allow students time to practice developing their own personal phrases and then applying their letter substitutions. Suggest that they destroy these notes so that they can use the passwords in the future.

Guide students to recognize that using information that is easy for others to figure out does not make a strong password.

Explain: *Experts say the trick is to use a code that is not difficult to remember because once you write it down, anyone can find it and copy it. A strong password must get not just one check, but all three checks shown on the posters.*

Conclude: *A strong password must get not just one check, but all three checks shown on the posters. To get this check (point to poster) we need to come up with a creative password that is hard for others to guess but not so complex that we have difficulty remembering it.*

Optional online research: Have students use online resources to answer the following questions.
- How are computer programs used to crack passwords?
- What exactly happens to the victims of identity theft?
- What has happened to other kids that have had their passwords stolen or shared them with their friends?

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Optional Discussion: Should you change your password regularly?

Ask: *Many online security sources of information include the rule, "change your password regularly." What are some of the software or online programs and applications you use that require passwords? Do you think it's a good idea to change your password(s) regularly?*

Guide students in creative exploration. Have students consider that changing a password and then writing down the new password where everyone can see it or creating a very simple password are not effective strategies. Encourage students to review ways in which they can create memorable but secure passwords.

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