VÝUKA TEORETICKÉ INFORMATIKY POMOCÍ METODY CLIL

METODICKÉ LISTY

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Obsah

Seznam příloh

Obrázek na titulní stránce byl vygenerován pomocí AI Midjourney.

Úvod

Tyto metodické listy obsahují 7 lekcí pro výuku tématu Kódování a přenos dat pomocí metody CLIL (Content and Language Integrated Learning, tj. obsahově a jazykově integrované učení). Lekce odpovídají očekávaným výstupům dle nového RVP ZV v oblasti informatika.

Metodické listy obsahují očekávané výstupy, cíle a možné problémy, které mohou nastat. Před každou lekcí se nachází stručné zaměření lekce v anglickém i českém jazyce. Samotné lekce a aktivity jsou pak detailně popsány v praktické části diplomové práce *Výuka teoretické informatiky pomocí metody CLIL.* Doporučuji si nejprve projít tyto metodické listy a pak detailní popis v DP, která pak obsahuje i zhodnocení výuky a zkušenosti při testování v praxi.

K metodickým listům jsou připravené i pracovní listy, které jsou k jednotlivým aktivitám potřeba.

Introduction

These method sheets contain 7 lessons for teaching the topic of Coding and data transfer using the CLIL (Content and Language Integrated Learning) method. The lessons correspond to the expected outcomes according to the new RVP ZV in the field of informatics.

The method sheets contain the expected outcomes, teaching objectives, and possible problems that may arise. Each lesson is preceded by a brief overview of the lesson in both English and Czech. The lessons and activities themselves are then described in detail in the practical part of the thesis Teaching theoretical informatics using the CLIL method. I recommend first going through these method sheets and then the detailed description in the thesis. The thesis then includes an evaluation of the teaching and testing experience in practice.

The method sheets are also accompanied by attachments that are needed for each activity.

LESSON 1 - Introduction to encoding and transmission of data.

CONTENT

Teaching aims:

Familiarize ourselves with the codes around us.
Activate prior knowledge about codes.
Figure out the importance of information encoding.

Learning outcomes:

Be aware of codes around us.
Be able to identify and explain simple codes around us.
Know the basic principle of encoding.

CULTURE/CITIZENSHIP

Students will learn the meaning of various warning signs they may encounter in everyday life. They will learn that the brand may be in a foreign language but thanks to the picture code it will be understood worldwide. Beware that some images may be misinterpreted.

COMMUNICATION

English structures expressing obligation or prohibition – *have to, must, can, cannot.* These are relatively complex structures that students do not learn until 8th grade. Therefore, they are only superficially familiar with them.

Examples:

You have to wear a helmet.
You cannot smoke here.
You can bring your pet here.

Vocabulary related to the topic – *prohibited, obligated, allowed.* Students are gradually introduced to the vocabulary they will need to understand in this learning unit – *encoding, codes.* Secondary vocabulary – *traffic sign, tag on clothes, weather.*

COGNITION

Students will be able to explain various simple codes around us. Next, they will engage their creative thinking and they will be reasoning and hypothesizing throughout the whole learning unit. Next, students will evaluate the meaningfulness of different codes and whether they are appropriate and easy to understand.

LEKCE 1 - Úvod do kódování a přenosu dat.

OBSAH

Cíle výuky:

Seznámit se s kódy v okolí.
Aktivizovat předchozí znalosti o kódech.
Přijít na význam kódování informací.

Očekáváné výstupy:

Uvědomit si kódy kolem nás.
Umět identifikovat a vysvětlit jednoduché kódy kolem nás.
Znát základní princip kódování.

KULTURNÍ ASPEKTY

Žáci se seznámí s významem různých varovných značek, se kterými se mohou setkat v každodenním životě. Naučí se, že značka může být v cizím jazyce, ale díky obrázkovému kódu jí budou rozumět po celém světě. Pozor na to, že některé obrázky mohou být špatně interpretovány.

KOMUNIKACE

Anglické struktury vyjadřující povinnost nebo zákaz – have to, must, can, cannot. Jedná se o poměrně složité struktury, které se žáci učí až v 8. třídě. Proto jsou s nimi seznámeni jen povrchově.

Příklady:

You have to wear a helmet.
You cannot smoke here.
You can bring your pet here.

Slovní zásoba související s tématem – zákazy, povinnosti, dovolení. Žáci jsou postupně seznámeni se slovní zásobou, kterou budou potřebovat k pochopení této vyučovací jednotky – kódování, kódy. Vedlejší slovní zásoba – dopravní značka, visačka na oblečení, počasí.

ROZVOJ MYŠLENÍ

Žáci budou schopni vysvětlit různé jednoduché kódy kolem nás. Dále zapojí své tvůrčí myšlení a v průběhu celé vyučovací jednotky budou uvažovat a vytvářet hypotézy. Dále budou žáci hodnotit smysluplnost různých kódů a to, zda jsou vhodné a snadno pochopitelné.

Introduction to encoding and transmission of data.

Required equipment: Smart board/projector or printed material, no need for computers.

INTRODUCTION

Greet the students and introduce the new learning topic – encoding.

Explain the learning outcomes of today's lesson. What they should accomplish by the end of this lesson.

- Be aware of codes around us.
- Be able to identify and explain simple codes around us.
- Know the basic principle of encoding.

> **Possible difficulty - CONFIDENCE**
> First CLIL lesson can be difficult for students, and they can be afraid to speak in English. They need to be assured that making mistakes is okay. It is crucial not to lower their confidence. Of course, correct mistakes, but always in a positive spirit. Teach students to learn from their mistakes and not to be ashamed of them.

WARM-UP

Try to expand the discussion on what the codes are. Students are likely to confuse encoding and programming. In English, it is a little bit tricky. To make it easier to understand, let's use word **encoding** instead of **coding**.

- In English coding can also mean *writing computer programs (= instructions)* according to the Cambridge Dictionary.

DO NOT BE AFRAID to use the first language to explain this. Students need to understand the difference.

Use guiding questions at first. Students should figure out the answer on their own.

- How do you know you can cross a very busy road in your city? (traffic lights)
- How do you know if you can iron your shirt? (tag on your shirt)
- How do you know what the weather will be like tomorrow?

Try opening the weather forecast on your phone. What are all the images you see that represent the weather? (sunny, cloudy, rainy, stormy, snowy)

It is important to use visual aids in the classroom. For example, the exit sign, math graphs, maps, symbols, or icons.

Students may already have some awareness of this topic from previous years. It is therefore important to activate this knowledge. Ask students if they remember anything about this topic from previous years.

Possible difficulty – VOCABULARY

Students may not immediately remember vocabulary such as weather. Try not to direct students to the translators right away. For example, try showing a web page with the weather in English. Make them associate the word in English with its meaning rather than its translation.

ACTIVITY 1 Attachment L1A1 – Emojis

Divide students into groups of 3-4. Each group will get a piece of paper with one sentence written on it and a piece of paper with a set of emojis.

The task of each group is to use the emojis given and express the sentence on the paper with them. They can use as many emojis as they want.

- Example sentences:
    1. I love eating pizza at the beach.
    2. Tomorrow, I have a secret surprise for you.
    3. The treasure is under the palm tree.
    4. I wish a new computer for Christmas.
    5. I want to watch a funny movie tonight.

- Possible answers:
    1. 😍 🍕 🏖
    2. 🔜 🤫 🎁 👀
    3. 💎 🔍 🌴 ⬇
    4. 🙏 🎄 🖥 🎁
    5. 🍿 😁 🌙
- You can also use for example names of movies, TV shows, or anything else.

After all the groups create their coded sentences, ask them to show it to the other groups. The other groups will try to decode the sentence.

The point of the activity is that not every code (emoji) has a clear meaning, and everyone can understand this code differently. This is because the students were not given any key.

> **Possible difficulty – TEAMWORK**
> Students should interact throughout the lesson more than the teacher, especially during teamwork. It is important to take the classroom climate into account when dividing groups. When working independently in groups, check on the students and let them know that you are in the classroom among them. Help them to make a real effort to use the English language.

ACTIVITY 2 Attachment L1A2 – Signs

Give students these instructions: *An Alien came to you, and he brought you several signs that he picked up around the world. He needs to explain their meaning.*

Show students the following signs and ask them to write their meaning as simply as possible in a sentence.

Students can work in groups again.

The first sign can be used as an example.

This sign is probably in Czech.

It probably means:

You cannot camp here.
You are not allowed to camp here.
Camping is prohibited here.

Can we sleep here without a tent?

This sign is probably in Spanish.

It probably means:

You can smoke here.
You are allowed to smoke here.
Smoking is allowed here.

This sign is easy to understand.

This sign is probably in Greek.

It probably means:

You cannot walk your dog here.
You are not allowed to come here with a dog.
Dogs are prohibited here.

Are other pets also prohibited or just dogs?

This sign is probably in Chinese or Japanese.

It probably means:

You have to/must wear a helmet.
You should wear a helmet.
You are not allowed to come here without a helmet.

Is it an obligation to wear a helmet or just a recommendation?

This sign has no text.

It probably means:

You can jump in the water here.
You are allowed to jump in the water here.
Jumping in the water is allowed here.

This sign could be a little confusing without any text. Students can discuss its meaning and even think of new meanings.

Try hypothesizing with students about the clarity of each sign.

- Some of them are very clear even if we don't know the language (we can guess foreign words or the picture is clear)
- Some are not so clear and if, for example, they use a different alphabet and the languages we know are not related to that language we cannot deduce anything.

That's the main encoding problem. It will not always be understood the same way by 2 people or 2 machines. It must be as clear as possible or a key must be provided.

Possible difficulty – VISUAL SUPPORT

In this exercise try to introduce students to verbs expressing obligation, recommendation, and permission. This is quite a challenging vocabulary. Students must have good visual support. It is helpful to write the verbs on the board and leave them there for the entire time they are doing the activity. As an example, you can work together to guess the meaning of the first sign and make some sentences.

CLOSURE

Ask students: *What other codes can we see around us?*

- Students should already be familiar with the other codes around them - road signs, tags on clothing, state signs, flags, etc.

Summarize what you have learned today and whether you have fulfilled the learning outcomes.

Tell the students what you will cover in the next lesson.

LESSON 2 - Character encoding.

CONTENT

Teaching aims:

Figure out how to encode the characters.
Learn how to read from a character set.
Create our own character set.

Learning outcomes:

Be aware of the complexity of coding different languages.
Be able to encode and decode characters using a character set.
Know the meaning of character encoding.

CULTURE/CITIZENSHIP

Students will learn that each nation uses different characters to write text. They realise that thanks to the character sets that computers use, we can communicate worldwide. Students will think about character sets in different languages, fostering an awareness of multilingualism and the diverse ways languages represent characters.

COMMUNICATION

Introduces technical **vocabulary** related to character encoding, such as "character sets", "ASCII table", "coding", and "decoding". Among other things, the lesson introduces students to words from the topic of punctuation, for example, "comma", "question mark" exclamation mark". Students will also review the use of high numerals and the alphabet.

They will also encounter the names of languages and countries and try to express themselves in which countries which language is spoken without using a passive sentence.

COGNITION

Encourages students to decode a message using logic and deduction. They have to figure out the encoding method without direct instructions, promoting problem-solving skills. Engages students in critical thinking about character sets, prompting them to consider various languages, symbols, and formats. Involves group discussions where students share their ideas, listen to others, and articulate their thoughts and opinions about character encoding.

LEKCE 2 – Kódování znaků

OBSAH

Cíle výuky:

Přijít na to, jak kódovat znaky.
Naučit se číst ze znakové sady.
Vytvořit vlastní znakovou sadu.

Očekáváné výstupy:

Uvědomit si složitost kódování různých jazyků.
Umět kódovat a dekódovat znaky pomocí znakové sady.
Vědět, proč znaky kódujeme.

KULTURNÍ ASPEKTY

Žáci se dozvědí, že každý národ používá k psaní textu jiné znaky. Uvědomí si, že díky znakovým sadám, které používají počítače, můžeme komunikovat po celém světě. Žáci budou přemýšlet o znakových sadách v různých jazycích, což podpoří povědomí o mnohojazyčnosti a různých způsobech, jakými znaky zobrazují.

KOMUNIKACE

Žáci se setkají s technickou slovní zásobu týkající se kódování znaků, jako jsou "znakové sady", "tabulka ASCII", "kódování", "dekódování ". Lekce mimo jiné seznamuje žáky se slovy z tématu interpunkce, například "čárka", "otazník" vykřičník". Žáci si také zopakují používání velkých číslic a abecedy.

Setkají se také s názvy jazyků a zemí a pokusí se vyjádřit, ve kterých zemích, se kterým jazykem mluví, aniž by použili pasivní věty.

ROZVOJ MYŠLENÍ

Žáci budou k dekódování zprávy používat logiku a dedukci. Žáci budou muset přijít na způsob kódování bez přímých instrukcí, což podporuje schopnost řešit problémy. Žáci budou zapojeni do kritického myšlení o znakových sadách, což je podněcuje k tomu, aby zvážili různé jazyky, symboly a formáty. Budou zahrnuty skupinové diskuse, v nichž budou žáci sdílet své nápady, naslouchat ostatním a vyjadřovat své myšlenky a názory na kódování znaků.

Character encoding.

Required equipment: Smart board/projector or printed material, no need for computers.

INTRODUCTION

Greet the students and ask them if they remember what they did last lesson.

Explain the learning outcomes of today's lesson. What they should accomplish by the end of this lesson:

- Be aware of how the computer encodes characters.
- Be able to read from character sets.
- Know other ways of writing characters.

WARM-UP

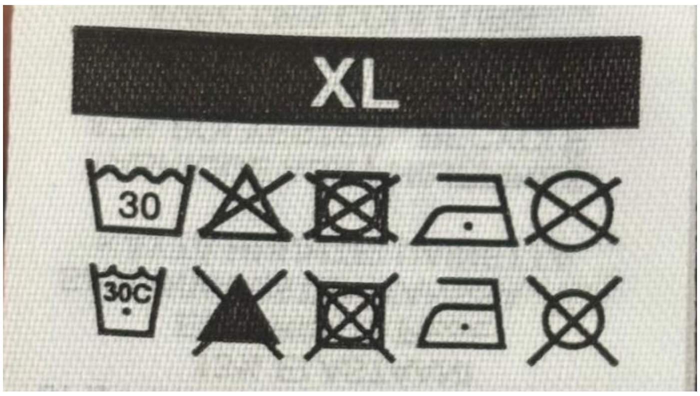
Question for students:

- *Look at the tags on your clothes. What codes do you see?*

Students can read a lot of information from the sign. Students will consider clothing brands, wash marks, or size marks as codes, which is correct.

Tell students to draw anything they can think of on the board. Preferably one at a time, so that no duplicate pictures appear on the board.

After finishing the drawing, explain each code one by one.



Possible difficulty – Unknown meaning

Students will likely draw a picture on the board that they and you won't understand. If this happens, it is a good idea to tell students to guess the meaning first and then try to find the meaning on the internet.

ACTIVITY 1 Attachment L2A1 – Small character set

Give students the blank table with only the numbers below:

65		75		85	
66		76		86	
67		77		87	
68		78		88	
69		79		89	
70		80		90	
71		81			
72		82			
73		83			
74		84			

Write the following code with the word below on the board:

H E L L O
72 69 76 76 79

Tell students to use the word HELLO to complete the table.

- If students do not figure out how the alphabet is encoded, do not reveal the solution. Try giving them other words until they figure it out on their own.

Ask the students if they have any idea how the table works.

- *The reason for asking after the table has been completed is so that all students can have enough time to figure out the principle and not have it immediately revealed to them.*

Now give students the code below and ask them to decode the message.

69 70 70 73 67 73 69 78 67 89

- The answer is *EFFICIENCY.* Students who got something different probably made a mistake in completing the table. Try to figure out these errors together.

Possible difficulty

Students will probably first consider the Czech alphabet which has an extra letter CH. Do not tell them what alphabet it is. If you get to the problem, it is a good stimulus for discussion. You can tell them the letter CH isn't on their keyboard either.

ACTIVITY 2

Tell students to create a character set with characters from the Czech language.

You can provide them with a new blank table or have them design their own on blank paper.

Students will ask a variety of questions as they create. For example, whether to add the letters like ř, č á, í. Guide students to create a table of their own, if they think these letters belong there have them add them.

Possible difficulty

Vocabulary containing punctuation is very difficult. If students do not know the word, have them say it in Czech. Students do not need to know this vocabulary; it is important to understand the content of this discussion.

At the end of the activity, select one student to code, for example, the word TŘEŠEŇ on the board using the chart they have created.

Once the student has encoded the word, ask others to try to decode the message using their charts.

Now there will be confusion because almost no one is likely to get the word right. This is because everyone has created their own table. That's why computers must have one unified one, otherwise writing messages would end up as this activity.

Question for discussion:

- What other languages use different characters than English?
- Students will have lots of ideas. You start:
    - *"They speak Slovak in Slovakia."* And write *Ľ* on the board.
- Now invite the students to continue as you did. If they don't know a letter that is in a foreign alphabet, try to find one on the internet and write it on the board. Examples of ideas from students:
    - They speak **German** in **Germany**.
    - They speak **Ukrainian** in **Ukraine**.
    - They speak **Chinese** in **China**.

The point of this discussion is to note how many other languages use additional characters. This activity also helps pupils to develop the names of languages and countries.

- What else would you need to add to the table to write normal messages?
    - Numbers
    - Punctuation
    - Emojis
- How do we separate words? Should we add a space to the table?
- What about upper and lower case? Do we have to distinguish them?

At the end of the discussion, students should realise that the table must be incredibly large to be used in today's computers.

ACTIVITY 3 Attachment L2A2 – ASCII table

Show the following table to the students. Give them the task of decoding the following message:

- 87 104 97 116 **32** 105 115 **32** 116 104 101 **32** 112 117 114 112 111 115 101 **32** 111 102 **32** 99 111 100 105 110 103 **63**

When monitoring, ensure that students are distinguishing between upper- and lower-case letters and using spaces when coding.

