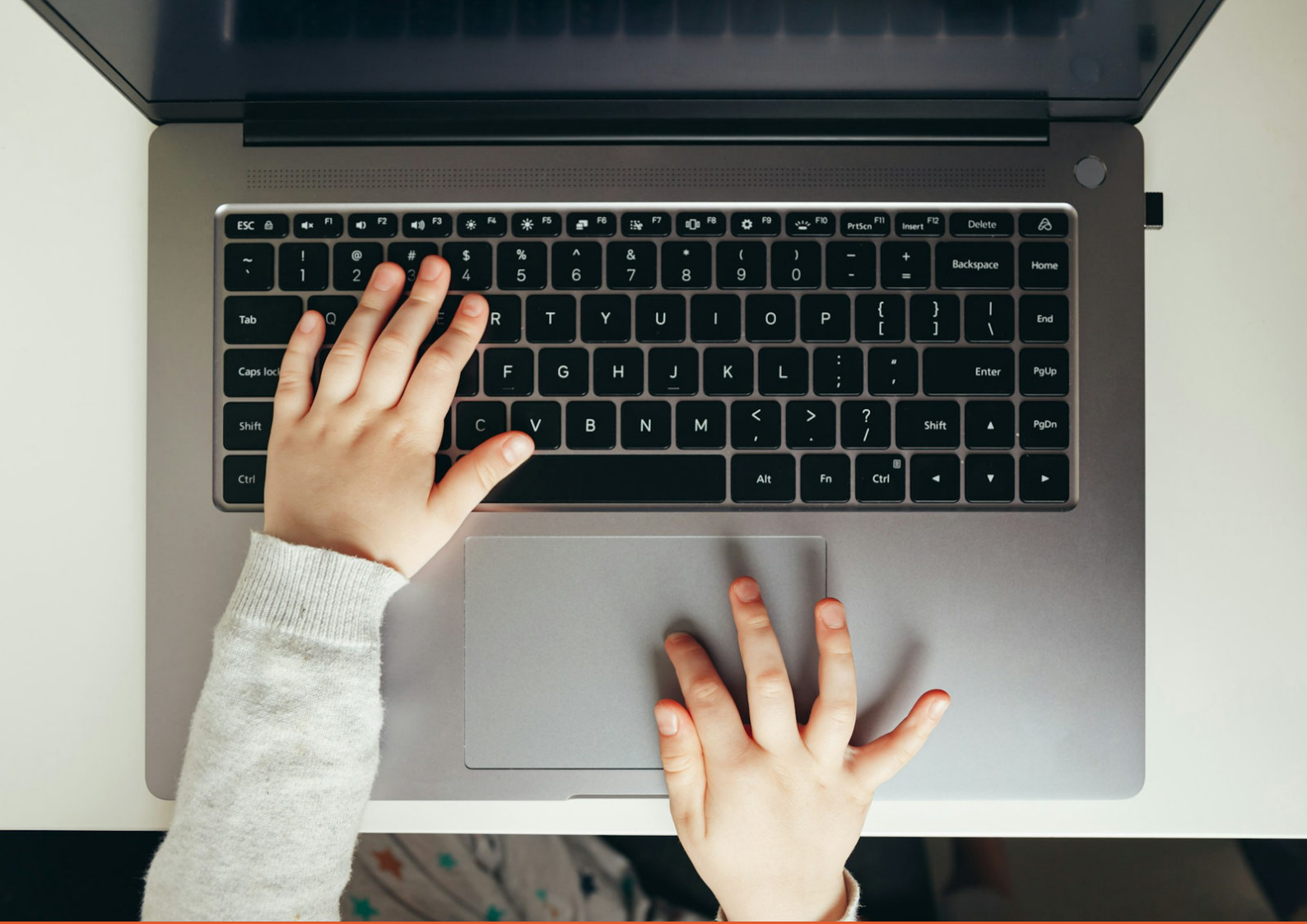




EduTrend Contents

EDUTECH · TECHNOLOGY · HIGH SCHOOL

Secret Messages

From Caesar ciphers to the ideas behind modern encryption

Ages 15–18

Level: Advanced

75 minutes

Teams of 3

Activity 05

Inside: activity at a glance · step-by-step session plan · facilitator notes · 3 student worksheets · assessment checklist

ACTIVITY 05 · AT A GLANCE

Secret Messages

Teams encrypt messages with a Caesar cipher and swap them. They crack an unknown cipher using letter frequency analysis, then discuss why simple ciphers are weak. A padlock analogy introduces public-key encryption, and teams consider why encryption matters for privacy, banking and messaging.

