

Encoding Secret Messages

Resources: Books, magazines, newspapers, pencils, worksheets, facts on Encryption

Time: 1 hour

Introduction: Since the beginning of civilization, Kings, Queens and Generals have relied on efficient communication in order to run their countries and command their armies.

At the same time, they have all been very aware of the consequences of any messages falling into the wrong hands, revealing precious secrets to enemy forces. This need for secrecy led to the creation of codes, also known as **ciphers**. A cipher is a code that is used for a message that you want to protect and keep safe. You don't want anyone else to read the message. There are many different types of ciphers, for example:

- Substitute symbols or numbers for letters
- Simple substitution cipher. A -> B -> C -> D etc.
- Writing backwards or mirror writing
- Morse code or Invisible ink.



The science that studies such secret communication is called cryptology. The term cryptology is derived from the Greek *kryptós* ("hidden") and *lógos* ("word"). Although a neutral country in WW2, Ireland was renowned for its ability to intercept and break codes. Dr Richard James Hayes was the director of the National Library of Ireland in 1941 but behind the scenes he was secretly working on breaking the infamous Nazi code: "Görtz Cipher". Dr Hayes, the genius librarian, cracked the Nazi cipher that had stumped some of the greatest code breaking minds at Bletchley Park, the center of British wartime Cryptography.

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Activity overview:

1. Working in pairs, agents will pass secret messages to another group using a book from the library. Since a book is such an everyday object, you won't be suspected of spying when you hold your 'code book'
2. Your message is transmitted in groups of 3 figures, like (11, 17, 5). These are the coordinates that point to a specific word in the book. (11, 17, 5) means that you should open page 11, then count from the top to the sentence number 17, and then the 5th word in that sentence.

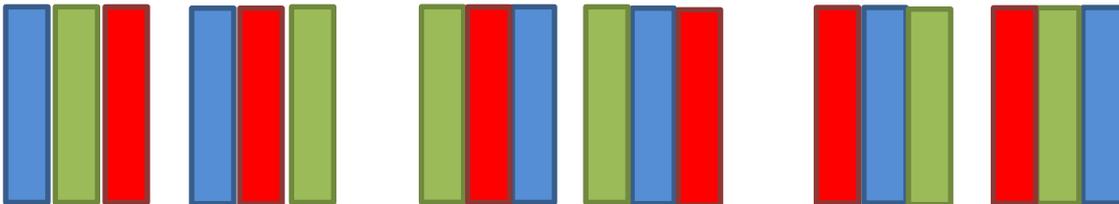
You could also add a fourth figure to indicate which letter in the word you are referring to.

3. As you continue to find word after word, you can string together whole sentences!

Book related puzzles: (ice breaker or an activity for early finishers)

1. Order matters!

If you have three books how many ways could they be stacked on a shelf? (in how many different orders)



2. Famous book worm puzzle

There is a set of 10 books of an encyclopaedia on a library shelf. A bookworm likes to eat through books. A book worm can eat through one book a day (they all have the same number of pages). If the worm starts at the front cover of the first book and eats, how long will it take for him to reach through to the back cover of the 10th book?



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3. **Q: what the first odd number in alphabetical order and what's your strategy?**

When you list all numbers from 1 to 1000 what is the first odd number?

Now when you list the numbers as words - i.e. one, two, three,... one thousand - then sort them alphabetically, what is the first odd number now?

Workshop step-by-step:

1. Pupils will begin the workshop by looking at the history of encryption and its usefulness. Discussed will be different methods of encrypting. (See the encryption facts attached)
2. Divide pupils into pairs. Warm up exercise: Each group gets an envelope marked "TOP SECRET" with the sentence that they need to translate themselves. Pupils decode the first part of the instruction by *reading it backwards*.
If some students finish quickly then they can practice writing their name in this format.
3. Now that students are in the correct frame of mind, they can begin encoding their own secret messages. 1. Practice. 2. Superhero Powers 3. Celebrity guests
4. Working in their pairs they must think of a sentence and then search through the book to locate all the words they require.

The message is transmitted in groups of 3 figures, like (11, 17, 5) to indicate the page number is 11, the sentence number is 17 and the word is the 5th one on that line.

If it is taking too long to find the word you're looking for you may need to reword your message. **(This will add to the literacy and problem-solving aspect)**

Advise students to pick the book wisely so they will find all the wording used in the given sentence. Ideally give them access to the dictionaries.

5. Walk around and assist. 10 minutes
6. After 10 minutes instruct the agents to finish encoding the first message. They should fold the piece of paper and write the book's title on the page too. Put the secret message and book title into the envelope. The book's title could be written in code to make it more challenging, for example written backwards or a given in the form of a clue.

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7. Distribute the envelopes among the class ensuring that each team does not get their own. Now, the new task is to decode the encrypted message. Give pupils a hand looking for the correct book if needed.
8. Allow students 5 minutes to decode the message. Then start on step 3 again, this time with a combination of 4 figures, spelling out the name of 3 celebrity guests.
9. If time allows, you can repeat the exercise again, where students can decide on the message. (See examples of positive messages to send)

Messages to encode:

Practice message: Search through a book and locate as many of these words as you can:

1. The quick red fox jumped over the two brown lazy dogs

Put the sentence together using a series of groups of 3 or 4 figures. (Order is very important)

Example: (12,4,3), (234, 10, 6), (21, 19, 1), ...

Do you notice anything significant about this sentence? a,b,c,...

2. If you were a superhero, what would your Superpower be?

Answer the question using the 3 figure cipher, remember to put it into a sentence.

3. If you could invite 3 celebrity guests to your birthday party, who would they be?

This time you are going to spell out the guest's name, using a group of 4 figures, like (11, 17, 5, 2) where these figures refer to the page number, sentence number, word position, and letter number.

4. What message would you like to send?

Examples of positive quotes for encoding:

"The more you give away the happier you become."- unknown

"You always pass failure on the way to success." – Mickey Rooney

"A person who never made a mistake, never tried anything new"- Albert Einstein