0	*[NULL]*	32	*[SPACE]*	64	@	96	`
1	*[START OF HEADING]*	33	!	65	A	97	a
2	*[START OF TEXT]*	34	"	66	B	98	b
3	*[END OF TEXT]*	35	#	67	C	99	c
4	*[END OF TRANSMISSION]*	36	$	68	D	100	d
5	*[ENQUIRY]*	37	%	69	E	101	e
6	*[ACKNOWLEDGE]*	38	&	70	F	102	f
7	*[BELL]*	39	'	71	G	103	g
8	*[BACKSPACE]*	40	(	72	H	104	h
9	*[HORIZONTAL TAB]*	41	)	73	I	105	i
10	*[LINE FEED]*	42	*	74	J	106	j
11	*[VERTICAL TAB]*	43	+	75	K	107	k
12	*[FORM FEED]*	44	,	76	L	108	l
13	*[CARRIAGE RETURN]*	45	-	77	M	109	m
14	*[SHIFT OUT]*	46	.	78	N	110	n
15	*[SHIFT IN]*	47	/	79	O	111	o
16	*[DATA LINK ESCAPE]*	48	0	80	P	112	p
17	*[DEVICE CONTROL 1]*	49	1	81	Q	113	q
18	*[DEVICE CONTROL 2]*	50	2	82	R	114	r
19	*[DEVICE CONTROL 3]*	51	3	83	S	115	s
20	*[DEVICE CONTROL 4]*	52	4	84	T	116	t
21	*[NEGATIVE ACKNOWLEDGE]*	53	5	85	U	117	u
22	*[SYNCHRONOUS IDLE]*	54	6	86	V	118	v
23	*[END OF TRANS. BLOCK]*	55	7	87	W	119	w
24	*[CANCEL]*	56	8	88	X	120	x
25	*[END OF MEDIUM]*	57	9	89	Y	121	y
26	*[SUBSTITUTE]*	58	:	90	Z	122	z
27	*[ESCAPE]*	59	;	91	[	123	{
28	*[FILE SEPARATOR]*	60	<	92	\	124	|
29	*[GROUP SEPARATOR]*	61	=	93	]	125	}
30	*[RECORD SEPARATOR]*	62	>	94	^	126	~
31	*[UNIT SEPARATOR]*	63	?	95	_	127	*[DEL]*

Whoever is faster can think about the answer to this question.

Check the solution at the end of the activity:

- The decoded message is: **What is the purpose of coding?**

Questions for discussion:

- *Why do you think the computer has to translate characters into numbers using this table?*
  - The answer doesn't have to be complicated at all. For example, by using a character set, multiple different computers can send and receive messages.

CLOSURE

Ask students: *Do you think emojis also have their own code? Or how do you think computers code them?*

- Students should understand that emojis must also have their own code. They may have noticed that emojis look different on Android phones than on iOS phones. But the code is the same.

Ask students: *How is it possible that some emojis do not appear on another* phone?

- The phone that received the code does not have the code assigned to any character.

Summarize what you have learned today and whether you have fulfilled the learning outcomes.

Tell the students what you will cover in the next lesson.

LESSON 3 - Cyphers

CONTENT

Teaching aims:

Learn the basic principles of cyphers.
Learn different ways of encrypting information.
Discuss the different encryption options.

Learning outcomes:

Be aware of different types of cyphers.
Be able to decipher and cypher basic cyphers.
Know the principle of encrypting information.

CULTURE/CITIZENSHIP

Students are introduced to Morse code, which started the worldwide development of telecommunications and radio communications.
Students are introduced to the various cyphers that played an important role in times of war when cyphers were necessary for the secret transmission of information.

COMMUNICATION

In one activity, students practise reading comprehension. In this activity, they will also practise making sentences in which they compare two people. They will also encounter simple vocabulary on the topic of family relationships.
Students will encounter fractions in the second half of the lesson. They will learn to express fractions most simply.

COGNITION

Students will use their problem-solving skills to crack cyphers and find logic in cypher tables. They will lead discussions on each cypher and try to evaluate its effectiveness. Next, they will engage their creative thinking to create their own messages to encrypt. They will also build strategies to decipher secret messages and be able to transfer this experience to other cyphers.

LEKCE 3 - Šifry

OBSAH

Cíle výuky:

Seznámit se se základním principem šifrování.
Poznat různé způsoby šifrování informací.
Diskutovat o různých možnostech šifrování.

Očekáváné výstupy:

Být si vědom existence různých typů šifer.
Umět dešifrovat a zašifrovat základní šifry.
Znát princip šifrování informací.

KULTURNÍ ASPEKTY

Žáci se seznámí s Morseovou abecedou, která odstartovala celosvětový rozvoj telekomunikací a rádiové komunikace.

Žáci se seznámí s různými šiframi, které hrály důležitou roli v dobách války, kdy byly šifry nezbytné pro tajný přenos informací.

KOMUNIKACE

V jedné aktivitě si žáci procvičují čtení s porozuměním. V této aktivitě si také procvičí tvorbu vět, ve kterých porovnávají dvě osoby. Setkají se také s jednoduchou slovní zásobou na téma rodinné vztahy.

Ve druhé polovině lekce se žáci setkají se zlomky. Naučí se vyjadřovat zlomky tím nejjednodušším způsobem.

ROZVOJ MYŠLENÍ

Žáci využijí své schopnosti řešit problémy při luštění šifer a hledání logiky v šifrovacích tabulkách. O každé šifře povedou diskusi a pokusí se zhodnotit její účinnost. Poté zapojí své kreativní myšlení a vytvoří vlastní zprávy k zašifrování. Budou také vytvářet strategie pro luštění tajných zpráv a budou schopni přenést tyto zkušenosti na jiné šifry.

Cyphers

Required equipment: Smart board/projector or printed material, no need for computers.

INTRODUCTION

Greet the students and ask them if they remember what they did last lesson.

Explain the learning outcomes of today's lesson. What they should accomplish by the end of this lesson:

- **Be aware of** different types of cyphers.
- **Be able to** decipher and cypher basic cyphers.
- **Know the** principle of encrypting information.

WARM-UP

Choose three students. One will stand by the board, one at the end of the classroom, and the third one between them.

The one furthest from the board is the broadcaster, the one in the middle is the transmitter and the one near the board is the receiver.

Project the chart from the last lesson on the board.

65	A	75	K	85	U
66	B	76	L	86	V
67	C	77	M	87	W
68	D	78	N	88	X
69	E	79	O	89	Y
70	F	80	P	90	Z
71	G	81	Q		
72	H	82	R		
73	I	83	S		
74	J	84	T		

Give broadcaster word INFORMATION.

The broadcaster will try to transmit the message to the transmitter and the transmitter will try to send the message to the receiver who will write the message on the board.

They can only use their fingers! Do not allow them to draw the numbers in the air.

ACTIVITY 1 Attachment L3A1 – Morse code & L3A2 – Worksheet – secret message

Either hand out or project the Morse code key to the students.

A	•–	J	•–––	T	–
B	–•••	K	–•–	U	••–
C	–•–•	L	•–••	V	•••–
D	–••	M	––	W	•––
E	•	N	–•	X	–••–
F	••–•	O	–––	Y	–•––
G	––•	P	•––•	Z	––••
H	••••	Q	––•–		
CH	––––	R	•–•		
I	••	S	•••		

Give students the following worksheet. solution

You found a secret message. Decrypt the message and answer the questions below.

My name is (1)_Marty_. I have one sister. Her name is (2)_Monica_ and she is 10 years older than me. We have 2 cousins. Their names are (3)_Jacob_ and (4)_Peter_. (5)_Peter_ is older than me but younger than my sister. (6)_Jacob_ is older than both of us.

1 -- | .- | .-. | - | -.--

2 -- | --- | -. | .. | -.-. | .-

3 .--- | .- | -.-. | --- | -...

4 .--. | . | - | . | .-.

5 .--. | . | - | . | .-.

6 .--- | .- | -.-. | --- | -...

A. How many people are mentioned in the text? Four people

B. What are their names? Marty, Monica, Jacob, Peter

C. Write 4 sentences with *younger/older* using names from exercise B.

1.

2.

3.

4.

Check the solution together:

You can then ask students additional questions to practise the family relationships vocabulary.

- For example. *Who's Marty's sister? Is Jacob an only child?*

Discussion

After completing the activity, ask the students if anyone knew the cypher before. When was it invented and what was it used for?

- Morse code was invented in the first half of the 19th century and played an important role in the development of long-distance communication.
- **Although Morse code is presented here as a cypher, it was originally used more as a code to help communicate over long distances.**

Select a few students and ask them about their strategy for solving the cypher.

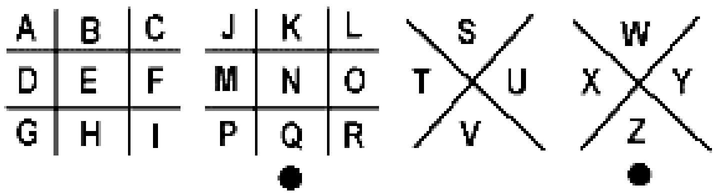
- How can this code be sent?
    - Written on paper.
    - By sound.

Are there any risks of cyphers transferred by sound?

- Someone can hear our cypher.
- Once we hear the cypher and it's over, we can't go back to it.

ACTIVITY 2 Attachment L3A3 – Polish Cross

Students will now try working with the new cypher. Either hand out or project the Polish Cross Cypher key to the students.



- Give students the following cypher to solve:

- The solution is "CIPHER BROKEN"

After deciphering, give students the task of encrypting their own short message. They then exchange their own cyphered messages with a classmate and try to decipher them.

> **Possible difficulty**
>
> If they choose a word that contains letters that are in the right part of the cypher (S-Z) they could have a problem with the encryption. Let them figure it out. It works just like the first part of the cypher.

Questions for discussion

How is this cypher different from the previous one?

- Expected answer: "*You have to draw it. It can be sent only as pictures.*" or "*The lines aren't next to each other, they're inside each other.*"

Can you type this cypher on a keyboard or send it by sound?

- Expected answer: *"No, you have to draw it."*

ACTIVITY 3 Attachment L3A4 - Fractions

Either hand out or project the Cypher key to the students.

- To simplify the activity, use the simplest method to express fractions.
  - $\frac{1}{4}$ = **one over four**
  - $\frac{5}{3}$ = **five over three**
  - $\frac{2}{2}$ = **two over two**

Try encrypting your own message now.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	R	S	T	U	V	W	X	Y	Z
5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
		5					4					3					2					1		

Switch your encrypted messages with a classmate and try to decrypt it.

Students can encrypt messages in two ways. Don't tell them that. It might lead to an interesting discussion.

- Two ways of encrypting the word *"COOL"*:

$$\frac{3}{5}\ \frac{1}{3}\ \frac{1}{3}\ \frac{4}{3} \qquad \frac{5}{3}\ \frac{3}{1}\ \frac{3}{1}\ \frac{3}{4}$$

Possible difficulty

The cypher key tends to suggest using the first style (blue writing), but if you find a student who has used the second style (red writing), have them write their cypher on the board.

Take advantage of the discussion that will arise. Someone will insist that this is not the way to encrypt. It's not written anywhere. Both options are correct.

CLOSURE

If you have time, ask students if they can design their own cypher table.

- If students are interested, you can spend another lesson on creating your own cyphers.
- The students would form a couple of teams, and each would create their own cypher, which they would then use to encrypt something, and the others would try to decipher it.
- The team with the hardest cypher to crack wins.

Summarize what you have learned today and whether you have fulfilled the learning outcomes.

Tell the students what you will cover in the next lesson.

LESSON 4 – Binary thinking

CONTENT

Teaching aims:

Learn the basic principle of the binary system.
Figure out the relationship between the binary system and everyday life.
Record information using the binary system.

Learning outcomes:

Be aware of the basic principle of the binary system.
Be able to correct errors using the control bit.
Know when different situations can be expressed by only two states.

CULTURE/CITIZENSHIP

In a warm-up activity, students will try out an encryption system that has been used for centuries. In the second activity, students talk about deciding between different options. This is done in the activity using simple voting. In this way, students learn about the basic mechanism of democracy. Students can then organise their own voting and learn how to record the results.

COMMUNICATION

In the warm-up activity, students have space to write words using only 6 letters. Students can compete to see who can create more words. In this activity, they develop their vocabulary. In Activity 1, students will encounter a conditional sentence. Based on the example sentences they see, they will try to use the conditional sentence themselves. In Activity 2, students read from a table and then use the table to complete the sentences.

COGNITION

Students evaluate whether the examples they have created are binary and then defend this evaluation. Students will also encounter errors in the use of the binary system and will have to find ways to correct these errors. They will be given an example of one solution to a problem and use generalization to transfer the solution of such a problem to another.

LEKCE 4 – Binární myšlení

OBSAH

Cíle výuky:

Seznámit se se základním principem binární soustavy.
Přijít na vztah binární soustavy a každodenního života.
Zapsat informace s pomocí binární soustavy.

Očekáváné výstupy:

Být si vědom základního principu binární soustavy.
Umět opravit chyby za použití kontrolního bitu.
Vědět, kdy lze různé situace vyjádřit pouze dvěma stavy.

KULTURNÍ ASPEKTY

V zahřívací aktivitě si žáci vyzkouší šifrovací systém, který je využíván již několik století. V druhé aktivitě si žáci povídají o rozhodování se mezi různými možnostmi. To se v aktivitě provádí pomocí jednoduchého hlasování. Tímto způsobem se žáci seznámí se základním mechanismem demokracie. Sami žáci si pak mohou uspořádat hlasování a naučit se jeho výsledky zapisovat.

KOMUNIKACE

V rozehřívací aktivitě mají prostor na vytváření vlastních slov pomocí pouze 6 písmen. Žáci mohou soutěžit kdo vytvoří více slov. Při takové aktivitě si rozvíjí slovní zásobu. V aktivitě 1 se žáci setkají s podmínkovou větou. Na základě vzorových vět, které uvidí, se sami pokusí podmínkovou větu vytvořit a použít. V aktivitě 2 budou žáci číst z tabulky a pak podle ní doplňovat do vět.

ROZVOJ MYŠLENÍ

Žáci vyhodnocují, zda jsou jimi vytvořené příklady opravdu binární a toto vyhodnocení následně obhajují. Žáci se také setkají s chybami v použití binární soustavy a budou muset přijít na způsob, jak tyto chyby opravit. K jednomu řešení problému budou mít k dispozici příklad a pomocí generalizace přenesou řešení takového problému na jiný.

Binary thinking

Required equipment: Smart board/projector or printed material, no need for computers.

INTRODUCTION

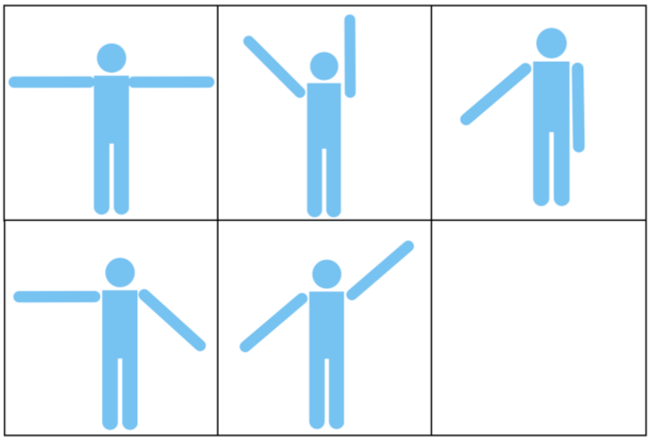
Greet the students and ask them if they remember what they did last lesson.

Explain the learning outcomes of today's lesson. What they should accomplish by the end of this lesson:

- **Be aware** of the basic principle of the binary system.
- **Be able to** correct errors using the control bit.
- **Know** when different situations can be expressed by only two states.

WARM-UP Attachment L4A1 - Figures

Project the cypher to the students.



R	T	A
S	L	

Using the tables above, decipher the following message:

- The decrypted message is: **START**

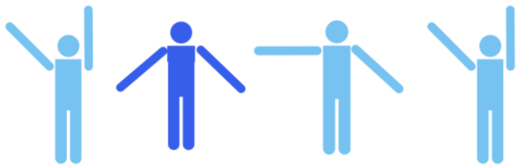
Additional task:

Now tell students to create their own encrypted message in groups.

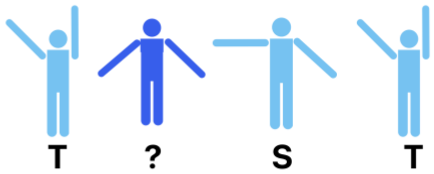
Tell them to use only the letters provided, plus tell them to add one letter of their choice.

Once they create and encrypt the message, they show the cypher to the other students without revealing the new letter.

- Example:
    - Group 1 created a message and demonstrated it like this:



    - Group 2 came up with this:



    - Group 2 found out that the new letter added is E and the word is *TEST.*
    - If the second group did not guess the newly added letter, let the first group create another cypher with the same letter and try again.

Students should deduce the encrypted word even if they are missing one piece of information.

ACTIVITY 1

Discussion before activity:

Who knows what binary numbers mean?

- Students are very likely to know that binary numbers are 0 and 1.

Could it be more than 2 numbers? E.g. 0,1 and 2?

- The expected answer is **"No"**. If someone answers **"Yes"** tell them to show you the third option on the light switch.

Tell the students to make pairs. Give students the following instructions:

Where in life do you find things that have only two states (like 0 and 1)?

Think of as many examples as you can.

Do a basic example together with a light switch. Write the following sentence on the board:

- If the light is on, the state is 1. If the light is off, the state is 0.

In this exercise, you and your students can have a look at the **IF clauses**.

Try guiding students to formulate their ideas using the zero conditional:

- IF + present simple, …. + present simple.
- **IF *THE LIGHT IS ON, THE STATE IS 1.***

You can prepare a handout with prepared sentences, where students will complete the sentences with other situations:

- **If** *the light is on* **, the state is** 1**. If** *the light is off* **, the state is** 0**.**
- **If __________________, the state is ___. If __________________, the state is ___.**
- **If __________________, the state is ___. If __________________, the state is ___.**
- **If __________________, the state is ___. If __________________, the state is ___.**

At the end of the activity, ask each pair what they came up with. Write their ideas on the board using the sentence structure above.

Possible answers:

- If you vote yes, the state is 1. If you vote no, the state is 0.
- If the door is open, the state is 1. If the door is closed, the state is 0.
- If you win in tennis, the state is 1. If you lose in tennis, the state is 1.
- If you say truth, the state is 1. If you tell a lie, the state is 0.

