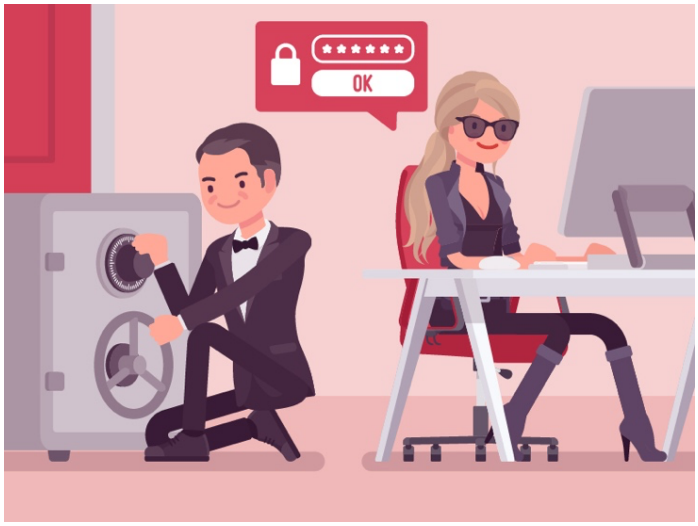
This page is for

Teachers

Give your passwords superpowers (Activity 2.1)

This activity teaches students about how to create secure passwords

How many guesses will it take to crack the code set by your partner?



Students do this activity with a partner. Player 1 chooses a three-digit code using only numbers between 1 and 6 (for example 235 or 532 or 625 but not 743). Player 2 has 10 chances to guess the number. After each guess Player 1 gives Player 2 information to help them make a better next guess.

Students and their families use passwords every day to secure information as basic as their order for a favourite pizza or as important as their bank account or school exam results. It's really important to keep this information secure.

It's fairly simple to guess a 3-digit code created using 6 numbers within 10 guesses. Short passwords can be easily cracked too. In our game there are 6 x 6 x 6, or 216 possible combinations. Adding an extra digit to the code would make it **much** harder to guess: there would now be 1,296 combinations. If we used eight digits in our password there would be 1,679,616 possible passwords (sticking to six numbers only). If we include all 10 digits and twenty six letters in the alphabet (upper case or lower case), we also make passwords much harder to crack: a 3 digit or letter password now has 238,328 combinations.

Length matters with passwords, and at the end of the activity students will have a strategy to choose their own strong passwords which are easy to remember (they are made up of three words) but hard for computers to guess (they have many characters).

This activity is expected to take 30 to 60 minutes. Print pages 2 and 3 for students to use.

Getting started (read to students):

Can you crack the code? Imagine that all that stands between you and a vault full of cash is a combination lock with 3 digits. Each digit can only be a number between 1 and 6. Use your logic powers to crack the code! Once you have cracked the code, use your new skills to create passwords with superpowers!

See a demonstration

cmp.ac/codecrackervid

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This page is for

Students

Crack the code

How many guesses do you need to crack open the vault?

Step 1

Player 1: choose a 3 digit number using only numbers between 1 and 6. Write it down to remember it, but keep it secret from player 2. You can use the same number more than once in your 3 digit number.

Step 2

Player 2: write your first guess in line 1 of the table.

Step 3

Player 1: in the smaller boxes on line 1, let Player 2 know how good their guess was:
If they have a number that's the right number in the right place, draw a ✅.
If they have the right number in the wrong place, draw a ?
If they guess a number that isn't in your number at all, draw a ❌

For example: If Player 1 is thinking of 653 and Player guesses 321, they would get a result of ?❌❌: one number (3) is the right number in the wrong place, and two numbers (2 and 1) aren't in the code at all.

1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						

Step 4

Repeat steps 2 and 3 in the next rows of the table as many times as you need until Player 2 guesses Player 1's number.