Learning outcomes

By the end of the session students can:

- encrypt and decrypt with a Caesar cipher;
- use frequency analysis;
- explain why key length matters;
- describe public-key encryption.

KEY WORDS

encryption · cipher · key ·
frequency analysis · public key ·
private key

CURRICULUM LINKS

Maths: modular arithmetic.
History: wartime codebreaking.
Citizenship: privacy and security.

1**EXPLORE**

How does it work?

2**DECOMPOSE**

Break the problem
down

3**DESIGN**

Plan the steps

4**BUILD**

Make or program it

5**DEBUG**

Find and fix errors

6**REFLECT**

Is it the right tool?

Materials (per team)

- Cipher wheels
- English letter frequency chart
- Ciphertext cards
- Padlocks and boxes (optional)
- Worksheets 1, 2 and 3

Before the session

- Make cipher wheels.
- Prepare ciphertexts of 200+ letters.
- Print frequency chart.
- Print worksheets.

SAFETY

Do not use real passwords or personal data in any examples.

ACTIVITY 05 · SESSION PLAN

Step by step

Longer ciphertexts make frequency analysis work much better; keep them over 200 letters.

Time	What happens	Say or ask
0–10 min Hook	Decode a short cipher.	<i>"How was it hidden?"</i>
10–25 min Caesar	Encrypt and swap.	<i>"How many keys are possible?"</i>
25–45 min Crack	Frequency analysis.	<i>"Which letter is most common?"</i>
45–60 min Public keys	Padlock analogy.	<i>"How can strangers share secrets?"</i>
60–75 min Discuss	Encryption in daily life.	<i>"Who should hold the keys?"</i>

CHALLENGE CARD (print or copy onto the board)

Encrypt a message, crack an unknown Caesar cipher with frequency analysis and explain how public-key encryption solves the key-sharing problem.

ACTIVITY 05 · FACILITATOR NOTES

The computing know-how in brief

A Caesar cipher shifts each letter by a fixed amount. With only 25 useful shifts, it can be broken by trying every key, or by frequency analysis: in English, E is usually the most common letter.

Modern encryption uses very large keys. In public-key encryption, anyone can use a public key to lock a message, but only the holder of the matching private key can unlock it.

Common ideas to listen for

- “Encryption makes data disappear.” It scrambles it reversibly.
- “A secret method is enough.” Security relies on keys.
- “Only criminals need encryption.” It protects everyday communication.

Adapting the activity

Support

Give a partly decoded text.

Stretch

Research the Vigenère cipher and why it resists simple frequency analysis.

WORKSHEET 1

Encrypt

Name: _____

Class: _____ Date: _____

Use your cipher wheel.

Encrypt

Plaintext	Shift	Ciphertext
1		
2		
3		

WORKSHEET 2

Frequency analysis

Count letters in the ciphertext.

Frequency analysis

Letter	Count	Likely plaintext
1st		
2nd		
3rd		
4th		
5th		

WORKSHEET 3

Public keys

Explain the idea.

How public-key encryption works and why it matters

FOR THE TEACHER

Assessment checklist

Use during the session. One sheet covers up to eight students; copy as needed.

Student	Encrypts correctly	Cracks with frequency analysis	Explains public keys

Suggested codes: W = working towards · E = expected · G = greater depth

ABOUT THIS ACTIVITY

Secret Messages is a sample activity from the EduTrend Contents Edutech Technology programme (high school, level: advanced). Every activity in the programme follows the same format: a practical challenge, a clear session plan, facilitator notes and ready-to-print worksheets, so that teachers, club leaders and parents can run it without extra preparation.

Full 15-, 20- and 32-week programmes are available from EduStore at edutrend.org.

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