If the students are skilled, you can show them how to simply connect 2 such sentences as above:

- If you vote yes, the state is 1 **and** if you vote no, the state is 0.

If someone disagrees with something, let the whole class discuss it.

- Someone can say a sentence: *If the traffic light is green, the state is 1. If the traffic light is red, the state is 0.*
- Someone can respond: *What about orange light? What if the green light starts blinking?*

Possible difficulty

Students come up with lots of other things. For example, an elevator (goes up/goes down). Is this binary? What if it's not moving? Isn't it a third option? These things must be explained, and students understand that binary means only two states.

ACTIVITY 2 Attachment L4A2 - Voting

Martin and Sonia are choosing a new couch. They don't know what colour they want, so they voted. Ask students what **number 1** could mean and what **number 0** could mean.

	Red	Blue	Green	Yellow	Brown	Black
Peter	1	1	0	1	0	0
Sonya	1	0	1	1	0	1
	o	x	x	o	o	x

What do the symbols **x** and **o** below the line mean?

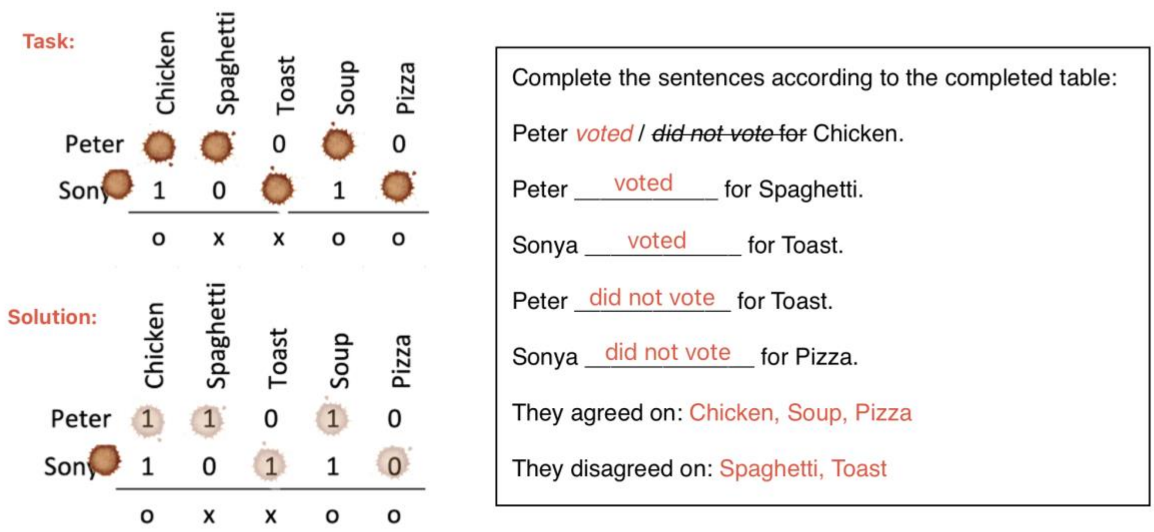
- Answer:
  - **x** means they don't share the same opinion.
  - **o** means they have the same opinion.

Which colours do they have the same opinion on?

  - Answer: **Red, Yellow, Brown**
  - **Which one are they most likely to get?**

A month later they did the same thing with their choice of what to have for dinner. Then when Sonya went shopping, she poured coffee on the voting paper.

- Can you use that paper to fill in how they voted? solution



Students may have trouble understanding the table. If this is the case, you can organise your own poll and create the same table.

CLOSURE

We can discuss with students where else this way of writing information fits. In particular, we will focus on the control bit which is represented here by x and o.

Summarize what you have learned today and whether you have fulfilled the learning outcomes.

Tell the students what you will cover in the next lesson.

LESSON 5 – The limits of ones and zeros

CONTENT

Teaching aims:

Become familiar with the use of the binary system.
Understand the limitations of the binary system in terms of the number of bits.
Record information using the binary system with the addition of a new bit.

Learning outcomes:

Be aware of the use of the binary system.
Be able to add a new bit to expand the possibilities.
Know the limitations of the binary system by number of bits.

CULTURE/CITIZENSHIP

In this lesson, the cultural aspects of the lesson introduce students to a new form of communication. In the world, for example, coloured bracelets are used to show support for a country or issue. In addition, students can reflect on the meaning of the symbols on flags. In activity 2, they encounter the way computers were previously programmed. For example, punched cards were used for this.

COMMUNICATION

In the second half, students will describe a few flags. In this describing activity, students will practise using adjectives. In the last activity, when they decode a message using the binary system, they encounter an error in the text that they have to figure out and then correct. Students can then discuss whether such an error could also occur in their mother tongue and how the languages differ.

COGNITION

Students encounter an error that they have to figure out and then correct. In the lesson, they also compare different solutions and hypothesize which solution is the most effective. Students also engage in abstract thinking while encoding and decoding using the binary system. They propose different solutions to solve the limitation of using a certain number of bits and then evaluate these solutions.

LEKCE 5 – Limity jedniček a nul

OBSAH

Cíle výuky:

Seznámit se s využitím binární soustavy.
Přijít na limity binární soustavy podle počtu bitů.
Zapsat informace s přidáním nového bitu.

Očekáváné výstupy:

Být si vědom využití binární soustavy.
Umět přidat nový bit a rozšířit tak možnosti.
Znát limity binární soustavy podle počtu bitů.

KULTURNÍ ASPEKTY

V této lekci se žáci v rámci kulturních aspektů seznámí s novou formou komunikace, kterou mohou jiné kultury v každodenním životě využívat. Ve světě se barevné náramky například využívají k vyjádření podpory nějaké zemi nebo jinému problému. Dále se žáci mohou zamyslet nad významem symbolů u vlajek. V aktivitě 2, se setkávají se způsobem, kterým byly dříve programovány počítače. Byly k tomu například využívány děrovací štítky.

KOMUNIKACE

V této lekci budou žáci popisovat vlajky. Při tomto popisování si žáci natrénují použití přídavných jmen a slovní zásoby na popis. V posledním cvičení, kdy dekódují zprávu pomocí binární soustavy, se setkají s chybou v textu, na kterou musí přijít a následně ji opravit. Žáci pak mohou diskutovat o tom, zda by taková chyba mohla vzniknout i v jejich mateřském jazyce a v čem dalším se jazyky liší.

ROZVOJ MYŠLENÍ

Studenti se setkají s chybou, na kterou musí přijít a následně ji opravit. V lekci také porovnávají různá řešení a hypotézují jaké řešení je nejefektivnější. Žáci dále zapojují abstraktní myšlení při kódování a dekódování za použití binární soustavy. Navrhují různá řešení, jak vyřešit limitaci použití určitého počtu bitů a tyto řešení pak zhodnocují.

The limits of ones and zeros

Required equipment: Smart board/projector or printed material, no need for computers.

INTRODUCTION

Greet the students and ask them if they remember what they did last lesson.

Explain the learning outcomes of today's lesson. What they should accomplish by the end of this lesson:

- **Be aware of the use of the binary system.**
- **Be able to add a new bit to expand the possibilities.**
- **Know the limitations of the binary system by number of bits.**

WARM UP Attachment L5A1 – Worksheet – bracelets

Students will need the worksheet from the attachment L5A1 for this activity. They will also work with this worksheet in Activities 1 and 2.

Possible difficulty

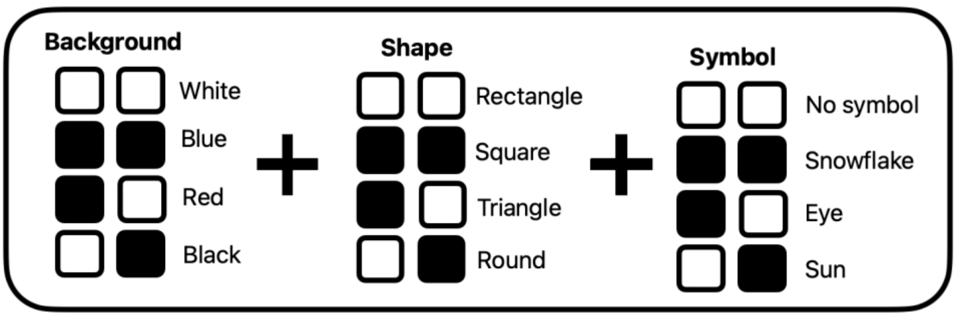
Students with a visual impairment that affects their perception of colour may have a significant disadvantage in this activity. Therefore, colours other than black and white are supplemented by their textual representation.

Provide students with the worksheet and introduce it.

Campers from summer camps use black and white beads to communicate.

They always wear a bracelet with 6 beads on their arm to recognise their camp flag.

They have these rules:

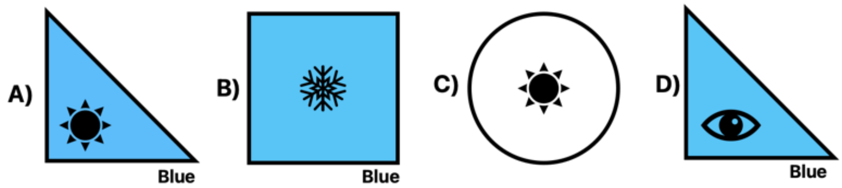


Exercise 1

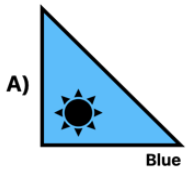
- In Exercise 1 the students will have to identify which flag the bracelet belongs to according to the rules above. They will have to divide the bracelet into 3 parts and compare them with the rules. As students compare pairs of beads one by one, they should eliminate one option every time.

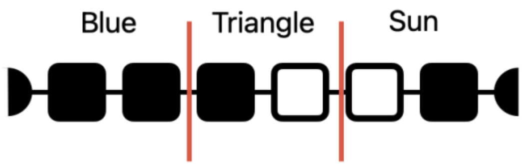
To which flag does the following bracelet belong?

- Options:



Solution:





Check the solution together.

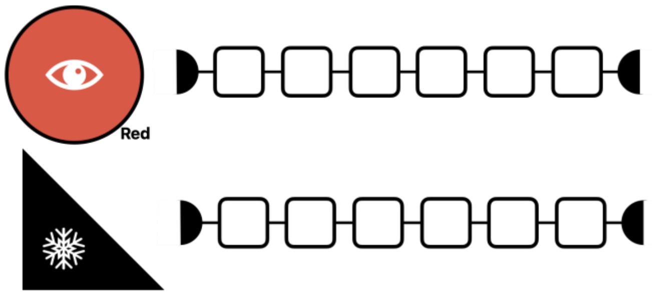
Ask students what their strategy was for finding the correct answer.

ACTIVITY 1

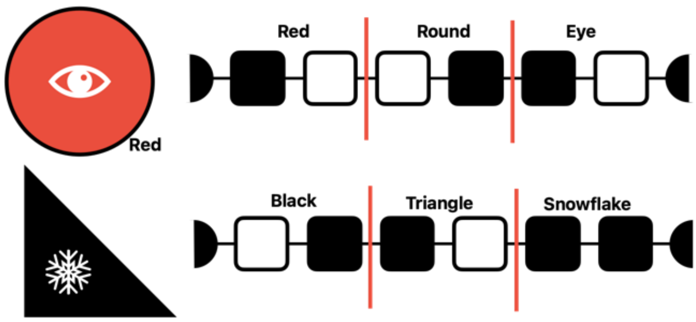
- Students will continue to work with the worksheet here. Now they will create bracelets according to the given flags. Again, they will use the given rules to do this.

Exercise 2

Create a bracelet for the following flags:



Solution:



Again, check the solution together.

You can ask six students to draw one bead at a time on the board.

Possible difficulty

Although geometric shapes are basic vocabulary, they may confuse the words. It would be good to draw them on the board at the beginning of the activity and write the words next to them.

ACTIVITY 2

For this activity, they have to replace the coloured black and white beads with 1's and 0's. They continue with the worksheet and follow the given rules.

Exercise 3

Introduction

So that campers don't have to make the bracelets themselves, they have a special machine for it.

All they have to do is give it the instructions in 1 and 0.

Solution:

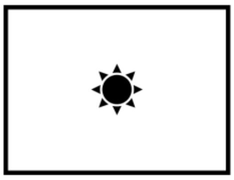
The instructions for the bracelet from the first task look like this:

111001 

What does 1 mean and what does 0 mean?

- 1 means ___black_______
- 0 means ___white_______

Create instructions for the machine for the following flags:



000001 ....

Blue

111111 ....

Red

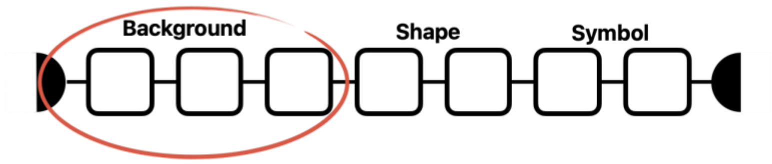
101011 ....

010100 ....

Additional task:

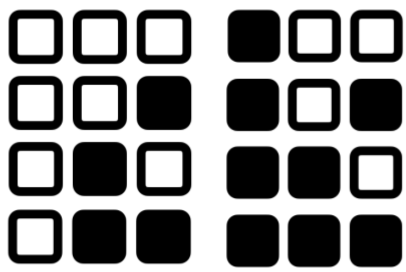
What if we want to add a new flag colour? How can we use beads to express more colours than just 4?

- With just 2 beads we do not have any other options. We need to add one more bead.



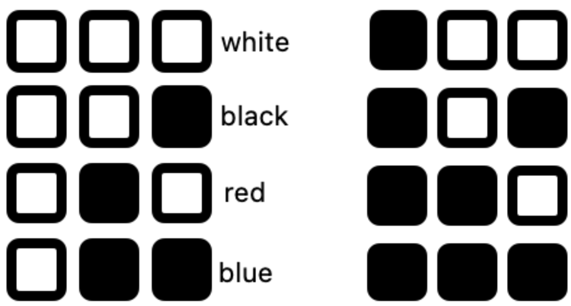
How many different background options do we have now? Ask students to draw them.

Solution:



Now we can use different combinations of black and white beads to create **8** options. Which options are already taken?

Possible answer:



- There are several possible answers. Students can match the original four colours to any combination.

For other combinations, come up with new colours.

ACTIVITY 3 Attachment L5A2 – Table with the message

The machine from previous activities can also print messages. Just give it the instructions in 0 and 1.

A	00001	J	01010	S	10011
B	00010	K	01011	T	10100
C	00011	L	01100	U	10101
D	00100	M	01101	V	10110
E	00101	N	01110	W	10111
F	00110	O	01111	X	11000
G	00111	P	10000	Y	11001
H	01000	Q	10001	Z	11010
I	01001	R	10010	?	?

First, tell students to try to encode, for example, their name.

- Then have them exchange the cypher with a classmate, who will decrypt the cypher and check it.

The campers want to print a message that their flag has disappeared. These are the instructions:

01111 10101 10010
00110 01100 00001 10111
01001 10011
00111 01111 01110 00101

Are the instructions okay?

- An error occurred somewhere, and FLAW was printed instead of FLAG. Where did the mistake happen?
    - One digit has been swapped so the whole message has a different meaning. W (10111) -> G (00111)
    - How could this mistake happen?
- The solution is OUR FLAG IS GONE

Some cultures have one extra letter. What could the instructions for this new letter look like?

- Possible answers: 11011, 11100, 11101, 11110, 11111, 00000.

- Some students may want to add another digit relative to the previous activity. You can try this method with your students. The students will probably soon get tired of it, as they have to make 64 combinations of 0 and 1. Tell them that this method is not suitable because it puts a lot of load on the computer.

CLOSURE

If you have time, you can ask students for ideas on how to avoid mistakes like the one in the previous activity.

Summarize what you have learned today and whether you have fulfilled the learning outcomes.

Tell the students what you will cover in the next lesson.

LESSON 6 – Picture encoding

CONTENT

Teaching aims:

Get familiar with bitmap images.
Learn how to encode and decode a bitmap image using the binary system.
Design our own solutions.

Learning outcomes:

Be aware of the errors that can occur when encoding bitmap images.
Be able to encode and decode a simple bitmap image.
Know the basic principle of bitmap images.

CULTURE/CITIZENSHIP

Through activities and demonstrations, students will have the opportunity to encounter a digital art form called pixel art. Students will have the opportunity to try creating their own pixel art which encourages their creativity and awareness of art.
Students also encounter a form of graphical representation of information.

COMMUNICATION

In this lesson, students work with a worksheet in which they are exposed to the English comparative in order to compare the features of two objects or persons. For example, "This picture is bigger." In contrast, a superlative is incorporated into the exercise. Next, students are exposed to new vocabulary as they describe each bitmap image. For example, "row" or "column."

COGNITION

Students use abstract thinking to encode and decode bitmap images using the binary system. They look for solutions to problems that may arise and are able to apply these solutions. Furthermore, students can deduce the meaning of images using only the codes and, alternatively, they can predict what the codes for different images will look like. They will need to hypothesise and choose the most appropriate strategy when creating their own codes.

LEKCE 6 – Kódování obrázku

OBSAH

Cíle výuky:

Seznámit se s bitmapovými obrázky.
Naučit se, jak zakódovat a dekódovat bitmapový obrázek pomocí dvojkové soustavy.
Navrhovat vlastní řešení.

Očekáváné výstupy:

Být si vědom, jaké mohou vzniknout chyby při kódování bitmapových obrázků.
Umět zakódovat a dekódovat jednoduchý bitmapový obrázek.
Znát základní princip bitmapových obrázků.

KULTURNÍ ASPEKTY

Prostřednictvím aktivit a ukázek budou mít žáci možnost seznámit se s digitální uměleckou formou zvanou pixel art. Studenti budou mít možnost vyzkoušet si vytvořit vlastní pixel art, který podpoří jejich kreativitu a povědomí o umění.
Studenti se také setkají s dříve používanou formou grafického znázornění informací, která za posledních deset let prošla obrovským vývojem.