Code:	6	5	3			
1	3	2	1	?	❌	❌
2	4	5	6	❌	✅	?
3	6	2	4	✅	❌	❌
4	6	5	1	✅	✅	❌
5	6	5	2	✅	✅	❌
6	6	5	3	✅	✅	✅

Here's how a game looks if the code is '653'

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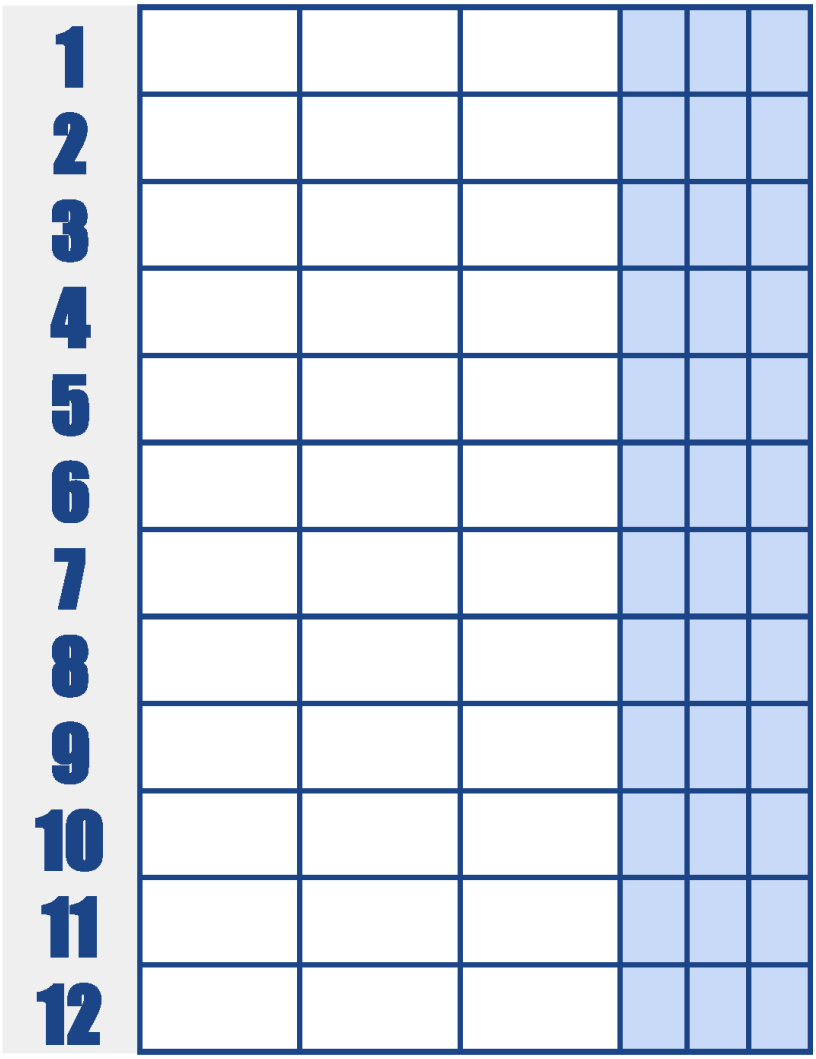
Step 5

Play the game again but instead of **numbers** this time agree with your partner on six items in a group: say, favourite foods (chocolate, donut, apple, cherry, salami, tomato) or superheros (Spiderman, Iron Man, Black Widow, Black Panther, Captain Marvel, Thor). Write the list down so you can both see it.

Play the game again - so Player 1 might choose **Thor - Iron Man - Spiderman**. If Player 2 guesses **Black Panther-Iron Man-Thor** - the feedback would be ❌✅❓.



Step 6

You can use this game to make really strong passwords. If your password is only 3 characters long, computers can guess your password **almost instantly**. If you use a password with 20 characters it will take much longer. So next time you need to choose a password think about your three favourite things in a group - foods, superheroes, TV shows. This will make a nice long password that you can remember easily but computers can't crack easily. For example the password **ThorIronManSpiderMan** would take ***607 million years*** for a computer to guess with today's technology!

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