Digital Technologies @ Home
Unplugged activities for students

This activity is for: Years 5-8

Unscrambling a secret message

This activity teaches…

We can make a message secret by changing the letters to create an *encrypted message*. This change process is called a *cipher*. Anyone who knows the cipher can reverse it, *decrypting* the secret message to get the original back. The message is still there, but hidden, because we've changed how we *represent* it.

Simple ciphers, such as Pig Latin[1] or Caesar Cipher[2], can be *cracked* to find the original message and the cipher.

We use *secure* ciphers (that are extremely hard to crack) to protect communication on the Internet, e.g. to stop hackers getting our credit card details when we shop online. Without encryption, every message we send is at risk.

In this activity, the message is encrypted by swapping letters (a *substitution cipher*). There is no pattern to how they are swapped, except that each letter always swaps to the same one. Here, the cipher encrypts every *G* by swapping it to an *A*, so to decrypt the message, we must swap every *A* back to an *G*.

You can crack the substitution cipher to find the original message by looking for familiar words and letter patterns in the encrypted message. Good luck!

This activity will take up to **60 minutes** . Print pages **2** for students. The answer appears on page **3**. If you are a teacher, read through page **4** for further information.

Getting started (read this with your child):

We're going to unscramble a hidden message, using our understanding of English and commonly used words, and learn about one way to send hidden messages. We're going to crack a cipher!

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[1] https://en.wikipedia.org/wiki/Pig_Latin
[2] https://cryptii.com/pipes/caesar-cipher

Can you unscramble the message?

The letters have been jumbled up. Use the grid at the bottom to write down your answer for each letter. Use your knowledge of words to figure out what the message says.

The first word has only one letter. How many one letter words do you know? It can't be **A** because the answer grid shows us that when you see a **G** in the scrambled message, this becomes **A** in the unscrambled message (the top line). So it must be **I**. Go ahead and find all the other letters **Y** in the scrambled message and write **I** above them. Also write **I** above **Y** in the answer grid at the bottom of the page.

Look for other parts of words that you recognize. On the third line the letters **BCGJ** are unscrambled to be **_HAT.** Think of a word that ends in **HAT**. It might be **THAT,** but we already know that **J** in the scrambled message becomes **T,** and this scrambled word starts with **B.** Once you have figured out what to change letter **B** to, write it above **B** everywhere you see it in the message and also in the answer grid, then look for other parts of words you recognise.

Unscramble this message

						T			A	T		M	Y
Y		Z	Y	P	W		J	H		W	G	J		A	L

			T	B					T	H	
	B	W	W	J	R	Y	N		B	Y	J	C

	H				.			H	A	T		
E	C	W	W	V	W	.		B	C	G	J		Y	V

T	H			B			T		B			A		-
J	C	W		R	W	V	J		R	D	W	G	P	-

	A		T								U	?	
I	G	V	J		I	H	D		L	H	M	?	

Write your answers here

M		H				A			T			U
A	B	C	D	E	F	G	H	I	J	K	L	M

			B									
N	O	P	Q	R	S	T	U	V	W	X	Y	Z

Answer key

Print this for yourself to check your child's answers.

The unscrambled message

I		L	I	K	E		T	O		E	A	T		M	Y
Y		Z	Y	P	W		J	H		W	G	J		A	L

	W	E	E	T	B	I	X		W	I	T	H	
	B	W	W	J	R	Y	N		B	Y	J	C	

C	H	E	E	S	E	.		W	H	A	T		I	S
E	C	W	W	V	W	.		B	C	G	J		Y	V

T	H	E		B	E	S	T		B	R	E	A	K	-
J	C	W		R	W	V	J		R	D	W	G	P	-

F	A	S	T		F	O	R		Y	O	U	?	
I	G	V	J		I	H	D		L	H	M	?	

The completed answer key

M	W	H	R	C	J	A	N	F	T	P	Y	U
A	B	C	D	E	F	G	H	I	J	K	L	M

X	Q	K	D	B	Z	O	G	S	E	V	I	L
N	O	P	Q	R	S	T	U	V	W	X	Y	Z

More information

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

Teachers

Adapting this activity

Once students understand how to complete this activity, ask them to prepare a hidden message for a family member, or in an online class, for a classmate. It helps to have short words in the message if you want to crack them.

Keep learning

For year 7 to 10 students interested in learning more about how computers communicate with encrypted messages, try this course:
cmp.ac/crypto

An additional hands-on lesson plan further exploring cryptography is available to download at
cmp.ac/cipherwheels

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

Ask students to create their own scrambled message using a substitution cipher that they create.

Students could also explore when cryptography is necessary for securing data by making a list of data they frequently send online: examples include messages, searches eg, for netflix, bus timetables, recipes, banking transactions, purchase of movie tickets, submitting school work. Students can then sort these transmissions into activities where encryption is (i) necessary (ii) a good idea (iii) unnecessary.

Linking it back to the Australian Curriculum: Digital Technologies

Digital systems
Investigate how data is transmitted and secured in wired, wireless and mobile networks, and how the specifications affect performance (ACTDIK023 - see cmp.ac/systems)

Cryptography is an important part of investigating the transmission of data.

Cryptography
Cryptography allows a message to be securely stored and transmitted.

Students explain why cryptography is necessary for securing data (e.g. transmitting credit card details over the web) and explore simple encryption and decryption algorithms (e.g. rot13 and XOR).

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