KOMUNIKACE

V této lekci žáci pracují s pracovním listem, ve kterém jsou vystaveni anglickému komparativu, aby dokázali porovnat vlastnosti dvou objektů nebo osob. Například *„This picture is bigger.“* Pro kontrast je ve cvičení zakomponovaný i superlativ. Dále žáci se při popisu jednotlivých bitmapových obrázků setkají s novou slovní zásobou. Například *„row“ nebo „column“.*

ROZVOJ MYŠLENÍ

Žáci využívají abstraktní myšlení pro kódování a dekódování bitmapových obrázků pomocí binární soustavy. Hledají řešení na problémy, které mohou vzniknout a toto řešení dokážou aplikovat. Žáci dále mohou dedukovat význam obrázků pouze pomocí kódů a obráceně mohou předvídat, jak budou vypadat kódy pro různé obrázky. Při vytváření vlastního způsobu kódování budou muset hypotézovat a zvolit nejvhodnější strategii.

Picture encoding

Required equipment: Smart board/projector or printed material, no need for computers.

INTRODUCTION

Greet the students and ask them if they remember what they did last lesson.

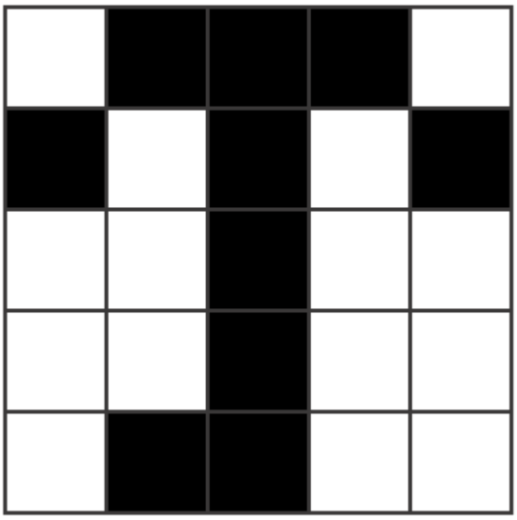
Explain the learning outcomes of today's lesson. What they should accomplish by the end of this lesson:

- **Be aware of the errors that can occur when encoding bitmap images.**
- **Be able to encode and decode a simple bitmap picture.**
- **Know the basic principle of bitmap images.**

WARM-UP L6A1 – Squares

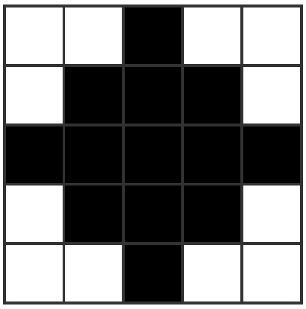
Provide students with a 5 by 5 bitmap pattern from attachment L6A1.

- Ask students to draw any picture using only 25 squares. Tell them not to tell anyone what they're drawing.
- Students can use only black and white squares.
- Give them time and then select a few students. These students will show their pictures to the whole class and the others have to guess what is in the picture.
- You can use the following picture as an example. It should be an **umbrella**. I recommend you to create your own picture and try it out.



ACTIVITY 1 Attachment L6A2 - Circles

Show students the first picture and ask them what the picture is made of.

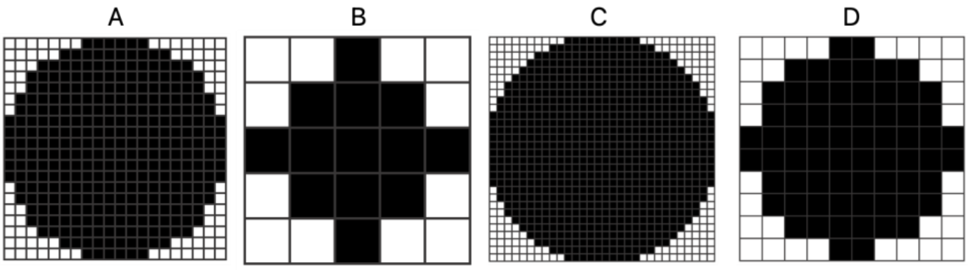


- The expected answer is that it is made up of squares, black and white. Some students might even say pixels.

Ask them how many squares there are in total.

- Students can say either 25 or 5x5.

One by one, show the students other pictures and ask them how many squares they are made of: solution



20x20/ 400 | 5x5 / 25 | 30x30/ 900 | 10x10 / 100

Exercise Smaller/Bigger solution

Read the sentences and fill in the correct word based on the pictures above.

Picture A is __bigger__ than picture B.

Picture B is __smaller__ than picture D.

Picture D is __smaller__ than picture A.

Picture C is __bigger__ than picture A.

Picture A is smaller than picture _C_ but bigger than picture B/D.

Picture D is bigger than picture _B_ but smaller than picture A/C.

Which picture has the most black squares? __C__

Which picture has the fewest white squares? __B__

Check the solution together.

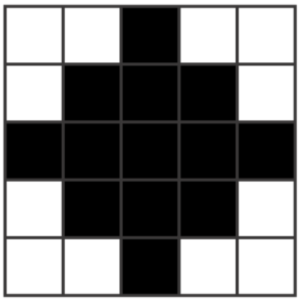
After completing the exercise, tell the students to remember when we created bracelets using 1's and 0's in the last lesson.

- 1 meant black and 0 meant white.

Tell students to try to code a 5x5/25 image on paper using 1's and 0's.

- You can do the first line together.
- After they are done, tell them to exchange the code with a classmate and check if they did the same.

Expected solution:



```
0 0 1 0 0
0 1 1 1 0
1 1 1 1 1
0 1 1 1 0
0 0 1 0 0
```

Identify students who have taken an unusual approach and have them explain their approach.

Note that this picture is symmetrical. Its solution will be the same when encoded horizontally and vertically!

Finally, ask students which of the pictures would be made up of the most 1s and 0s.

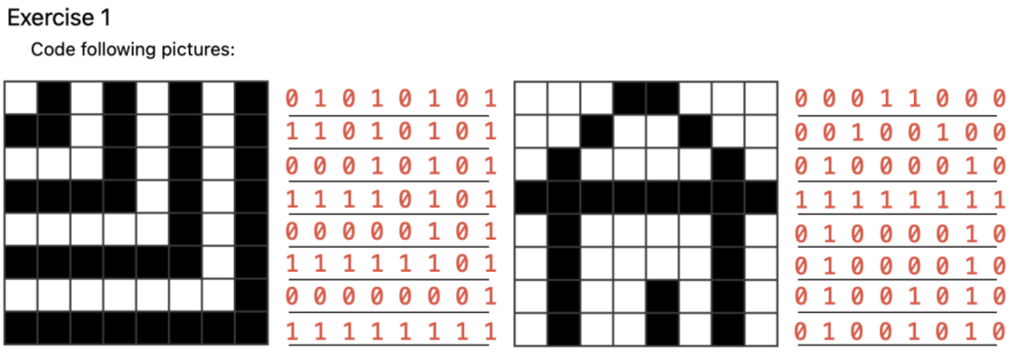
Possible difficulty

Students may not immediately realize that a picture with more squares must necessarily be larger. It is a good idea to project all images the same size so that students realise that it is the number of pixels that matters and not the real size. You can give students the example that each square costs 1 euro. The fewer the cubes, the cheaper the picture.

ACTIVITY 2 Attachment L6A3 – Worksheet – pictures

Exercise 1

Students receive a picture and use 1 and 0 to code the picture. solution

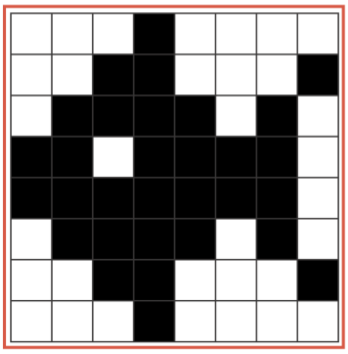


When you have finished, check the exercise together. One student can say one line. The others check it.

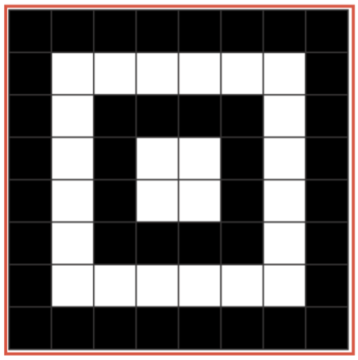
Exercise 2

Students receive a code, and their task is to draw a picture. solution

```
00010000
00110001
01111010
11011110
11111110
01111010
00110001
00010000
```



```
1111111110000
0011011110110
1001011010010
1101111011000
000111111111
```



Intentionally, the first code is divided into rows and the second is not. The second code is not divided, they have to count eight digits each time.

One student can do the exercise on the teacher's PC in a spreadsheet. You can then project the solution to the others.

Exercise 3

Steps:

1. In this exercise, the student attempts to encode their own picture.
2. Tell students to draw a picture and then encode it on a piece of paper.
3. Students then swap this worksheet with a classmate and try to decode it using their worksheet.
4. Students then swap the worksheet again and the classmate says whether it is the picture they intended.

- If the image looks different, it may be due to one of two reasons:
    1. The image was incorrectly encoded. The error was caused by the student who coded the image.
    2. The image was incorrectly decoded. The error was caused by the student who decoded the image.
- If a mistake has been made, ask the students to discuss with each other where it happened.

Possible difficulty

Students with a reading disability may have difficulty with the exercise. For such students, it will be necessary to prepare a special exercise that will not prevent them from understanding the topic.

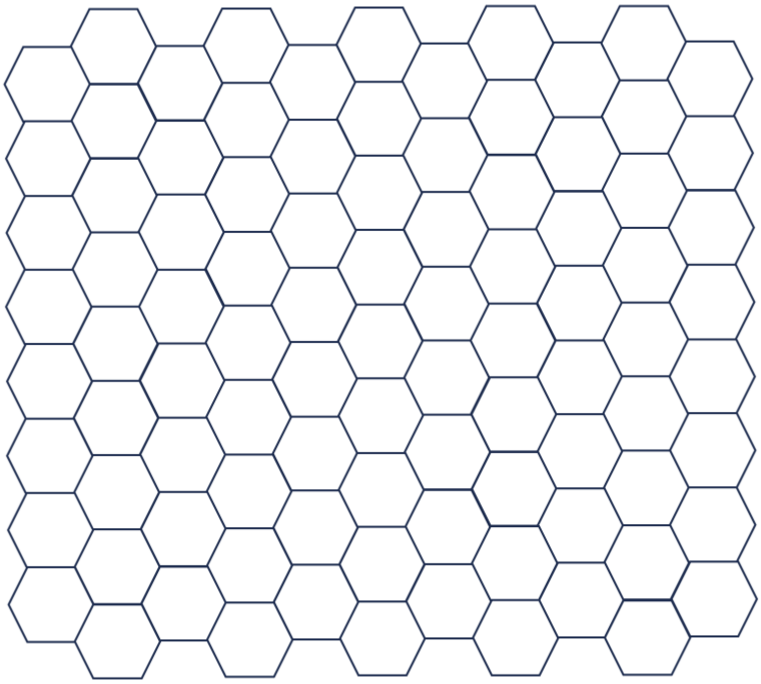
ACTIVITY 3 Attachment L6A4 – Tiles

Divide students into 2 groups.

There is a machine that lays the pavement according to the instructions. Now it has the job of laying the black and white tiles as shown in the picture below. Think of what these instructions could look like using only numbers.

Detailed instructions for this activity:

- Discuss with a classmate how you will code the picture that is drawn using the honeycombs. You can use any number!
- Draw a black-and-white picture in the honeycomb. Do not show it to your classmates!
- Encode your picture as you and your classmate agreed.
- Swap codes with a classmate and try to decode them.



Questions for the discussion:

What strategy did you use? Can you show us?

- Did they code by rows or columns? Or something else?

If anyone was unable to decode the images. Why? Where was the problem?

- It is possible that the code was not clear.
- Or the code was correct and only an error occurred in the encoding or decoding.

Which of the strategies presented was the most effective?

- Easiest to encode and easiest to decode. It must also be clear. This means that decoding cannot produce multiple possible images.

CLOSURE

At the end of the lesson summarize what you have learned today and whether you have fulfilled the learning outcomes.

Tell the students what you will cover in the next lesson.

LESSON 7 – Compression

CONTENT

Teaching aims:

Learn the basics of image compression.
Figure out the advantages and disadvantages of compression.
Learn to deal with compression problems.

Learning outcomes:

Be aware of the basic principle of compression.
Be able to compress simple bitmap image.
Know the advantages and disadvantages of compression.

CULTURE/CITIZENSHIP

Students will encounter graph interpretation in this lesson. In this graph, they see the so-called Screen Time, i.e. the time spent in front of the screen. They can develop a discussion about how much screen time they have and whether it is too little or too much. They can then discuss whether this has changed from earlier times and whether it will be the same in, say 10 years.

COMMUNICATION

In this lesson, students practise the comparative again and encounter the superlative. They use this to describe the images. In this description, they also discuss whether the meaning has been preserved or changed during compression. Therefore, we are faced with the ability to compare images.

In the activity where students interpret the graph, they encounter an exercise where they put the verbs into the correct form. In this exercise, they practise the present continuous tense. In this activity, they also encounter reading skills and interpreting the text and the graph.

COGNITION

The warm-up activity encourages students to observe, discuss, and analyse visual information. The team code activity challenges students to think collectively, dividing a larger problem into manageable parts—a cognitive skill crucial for complex problem-solving. The graph activity requires students to decode an image, transforming it into meaningful data, which involves higher-order cognitive functions like analysis and interpretation.

LEKCE 7 – Komprese

OBSAH

Cíle výuky:

Seznámit se se základy komprese obrázků.
Přijít na výhody a nevýhody komprese.
Naučit se vypořádat se s problémy komprese.

Očekáváné výstupy:

Být si vědom základního principu komprese.
Umět zkomprimovat jednoduchý bitmapový obrázek.
Znát výhody a nevýhody komprese.

KULTURNÍ ASPEKTY

Žáci se v této lekci setkají s interpretací grafu. V tomto grafu vidí takzvaný Screen Time, tedy čas strávený u obrazovky. Můžou na toto téma rozvinout diskusi, kolik oni sami tráví času u obrazovky a zda je to málo či moc. Mohou pak diskutovat, zda se toto změnilo od dob, kdy chodili do školy jejich rodiče a zda to bude stejné například za 10 let.

KOMUNIKACE

V této lekci žáci znovu procvičují komparativ a setkávají se i se superlativem. Toto využívají při popisu obrázků. Při tomto popisu také diskutují o tom, zda byl zachován význam nebo se při komprimaci změnil. Setkáváme se tedy s porovnáváním obrázků.

Při aktivitě, kde žáci interpretují graf se setkávají s cvičením, kde žáci doplňují slovesa ve správném tvaru. V tomto cvičení si natrénují přítomný čas průběhový. V tomto cvičení se také setkají se čtením a interpretací textu a grafu.

ROZVOJ MYŠLENÍ

Rozehřívací aktivita vede žáky k pozorování, diskusi a analýze graficky znázorněných informací. Aktivita 2 vyzývá žáky ke kolektivnímu myšlení a rozdělení většího problému na zvládnutelné části – kognitivní dovednost, která je pro řešení komplexních problémů klíčová. Aktivita s grafy vyžaduje, aby žáci dekódovali obrázek a převedli jej na smysluplná data, což zahrnuje kognitivní funkce, jako je analýza a interpretace.

Compression

Required equipment: Smart board/projector or printed material, no need for computers.

INTRODUCTION

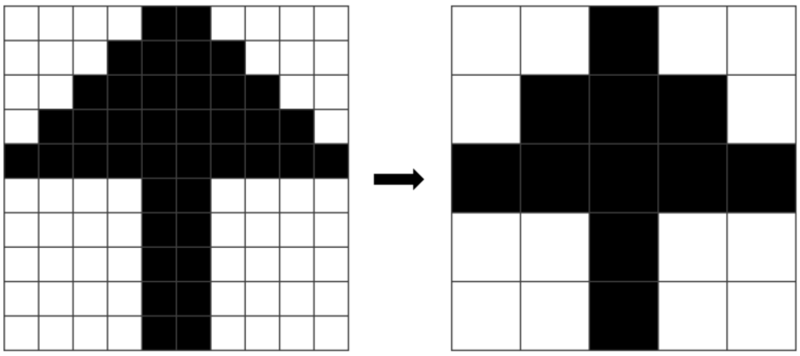
Greet the students and ask them if they remember what they did last lesson.

Explain the learning outcomes of today’s lesson. What they should accomplish by the end of this lesson:

- **Be aware of the basic principle of compression.**
- **Be able to compress simple bitmap image.**
- **Know the advantages and disadvantages of compression.**

WARM-UP Attachment L7A1 – Arrow

Project or distribute the following image to students:



Give them a moment to discuss in pairs what is happening in the picture.

Expected answers:

- *“The picture is smaller.”*
- *“There is a smaller number of squares.”*
- *“It looks worse.”*

Questions for discussion:

- What's in the picture?
- What are the differences between the pictures?
- Do you have any idea how the first picture turned into the second picture?

Students are now asked to decide which statement is true and which is false. Picture A is the picture on the left and picture B is the picture on the right.

Solution:

Decide which statements are true (T) and which are false (F).

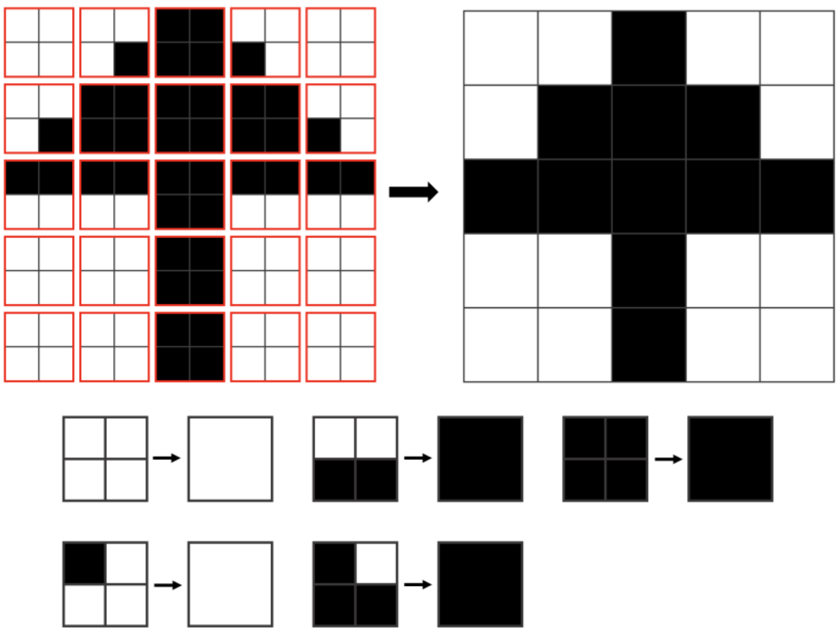
1. Picture A is bigger than picture B. T - F
2. Picture B needs more space than picture A. T - F
3. Picture A is more detailed than picture B. T - F
4. 00100 is first row in Picture B. T - F
5. 11111 is third row in picture B. T - F

- Check the solution together. Tell students to close their eyes and stand up if they think the statement is true and sit down if they think it is false.
- If the statement is false, ask students to correct it.

