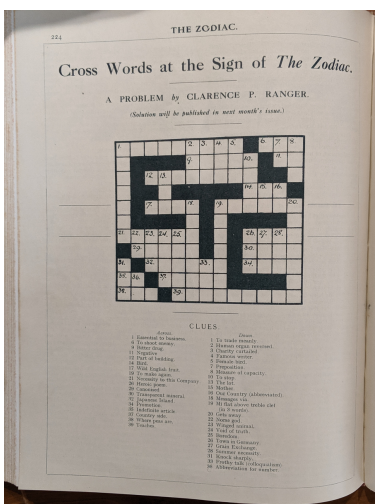# Secret Messages

What is this activity about?

To learn simple ways to keep a message secret

What you need:

- some paper
- pens and pencils
- a PK code wheel
- a paper fastener for the code wheel
- scissors
- some sellotape

How is it linked to PK Porthcurno?

We think the people at the Eastern Telegraph Company could have hidden their initials better than this!
Can you design a word puzzle with a hidden message?

People have nearly always wanted to keep some messages secret. This could be challenging, especially if you wanted to send your message a long way by telegraph. Many people would be able to see your message along the way.

Sometimes the need for secrecy was during a war. Today, almost everyone needs secret messages, even if they don't realise it. Keeping communication secret, or **cryptography**, is what makes internet shopping and banking safe.
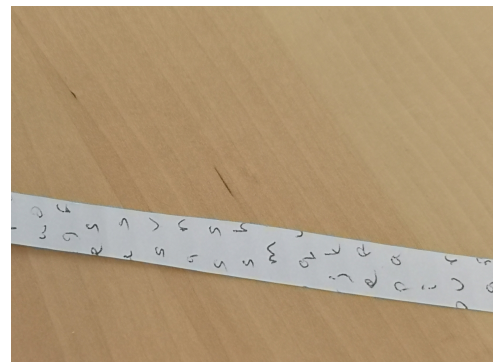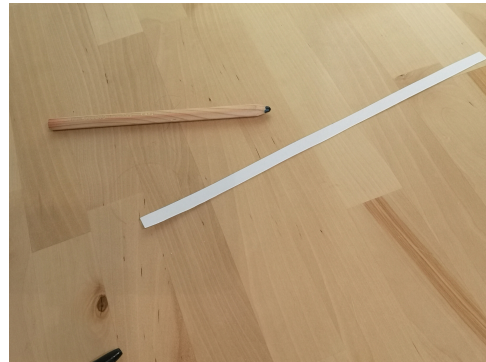
Your Challenge

- Make some secret messages

- Test your messages on your family and friends - can they work out your message?

Hiding your message

One of the easiest ways to keep a message secret is by hiding it. People you don't want to see your message won't even know there is a message. The person you want to send the message to needs to know where to find it. This is called **steganography**.

One simple way to do steganography is to use a thin strip of paper and wrap it around a pen or pencil.

- Wrap your paper in a spiral. Use tape to hold the ends in place.

- Write your message along the length of the pen or pencil.

- Unwind your spiral. it should be very hard to see a message. You can disguise your message some more by drawing or writing more things on the paper.

- The person you are sending the message to just needs to have a pen or pencil the same as the one you used. They wind the paper in a spiral, and can read your message.

Another way to hide a message is with invisible ink. The problem with these kinds of steganography, though, is that it's hard to use them on a telegraph message.
Can you think of any other ways to hide a secret message in an ordinary-looking message?

Ciphers

When you use a **cipher**, you substitute a different letter (or sometimes a symbol) for each letter in your message.

The simplest way to make a cipher is to just shift the alphabet along. In this example, we have moved the alphabet so that 'C' falls under 'a'. The official name for a cipher like this is a **monoalphabetic substitution cipher**. Can you work out why?

Plaintext Alphabet	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
Ciphertext Alphabet	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A

Note: usually when people write about ciphers, they use lower case (small) letters for the plaintext - the original message. Capital letters are used for the ciphertext - the secret version of the message.

In our example we have shifted the alphabet by one letter, but you can choose any number. If you want to be really secret you could move the alphabet by a different amount for each new message.

Using our example above,

pk porthcurno

would become

QL QPSUIDVSOP.

Turning your plaintext (original message) into ciphertext (secret message) is called enciphering. Going the other way, and figuring out the original message from the ciphertext, is called deciphering.

Can you encipher your name?

Can you decipher this message?

QL QPSUIDVSOP JT UIF NVTFVN PG HMPCBM DPNNVODBUJPOT

Have a go at making up your own secret messages. Use different sized shifts of the alphabet for more secrecy. Making and using the PK code wheel from our learning resources page can help you switch from one to another easily.

If you have a paper copy of this, or you can't use the link in the text for another reason, you can find the PK code wheel at https://pkporthcurno.com/wp-content/uploads/2020/08/PK-Challenge-Make-your-own-PK-code-wheel-colour.pdf

Did you know?

In one of the earliest examples of steganography, it is said that a messenger's head was shaved, and the message was written (or even tattooed!) on their head. After their hair had grown back, they were sent to deliver the message. The people they were sent to would know to shave their head and read the message. We don't think this would be useful for urgent messages!

Steganography is still used today. It is possible to hide a message by altering a few **pixels** in a digital image in a particular way. When you send it, no-one can tell it's not just a picture. But the person you send it to knows which pixels to look at to get the message.

The monoalphabetic substitution cipher is sometimes called the **Caesar Cipher**, as it is thought to have originated in Roman times.

Some cipher systems use symbols instead of letters - a famous example is the **pigpen** cipher. See if you can find out more about it and how it got its name.

Look out for future STEAM Explorers activities...

We will look again at secret messages, and learn some ways to make your secrets even more secure!

Connect with us

Test our codebreaking skills by sending your enciphered messages to us.
(Don't put any **real** secrets in them!)

#PKPorthcurno #SecretMessages #SteamExplorers #PlayfulMuseums

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