Digital Technologies @ Home
Unplugged activities for students

This page is for
Teachers
Parents and carers

This activity is for: Years 4-6

Cracking a code — give your passwords superpowers

This activity teaches…

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

Students do this activity with a parent / carer / sibling. 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 improve their 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. Maths tells us that 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.

This activity is expected to take 30 to 60 minutes.

Getting started (read this with your child):

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. All the numbers are 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 super powers!

See a demonstration

cmp.ac/codecrackervid

Crack the code

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

This page is for

Students

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.

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.

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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.

This page is for

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'

Students

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, superheros, 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! Always remember to use long passwords. You can check your password here: www.howsecureismypassword.net

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Write down the six item here (eg Spiderman, Iron Man, Black Widow, Black Panther, Captain Marvel, Thor):

Want more?

Here are some further activities, online resources, assessment ideas and curriculum references.

Teachers

This page is for

For teachers creating a portfolio of learning or considering this task for assessment

Ask students to suggest tips for creating a secure password.

Students can create their own code-cracking game using the principles in this game.

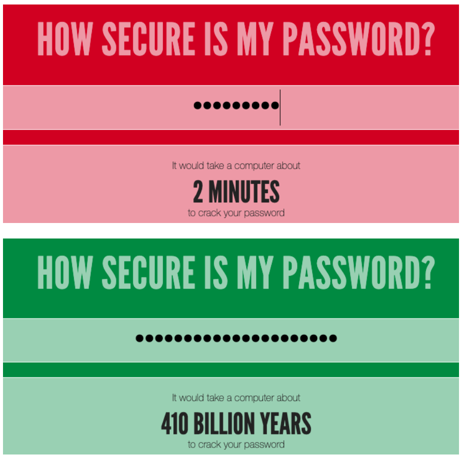
Adapting this activity

This activity could be adapted for learners of many ages by: using colours instead of numbers (for example, guess a three colour code made of green, red, blue and yellow), using all digits between 0 and 9 in the first game, or beginning with a four digit code.

Keep learning

To explore password security, and other key issues around information privacy, enrol students in the Information Privacy and Security Schools Cyber Security Challenge:
cmp.ac/infosec

To see in real time how secure different lengths of passwords are, look at:
www.howsecureismypassword.net (also good to view on a mobile device.)



Linking it back to the Australian Curriculum: General ICT Capabilities

Apply personal security protocols
identify and value the rights to identity, privacy and emotional safety for themselves and others when using ICT and apply generally accepted social protocols when using ICT to collaborate with local and global communities.

Refer to aca.edu.au/curriculum for more curriculum information.