Students should figure out that the image has become smaller and that four squares have combined into one.

If there is a student in the class who comes up with the principle of joining squares, let them explain their idea to the others.

- Then project the concept:



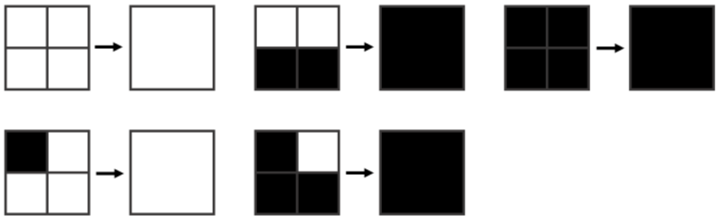
ACTIVITY 1 Attachment L7A2 – Worksheet – compression

Exercise 1

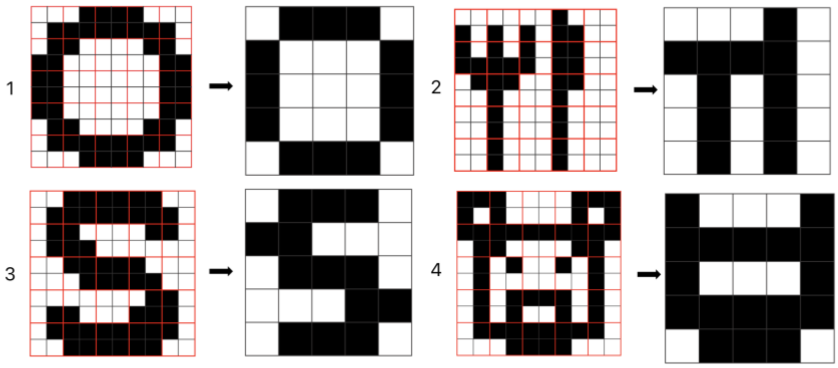
Students have to compress 4 images according to the given rules and then evaluate whether the meaning of the images remained the same after compression.

Either print out the rules or project it on the board.

- Rules:



Solution:



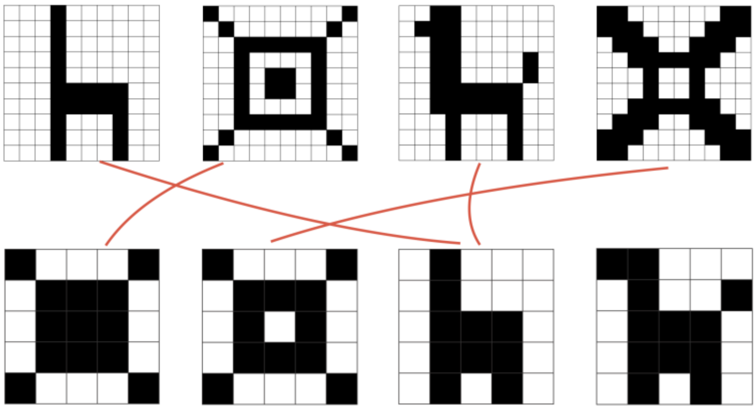
- Discuss with students whether the meaning of the images has been maintained or changed.
  - For the first and third picture, students will probably tell you that the meaning has stayed the same. For pictures 2 and 4 we cannot say that we can clearly see what is in the picture.

Exercise 2

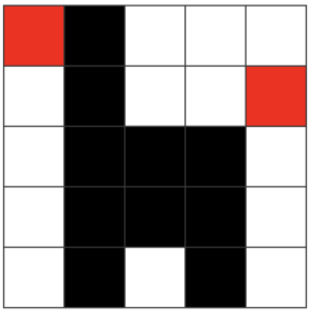
Students have to match images before and after compression.

They can work in pairs again.

Solution:

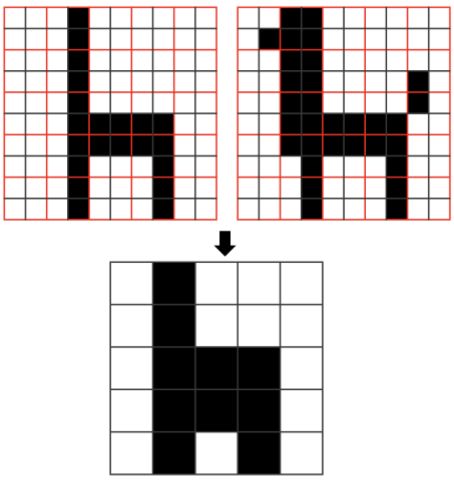


One image after compression is intentionally wrong. There are extra pixels. This image cannot be matched with any other picture.



On the other hand, every image before compression can be matched with an image after compression.

This means that two images look the same after compression, even if they looked differently before compression. Solution:



Again, you can discuss whether the meaning has remained the same.

You can practise comparing pictures. Always show 2 pictures before and after compression and ask students.

ACTIVITY 2 Attachment L7A3 – Team code

Show students the entire uncompressed image.

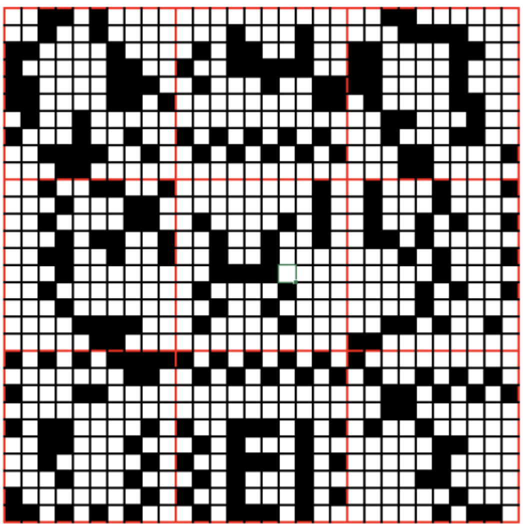
- **Question for students:**
  - *We need to decode this big picture. Any ideas on how to make it easier?*
- **Expected answer:**
  - *We split up and everyone does something. The computer also does more things at once to make it faster.*

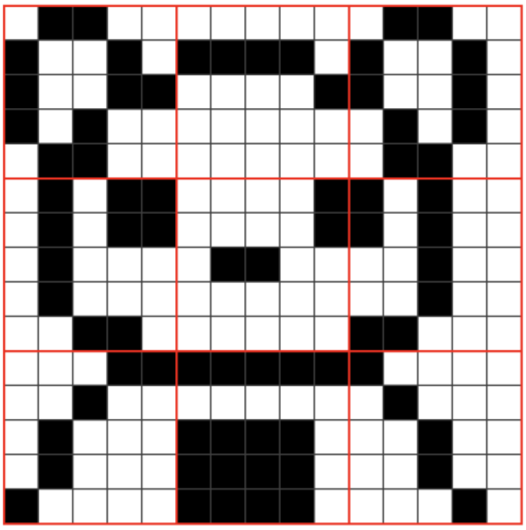
Divide the students into 9 groups.

Each group gets a different picture. Tell them to compress it according to the same rules as before.

If students put all 9 compressed images together, they get one big picture.
Before handing out the individual pictures, you can write on the other side the coordinates where each part belongs (E.g. A1, B2, etc..)

Picture before and final image:





When finished, compare the students' results with the solution. If there's a mistake somewhere, work together to figure out where it came from and how to fix it.

Possible difficulty

There can be a big difference in the pace of the students. Some groups will be faster than others. You can use the fast students as verifiers. They can swap solutions with another finished group and check each other's solutions. Or they can guess what will be in the final picture. In this method, have them write their guesses on a piece of paper (in English) and not shout it.

ACTIVITY 3 Attachment L7A4 – Worksheet – colours

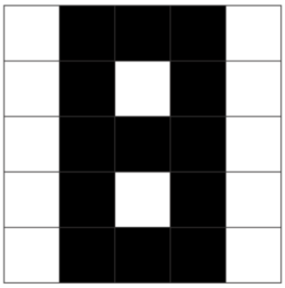
Exercise 1

In this activity, students must first figure out how the first image is encoded and then encode the second image in the same way.

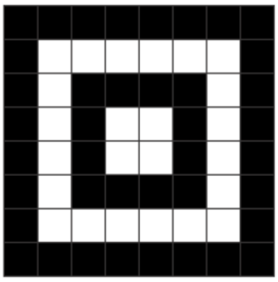
First, give students time to think, about how the image is encoded. Then ask the students for the solution and let them explain the solution so that everyone understands it.

Then everyone can start coding the second image.

Solution:



1W 3B 1W
1W 1B 1W 1B 1W
1W 3B 1W
1W 1B 1W 1B 1W
1W 3B 1W



8B
1B 6W 1B
1B 1W 4B 1W 1B
1B 1W 1B 2W 1B 1W 1B
1B 1W 1B 2W 1B 1W 1B
1B 1W 4B 1W 1B
1B 6W 1B
8B

- Check the solution together.

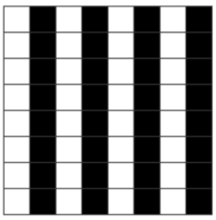
Exercise 2

In this exercise, students no longer encode. They have to look at the pictures and just imagine what such a code would look like. Then they have to determine which picture will have the largest instructions and which will have the shortest.

- Solution:
  - **A – the longest**. Every pixel in each line must be described.
  - **B – the shortest**. Each row has only one colour.
  - **C - This picture is in between.** Some instruction lines are longer, and some are shorter.

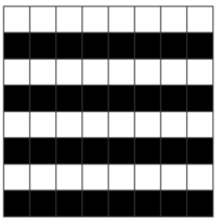
Later, you can show students what the images would look like encoded so they can imagine and justify their solution:

A



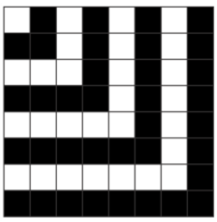
1W 1B 1W 1B 1W 1B 1W 1B
1W 1B 1W 1B 1W 1B 1W 1B
1W 1B 1W 1B 1W 1B 1W 1B
1W 1B 1W 1B 1W 1B 1W 1B
1W 1B 1W 1B 1W 1B 1W 1B
1W 1B 1W 1B 1W 1B 1W 1B
1W 1B 1W 1B 1W 1B 1W 1B
1W 1B 1W 1B 1W 1B 1W 1B

B



8W
8B
8W
8B
8W
8B
8W
8B

C



1W 1B 1W 1B 1W 1B 1W 1B
2B 1W 1B 1W 1B 1W 1B
3W 1B 1W 1B 1W 1B
4B 1W 1B 1W 1B
5W 1B 1W 1B
6B 1W 1B
7W 1B
8B

You can discuss whether the instructions can be simplified further.

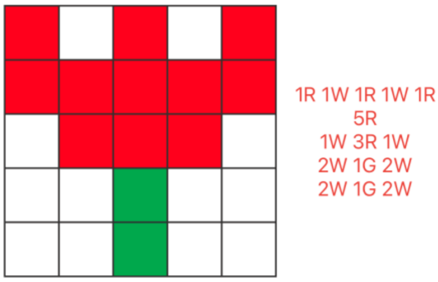
Exercise 3

In this activity, students encounter a coloured picture for the first time.

They have to encode the following 2 images in the same way as before.

The first picture will be easier. For example, they can code red with the letter R and green with the letter G.

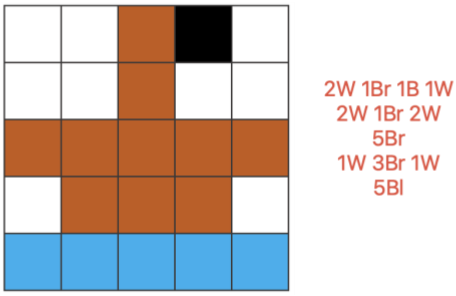
Possible solution:



The second picture will be more complicated. Here we have more colours that start with the same letter - **B**lack, **B**rown and **B**lue.

Students need to figure out a way to solve this problem. You can ask students:

Possible solution:



Discuss all possible solutions with the students.

- What problem would occur if we didn't solve this problem and all 3 colours had the same letter?

Some students may have come up with an unusual but functional solution. Some solutions, on the other hand, may be unusable. Discuss them.

Possible difficulty

Students with a visual impairment that affects their perception of colour may have a significant disadvantage in this activity. For these students, the following activity is designed to replace activity 3.

Exercise 3 for students with visual impairment

Questions for students:

- Without drawing, what will probably be the result of the following pictures?

Red White Red White Red
Red Red Red Red Red
White Red Red Red White
White White Green White White
White White Green White White

White White Brown Black White
White White Brown White White
Brown Brown Brown Brown Brown
White Brown Brown Brown White
Blue Blue Blue Blue Blue

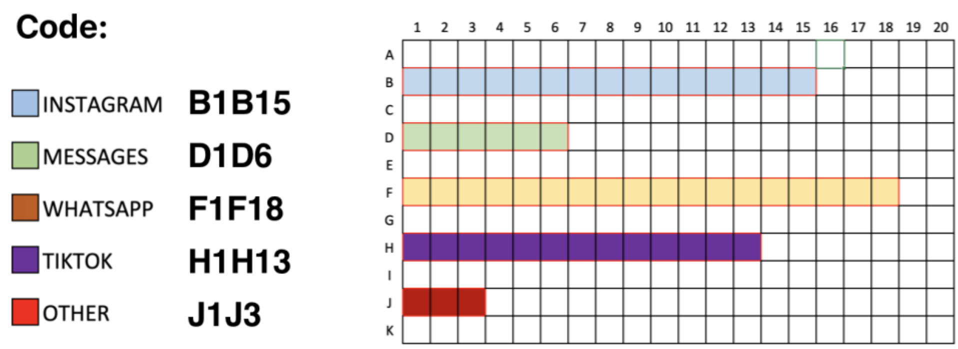
- Can you simplify these instructions?

The answers and their meaning are the same as for non-disadvantaged students in the previous activity.

ACTIVITY 4 Attachment L7A5 - Graph

Exercise 1

Students are asked to decode the image. After decoding, students find that they have created a graph. Solution:



Questions for discussion:

- What does the chart show us?

  Expected answers:

  - How long do we spend on each application.
  - How much storage do apps take on your phone.

Exercise 2

In this exercise, students put the verb in the correct tense. Here it is the present continuous tense. Students will need the graph to fill in the right information.

Solution:

In the morning, I usually start my day by checking my messages. On average, I spend about _6_ minutes _messaging_ (message) friends and family, catching up on the latest news and making plans.

As the day progresses, I find myself drawn to Instagram. It's my go-to platform for sharing moments from my day and staying updated on what my friends are up to. I typically spend around _15_ minutes _scrolling_ (scroll) through the feed and liking posts.

Around lunchtime, I enjoy a quick break with TikTok. This app is my guilty pleasure, and I can easily lose track of time while watching entertaining short videos. On average, I spend about _13_ minutes _watching_ (watch) TikToks.

Later in the day, I use WhatsApp to stay connected with friends and colleagues. Whether it's coordinating plans or discussing work-related matters, I spend approximately _18_ minutes _chatting_ (chat) on WhatsApp.

In addition to these main apps, I also dedicate some time to other activities, such as checking emails and browsing the web. On average, I spend about _3_ minutes _doing_ (do) these tasks.

- Check the solution together.
- For each question, ask students how they found the solution.

CLOSURE

At the end of the lesson, I recommend reviewing with the students where they encountered compression in today's lesson and what compression actually means. Students can be asked to create their own definition of compression.

At the end of the lesson, summarize what you have learned today and whether you have fulfilled the learning outcomes.

Tell the students what you will cover in the next lesson.

VÝUKA TEORETICKÉ INFORMATIKY POMOCÍ METODY CLIL

PRACOVNÍ LISTY

Bc. Kůrka Martin

L1A1

❤️ ❤️‍🩹 💔 😍 🥰
🍕 🇮🇹 🍄 ⛱️ 🏖️
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🥸 🙌 👀 💫 🎉

L1A2

ZÁKAZ
STANOVÁNÍ

PERMITIDO
FUMAR DENTRO
DE ESTA ZONA

Απαγορεύονται οι σκύλοι

ヘルメットを着用する

マンダトリー

L2A1

65		75		85	
66		76		86	
67		77		87	
68		78		88	
69		79		89	
70		80		90	
71		81			
72		82			
73		83			
74		84			

65		75		85	
66		76		86	
67		77		87	
68		78		88	
69		79		89	
70		80		90	
71		81			
72		82			
73		83			
74		84			

65		75		85	
66		76		86	
67		77		87	
68		78		88	
69		79		89	
70		80		90	
71		81			
72		82			
73		83			
74		84			

65		75		85	
66		76		86	
67		77		87	
68		78		88	
69		79		89	
70		80		90	
71		81			
72		82			
73		83			
74		84			

65		75		85	
66		76		86	
67		77		87	
68		78		88	
69		79		89	
70		80		90	
71		81			
72		82			
73		83			
74		84			

65		75		85	
66		76		86	
67		77		87	
68		78		88	
69		79		89	
70		80		90	
71		81			
72		82			
73		83			
74		84			

L2A2

0	*[NULL]*	32	*[SPACE]*	64	**@**	96	**`**
1	*[START OF HEADING]*	33	**!**	65	**A**	97	**a**
2	*[START OF TEXT]*	34	**"**	66	**B**	98	**b**
3	*[END OF TEXT]*	35	**#**	67	**C**	99	**c**
4	*[END OF TRANSMISSION]*	36	**$**	68	**D**	100	**d**
5	*[ENQUIRY]*	37	**%**	69	**E**	101	**e**
6	*[ACKNOWLEDGE]*	38	**&**	70	**F**	102	**f**
7	*[BELL]*	39	**'**	71	**G**	103	**g**
8	*[BACKSPACE]*	40	**(**	72	**H**	104	**h**
9	*[HORIZONTAL TAB]*	41	**)**	73	**I**	105	**i**
10	*[LINE FEED]*	42	*****	74	**J**	106	**j**
11	*[VERTICAL TAB]*	43	**+**	75	**K**	107	**k**
12	*[FORM FEED]*	44	**,**	76	**L**	108	**l**
13	*[CARRIAGE RETURN]*	45	**-**	77	**M**	109	**m**
14	*[SHIFT OUT]*	46	**.**	78	**N**	110	**n**
15	*[SHIFT IN]*	47	**/**	79	**O**	111	**o**
16	*[DATA LINK ESCAPE]*	48	**0**	80	**P**	112	**p**
17	*[DEVICE CONTROL 1]*	49	**1**	81	**Q**	113	**q**
18	*[DEVICE CONTROL 2]*	50	**2**	82	**R**	114	**r**
19	*[DEVICE CONTROL 3]*	51	**3**	83	**S**	115	**s**
20	*[DEVICE CONTROL 4]*	52	**4**	84	**T**	116	**t**
21	*[NEGATIVE ACKNOWLEDGE]*	53	**5**	85	**U**	117	**u**
22	*[SYNCHRONOUS IDLE]*	54	**6**	86	**V**	118	**v**
23	*[END OF TRANS. BLOCK]*	55	**7**	87	**W**	119	**w**
24	*[CANCEL]*	56	**8**	88	**X**	120	**x**
25	*[END OF MEDIUM]*	57	**9**	89	**Y**	121	**y**
26	*[SUBSTITUTE]*	58	**:**	90	**Z**	122	**z**
27	*[ESCAPE]*	59	**;**	91	**[**	123	**{**
28	*[FILE SEPARATOR]*	60	**<**	92	****	124	**|**
29	*[GROUP SEPARATOR]*	61	**=**	93	**]**	125	**}**
30	*[RECORD SEPARATOR]*	62	**>**	94	**^**	126	**~**
31	*[UNIT SEPARATOR]*	63	**?**	95	**_**	127	*[DEL]*

L3A1

A	•–	J	•–––	T	–
B	–•••	K	–•–	U	••–
C	–•–•	L	•–••	V	•••–
D	–••	M	––	W	•––
E	•	N	–•	X	–••–
F	••–•	O	–––	Y	–•––
G	––•	P	•––•	Z	––••
H	••••	Q	––•–		
CH	––––	R	•–•		
I	••	S	•••		

A	•–	J	•–––	T	–
B	–•••	K	–•–	U	••–
C	–•–•	L	•–••	V	•••–
D	–••	M	––	W	•––
E	•	N	–•	X	–••–
F	••–•	O	–––	Y	–•––
G	––•	P	•––•	Z	––••
H	••••	Q	––•–		
CH	––––	R	•–•		
I	••	S	•••		

A	•–	J	•–––	T	–
B	–•••	K	–•–	U	••–
C	–•–•	L	•–••	V	•••–
D	–••	M	––	W	•––
E	•	N	–•	X	–••–
F	••–•	O	–––	Y	–•––
G	––•	P	•––•	Z	––••
H	••••	Q	––•–		
CH	––––	R	•–•		
I	••	S	•••		

A	•–	J	•–––	T	–
B	–•••	K	–•–	U	••–
C	–•–•	L	•–••	V	•••–
D	–••	M	––	W	•––
E	•	N	–•	X	–••–
F	••–•	O	–––	Y	–•––
G	––•	P	•––•	Z	––••
H	••••	Q	––•–		
CH	––––	R	•–•		
I	••	S	•••		

A	•–	J	•–––	T	–
B	–•••	K	–•–	U	••–
C	–•–•	L	•–••	V	•••–
D	–••	M	––	W	•––
E	•	N	–•	X	–••–
F	••–•	O	–––	Y	–•––
G	––•	P	•––•	Z	––••
H	••••	Q	––•–		
CH	––––	R	•–•		
I	••	S	•••		

A	•–	J	•–––	T	–
B	–•••	K	–•–	U	••–
C	–•–•	L	•–••	V	•••–
D	–••	M	––	W	•––
E	•	N	–•	X	–••–
F	••–•	O	–––	Y	–•––
G	––•	P	•––•	Z	––••
H	••••	Q	––•–		
CH	––––	R	•–•		
I	••	S	•••		

A	•–	J	•–––	T	–
B	–•••	K	–•–	U	••–
C	–•–•	L	•–••	V	•••–
D	–••	M	––	W	•––
E	•	N	–•	X	–••–
F	••–•	O	–––	Y	–•––
G	––•	P	•––•	Z	––••
H	••••	Q	––•–		
CH	––––	R	•–•		
I	••	S	•••		

A	•–	J	•–––	T	–
B	–•••	K	–•–	U	••–
C	–•–•	L	•–••	V	•••–
D	–••	M	––	W	•––
E	•	N	–•	X	–••–
F	••–•	O	–––	Y	–•––
G	––•	P	•––•	Z	––••
H	••••	Q	––•–		
CH	––––	R	•–•		
I	••	S	•••		

A	•–	J	•–––	T	–
B	–•••	K	–•–	U	••–
C	–•–•	L	•–••	V	•••–
D	–••	M	––	W	•––
E	•	N	–•	X	–••–
F	••–•	O	–––	Y	–•––
G	––•	P	•––•	Z	––••
H	••••	Q	––•–		
CH	––––	R	•–•		
I	••	S	•••		

L3A2

You found a secret message. Decrypt the message and answer the questions below.

My name is (1)__________. I have one sister. Her name is (2)__________ and she is 10 years older than me. We have 2 cousins. Their names are (3)__________ and (4)__________. (5)__________ is older than me but younger than my sister. (6)__________ is older than both of us.

1 -- | .- | .-. | - | -.--
2 -- | --- | -. | .. | -.-. | .-
3 .--- | .- | -.-. | --- | -...
4 .--. | . | - | . | .-.
5 .--. | . | - | . | .-.
6 .--- | .- | -.-. | --- | -...

A. How many people are mentioned in the text? ____________

B. What are their names? __________________________________

C. Write 4 sentences with *younger/older* using names from exercise B.

1.
2.
3.
4.

You found a secret message. Decrypt the message and answer the questions below.

My name is (1)__________. I have one sister. Her name is (2)__________ and she is 10 years older than me. We have 2 cousins. Their names are (3)__________ and (4)__________. (5)__________ is older than me but younger than my sister. (6)__________ is older than both of us.

1 -- | .- | .-. | - | -.--
2 -- | --- | -. | .. | -.-. | .-
3 .--- | .- | -.-. | --- | -...
4 .--. | . | - | . | .-.
5 .--. | . | - | . | .-.
6 .--- | .- | -.-. | --- | -...

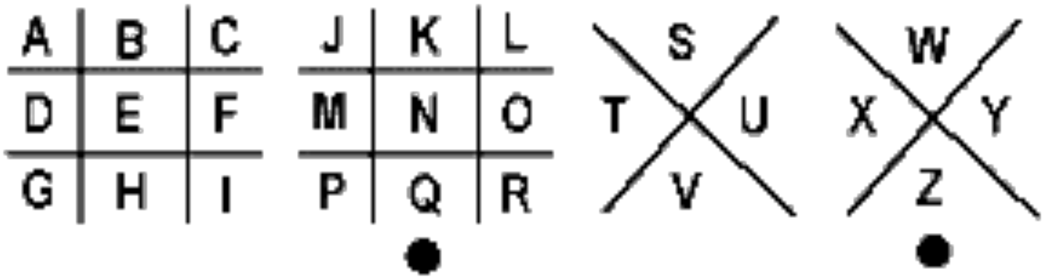
A. How many people are mentioned in the text? ____________

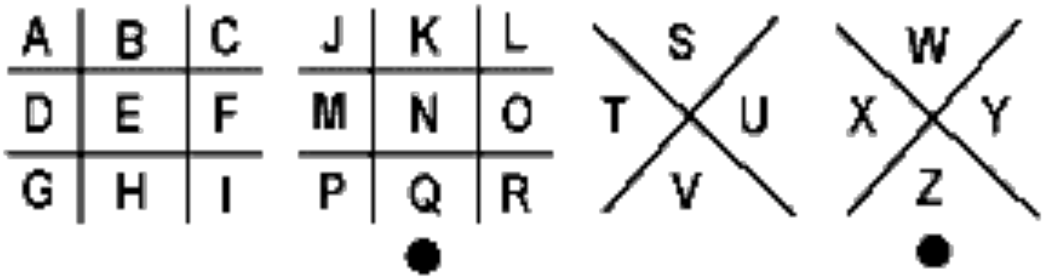
B. What are their names? __________________________________

C. Write 4 sentences with *younger/older* using names from exercise B.

1.
2.
3.
4.

L3A3


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


A B C
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P Q R
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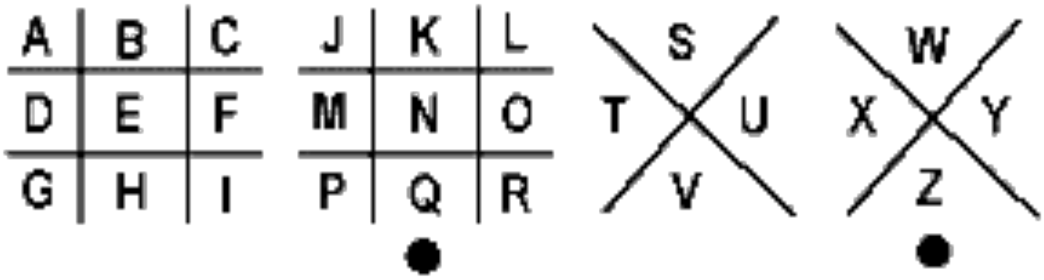
W X Y Z


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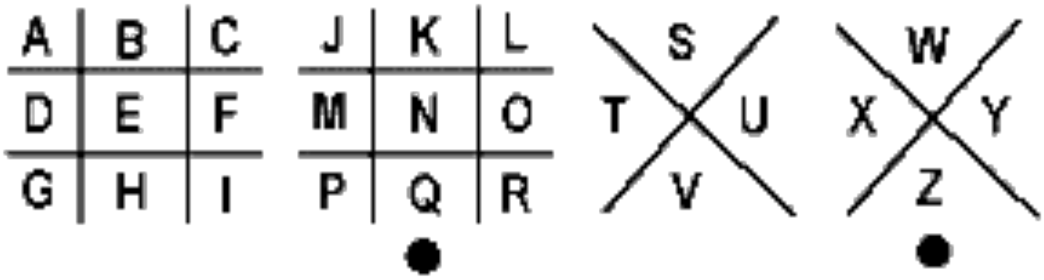
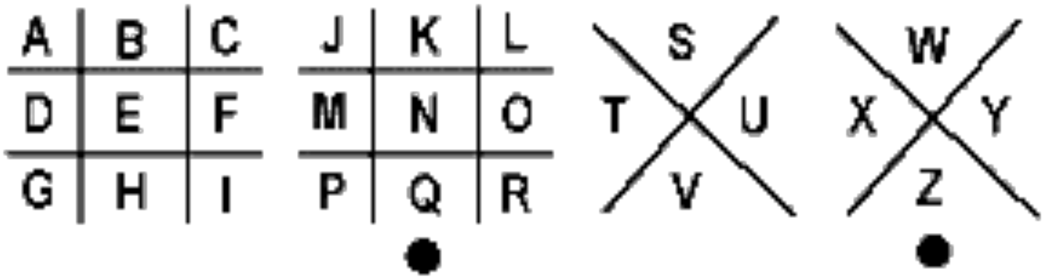
M N O
P Q R
S T U V
W X Y Z


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


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

L3A4

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	R	S	T	U	V	W	X	Y	Z
5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
		5					4					3					2					1		

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	R	S	T	U	V	W	X	Y	Z
5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
		5					4					3					2					1		

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	R	S	T	U	V	W	X	Y	Z
5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
		5					4					3					2					1		

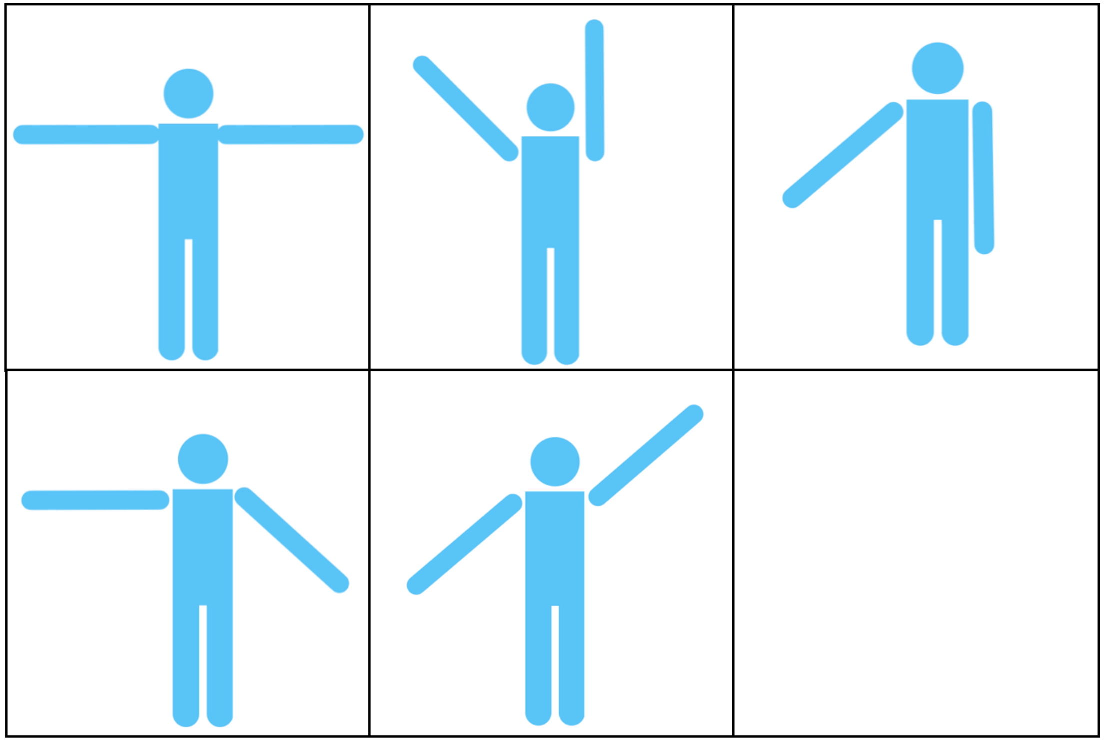
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	R	S	T	U	V	W	X	Y	Z
5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
		5					4					3					2					1		

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	R	S	T	U	V	W	X	Y	Z
5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
		5					4					3					2					1		

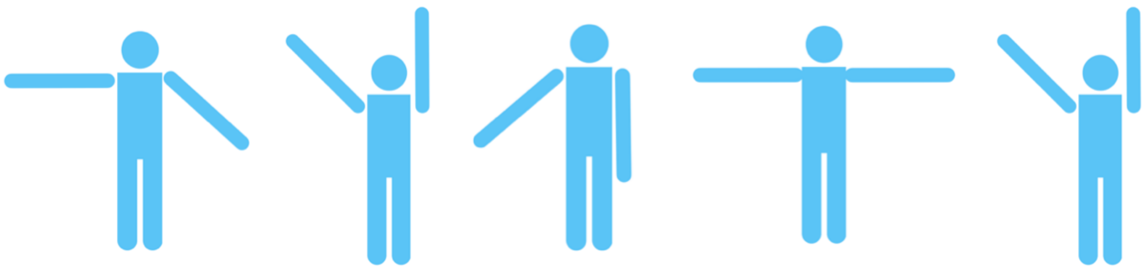
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	R	S	T	U	V	W	X	Y	Z
5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
		5					4					3					2					1		

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	R	S	T	U	V	W	X	Y	Z
5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
		5					4					3					2					1		

L4A1



R	T	A
S	L	



L4A2

	Red	Blue	Green	Yellow	Brown	Black
Peter	1	1	0	1	0	0
Sonya	1	0	1	1	0	1
	o	x	x	o	o	x

	Chicken	Spaghetti	Toast	Soup	Pizza
Peter	[illegible]	[illegible]	0	[illegible]	0
Sony	1	0	[illegible]	1	[illegible]
	o	x	x	o	o

Complete the sentences according to the completed table:

Peter *voted* / *did not vote* for Chicken.

Peter ___________ for Spaghetti.

Sonya ____________ for Toast.

Peter ____________ for Toast.

Sonya _____________ for Pizza.

They agreed on: _______________________________

They disagreed on: ______________________________

Complete the sentences according to the completed table:

Peter *voted* / *did not vote* for Chicken.

Peter ___________ for Spaghetti.

Sonya ____________ for Toast.

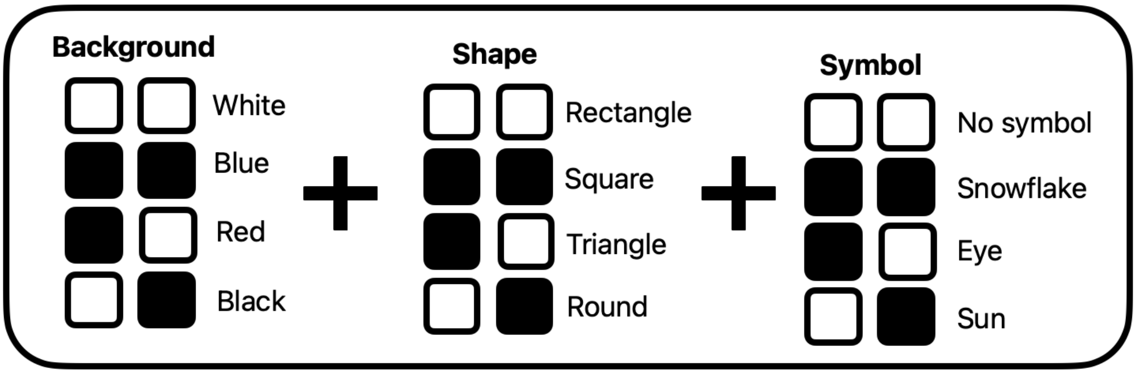
Peter ____________ for Toast.

Sonya _____________ for Pizza.

They agreed on: _______________________________

They disagreed on: ______________________________

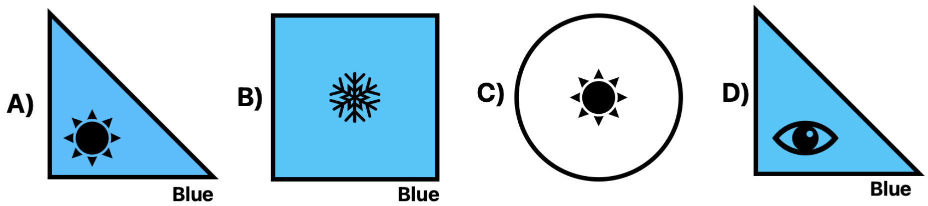
L5A1



Exercise 1

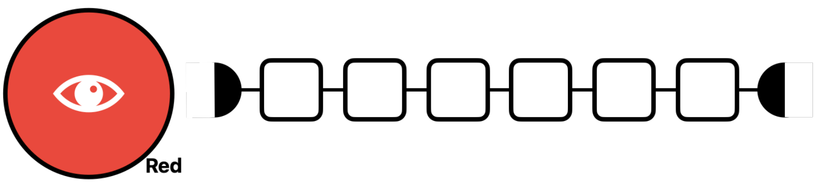
To which flag does the following bracelet belong?

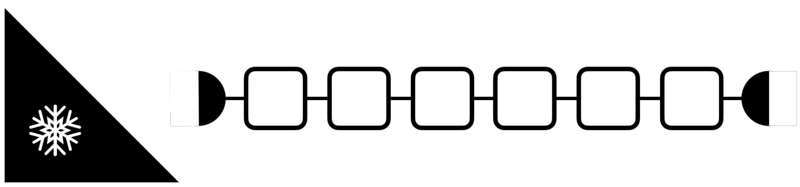
Options:



Exercise 2

Create a bracelet for the following flags:





Exercise 3

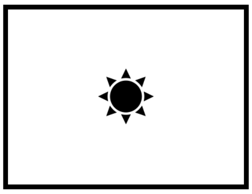
The instructions for the bracelet from the first task look like this:

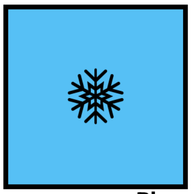
111001 

What does 1 mean and what does 0 mean?

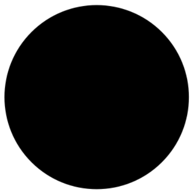
- 1 means ________________
- 0 means ________________

Create instructions for the machine for the following flags:

 ....


Blue
....


Red
....

 ....

A	0 0 0 0 1	J	0 1 0 1 0	S	1 0 0 1 1
B	0 0 0 1 0	K	0 1 0 1 1	T	1 0 1 0 0
C	0 0 0 1 1	L	0 1 1 0 0	U	1 0 1 0 1
D	0 0 1 0 0	M	0 1 1 0 1	V	1 0 1 1 0
E	0 0 1 0 1	N	0 1 1 1 0	W	1 0 1 1 1
F	0 0 1 1 0	O	0 1 1 1 1	X	1 1 0 0 0
G	0 0 1 1 1	P	1 0 0 0 0	Y	1 1 0 0 1
H	0 1 0 0 0	Q	1 0 0 0 1	Z	1 1 0 1 0
I	0 1 0 0 1	R	1 0 0 1 0	?	?

01111 10101 10010

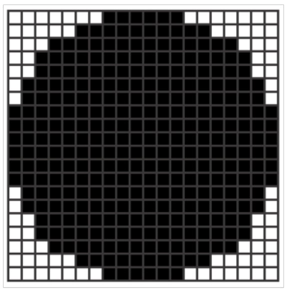
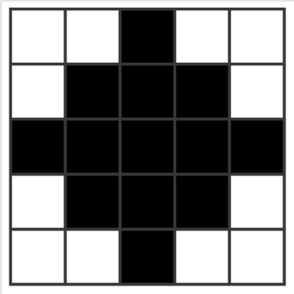
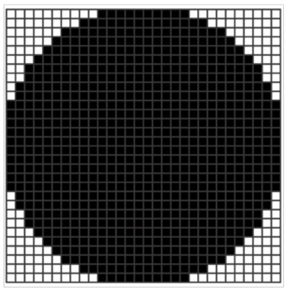
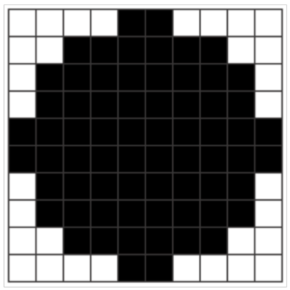
00110 01100 00001 10111

01001 10011

00111 01111 01110 00101

L6A1

L6A2

A	B	C	D
			
....	....	....	....

Read the sentences and fill in the correct word based on the pictures above.

Picture A is ___________ than picture B.

Picture B is ___________ than picture D.

Picture D is ___________ than picture A.

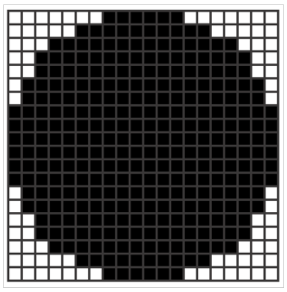
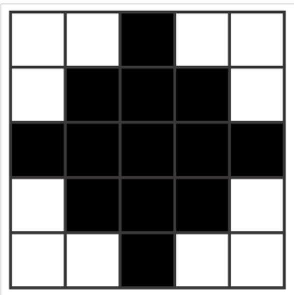
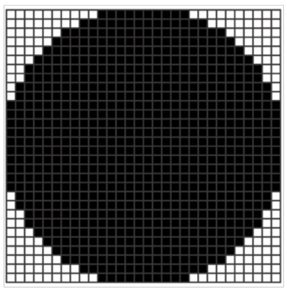
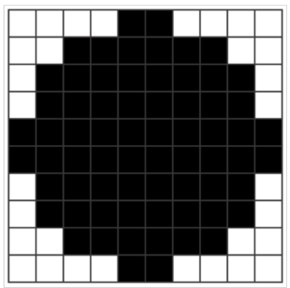
Picture C is ___________ than picture A.

Picture A is smaller than picture ___ but bigger than picture ___.

Picture D is bigger than picture ___ but smaller than picture ___.

Which picture has the most black squares? _______

Which picture has the fewest white squares? ________

A	B	C	D
			
....	....	....	....

Read the sentences and fill in the correct word based on the pictures above.

Picture A is ___________ than picture B.

Picture B is ___________ than picture D.

Picture D is ___________ than picture A.

Picture C is ___________ than picture A.

Picture A is smaller than picture ___ but bigger than picture ___.

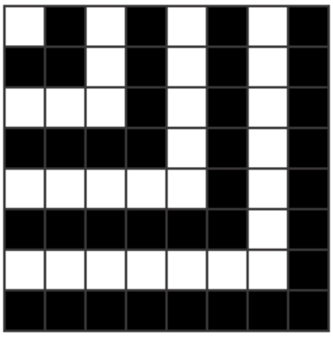
Picture D is bigger than picture ___ but smaller than picture ___.

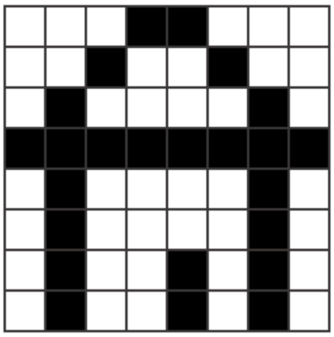
Which picture has the most black squares? _______

Which picture has the fewest white squares? ________

Exercise 1

Code following pictures:





Exercise 2

Decode following pictures:

```
00010000
00110001
01111010
11011110
11111110
01111010
00110001
00010000
```

```
1111111110000
0011011110110
1001011010010
1101111011000
000111111111
```

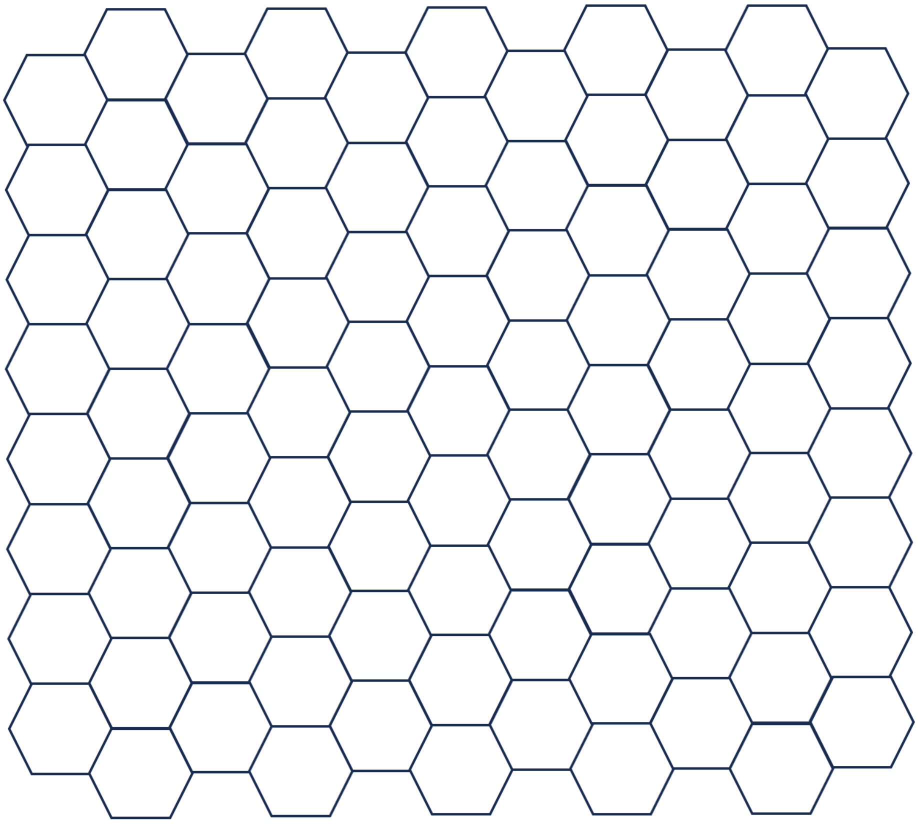
Exercise 3

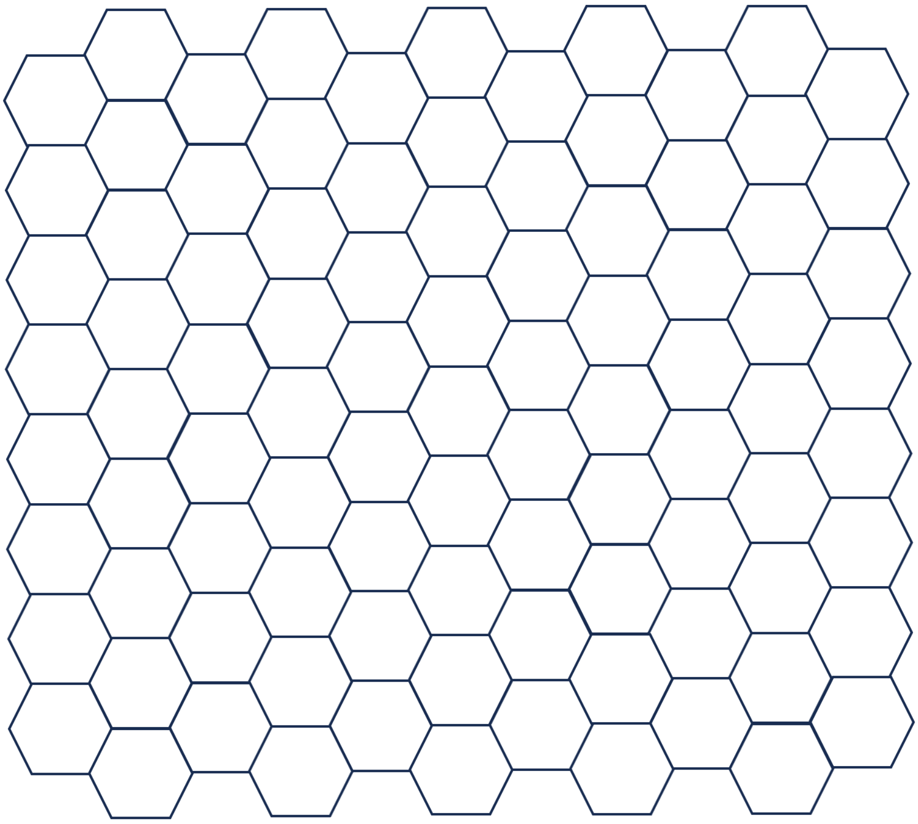
Create your own image, code it and then swap the code with a classmate.

Your picture:

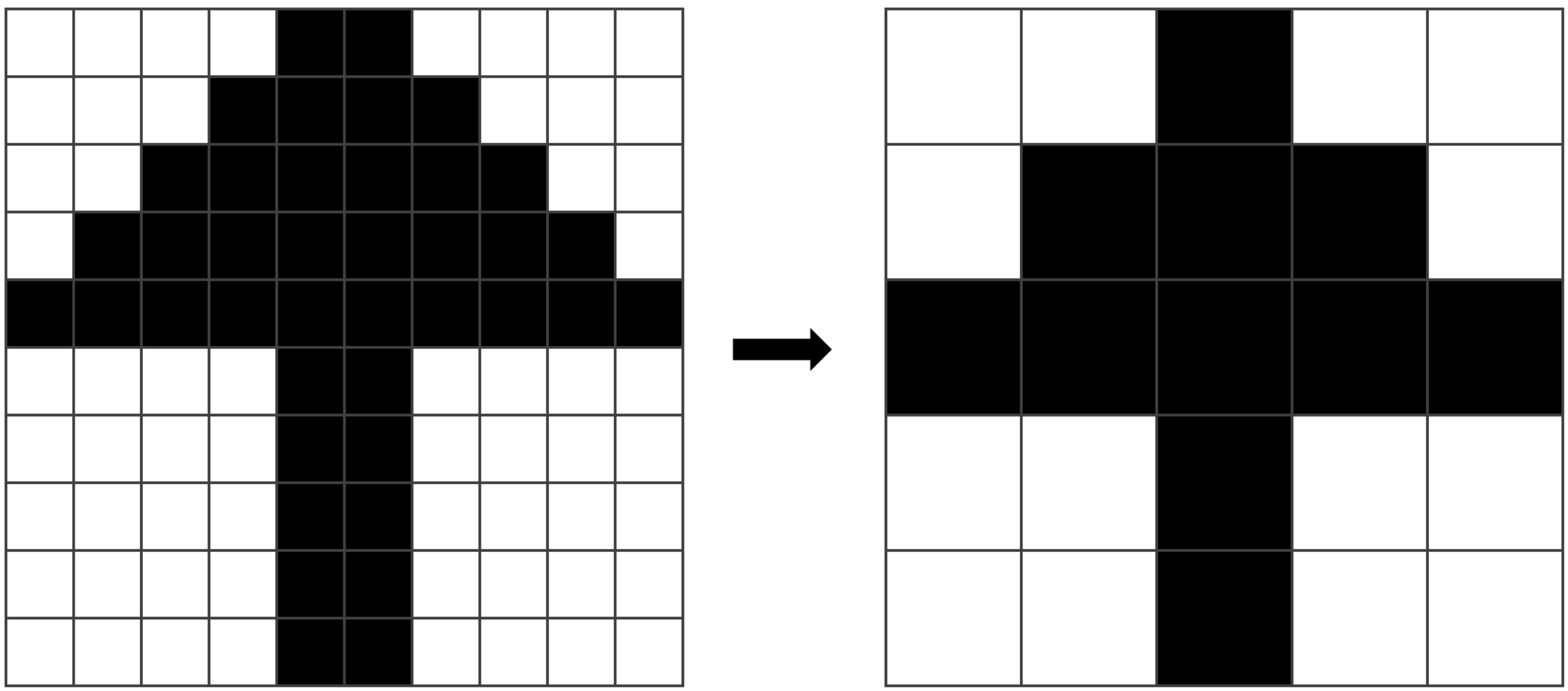
Picture of your classmate:

L6A4





L7A1



Decide which statements are true (T) and which are false (F).

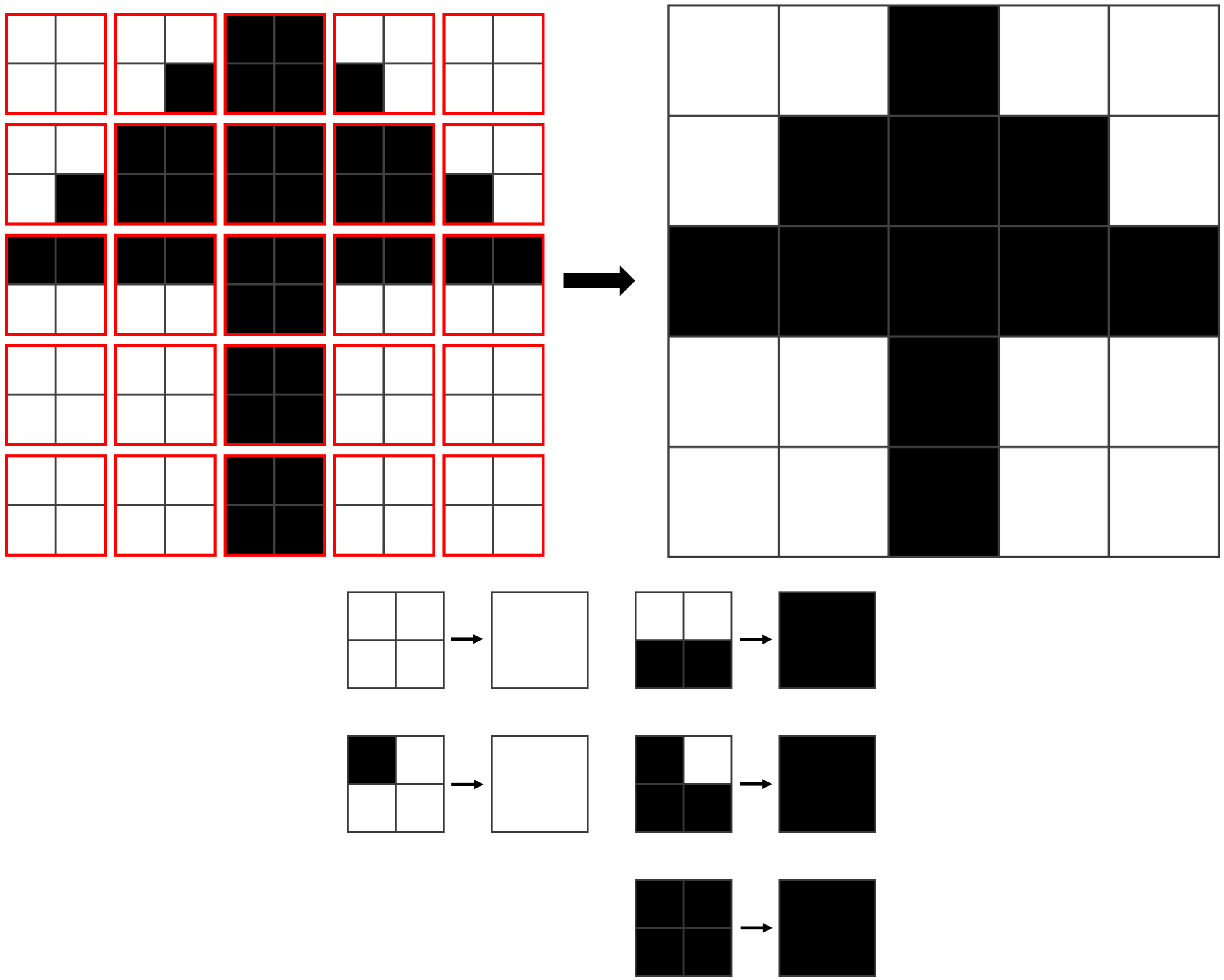
1. Picture A is bigger than picture B. T - F
2. Picture B needs more space than picture A. T - F
3. Picture A is more detailed than picture B. T - F
4. 00100 is first row in Picture B. T - F
5. 11111 is third row in picture B. T - F

Decide which statements are true (T) and which are false (F).

1. Picture A is bigger than picture B. T - F
2. Picture B needs more space than picture A. T - F
3. Picture A is more detailed than picture B. T - F
4. 00100 is first row in Picture B. T - F
5. 11111 is third row in picture B. T - F

Decide which statements are true (T) and which are false (F).

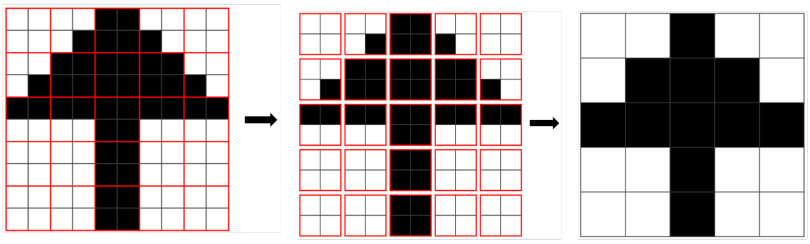
1. Picture A is bigger than picture B. T - F
2. Picture B needs more space than picture A. T - F
3. Picture A is more detailed than picture B. T - F
4. 00100 is first row in Picture B. T - F
5. 11111 is third row in picture B. T - F



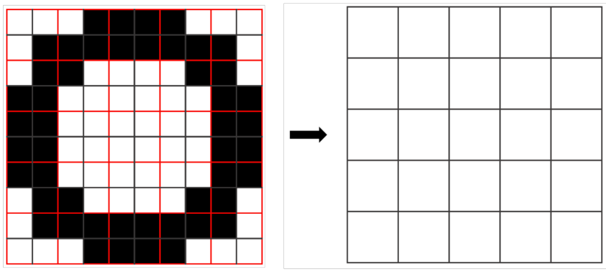
L7A2

Exercise 1

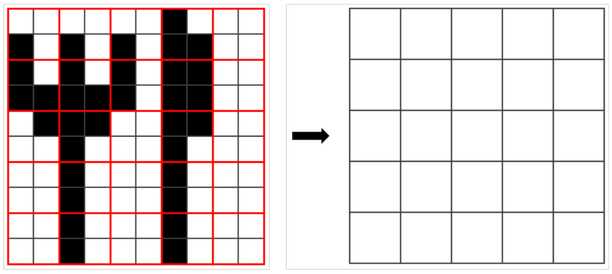
Compress the images according to the rules. The first one you see is an example:



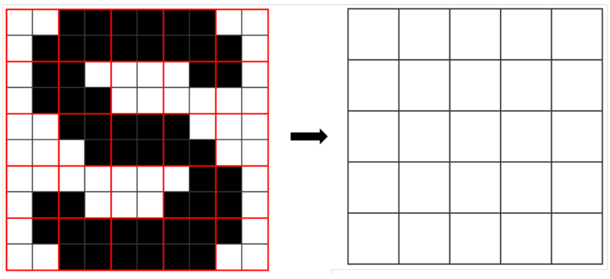
1



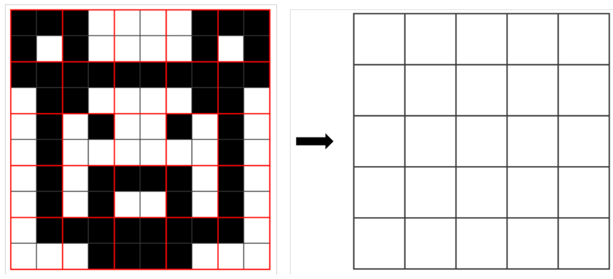
2



3

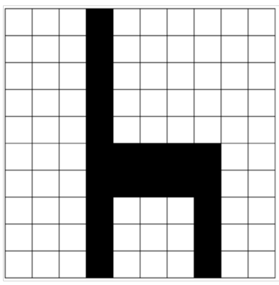


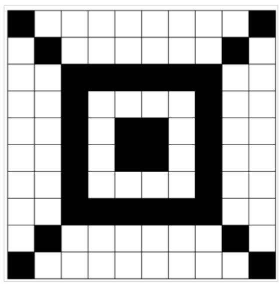
4

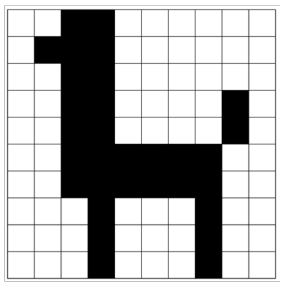


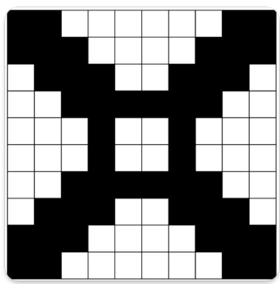
Exercise 2

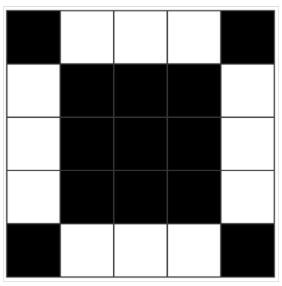
Match the images before and after compression.

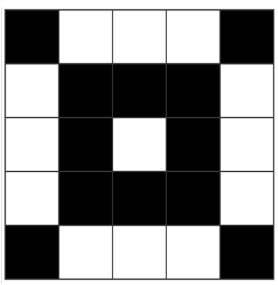


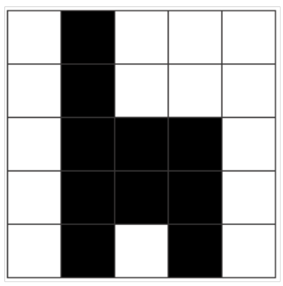


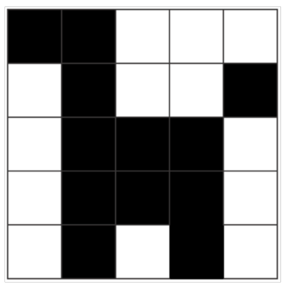




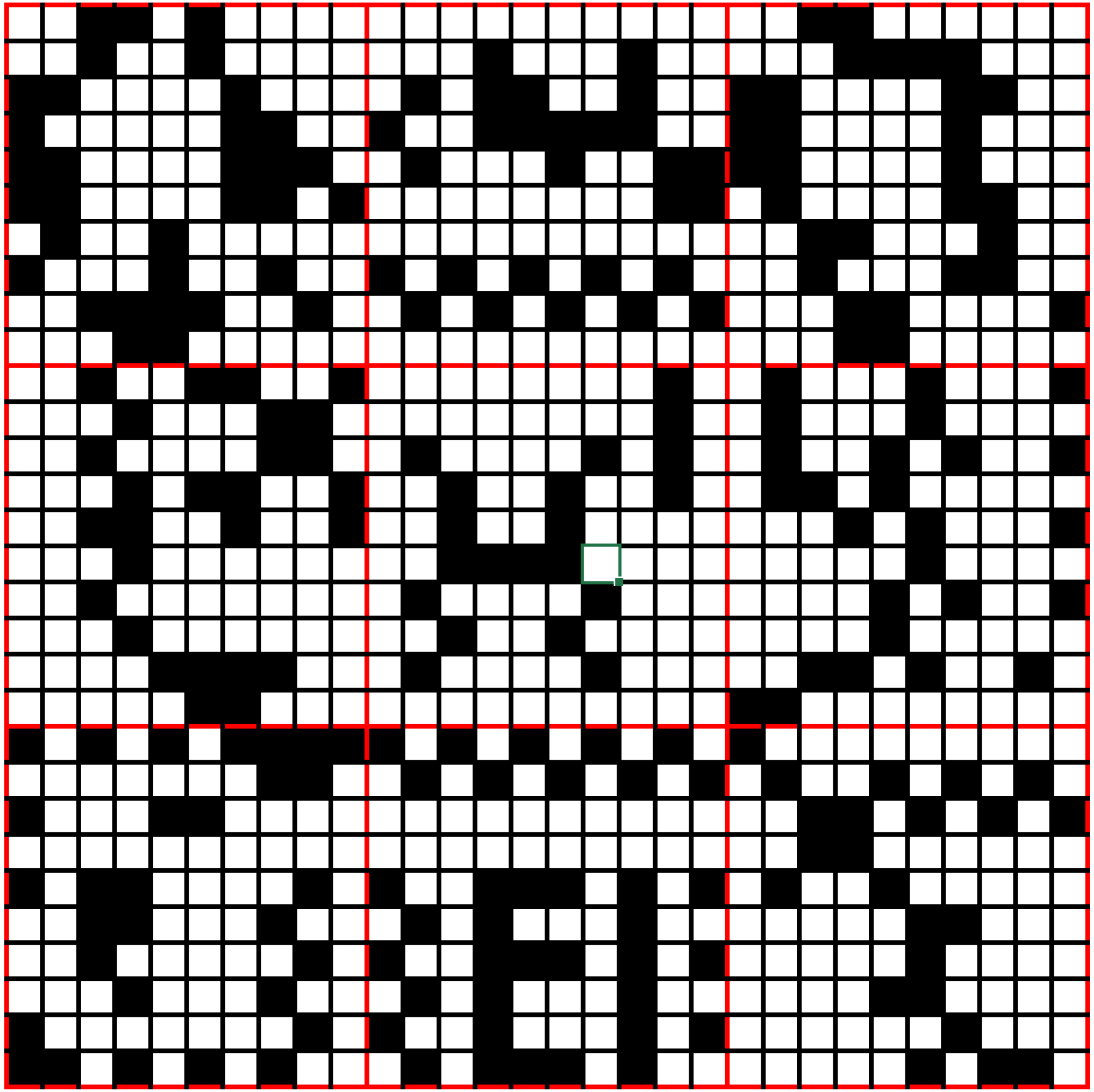


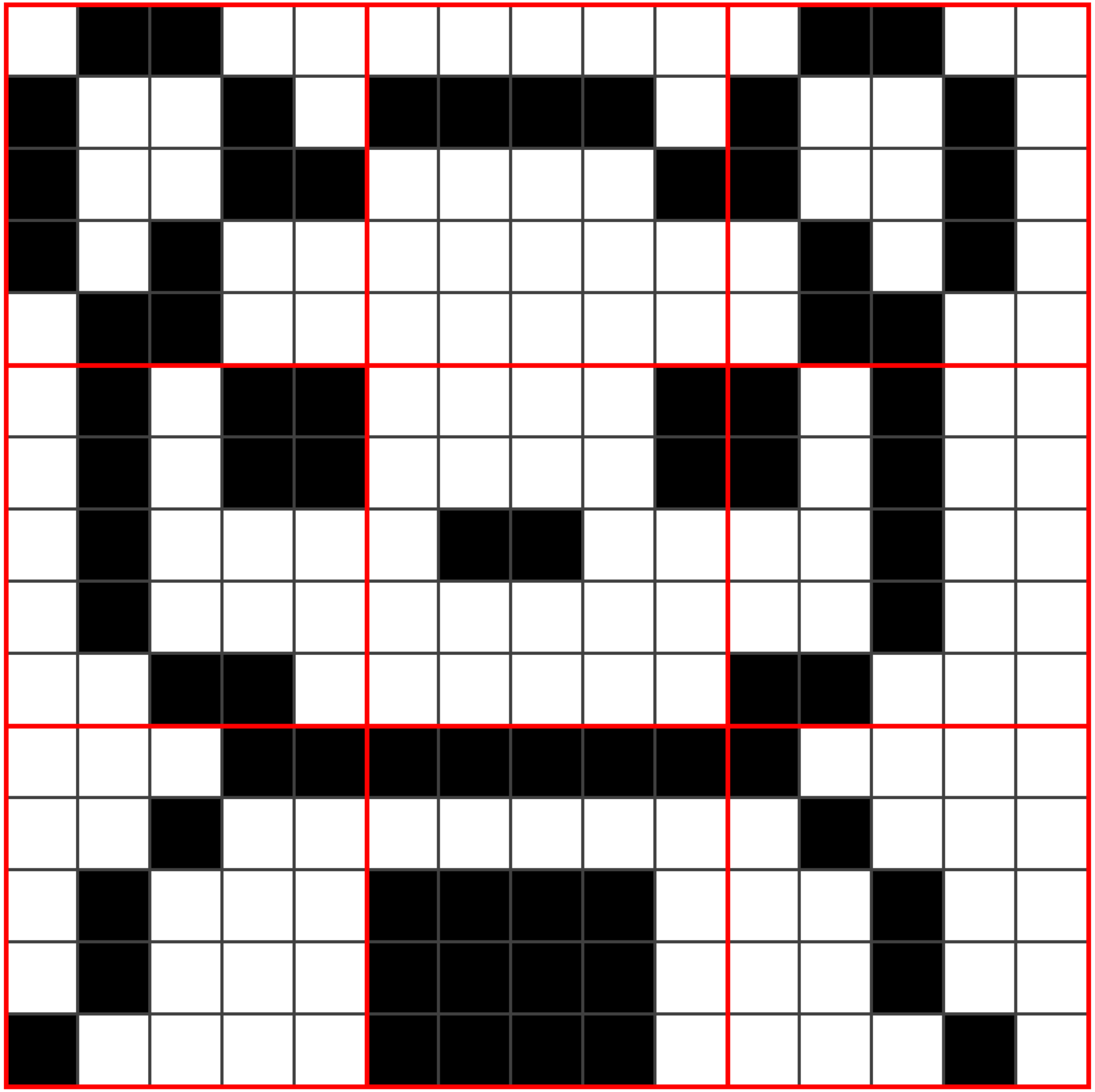


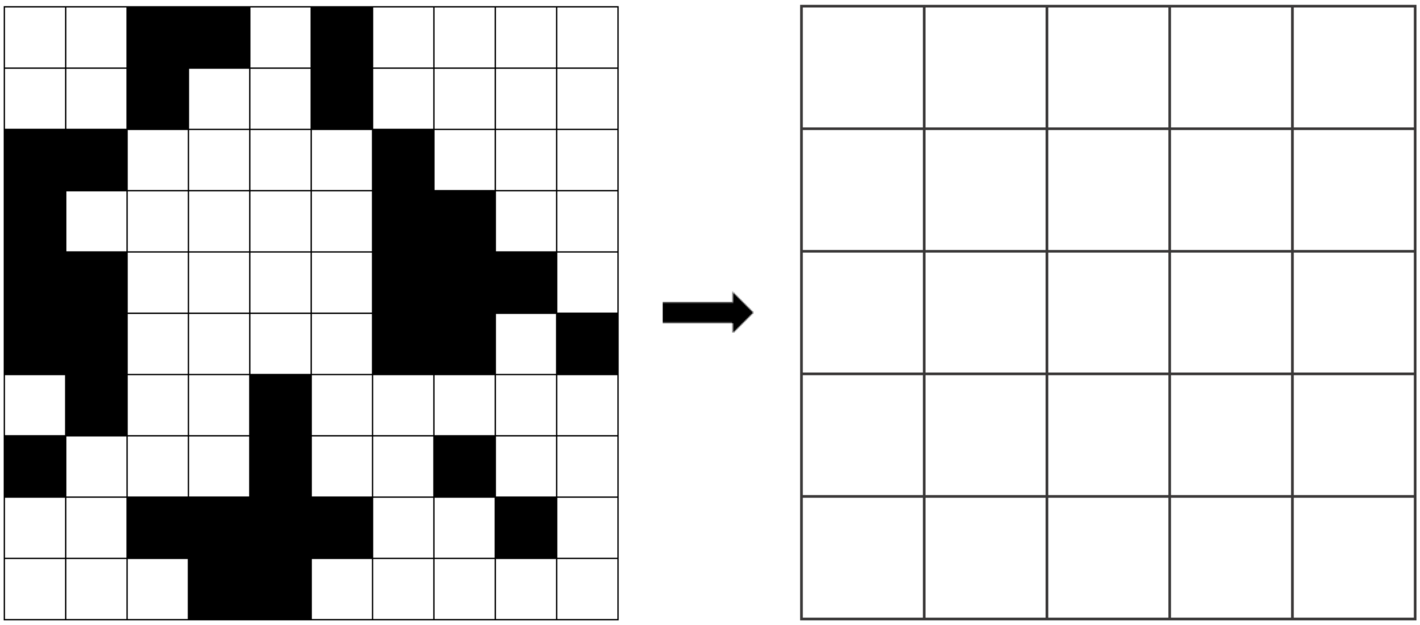


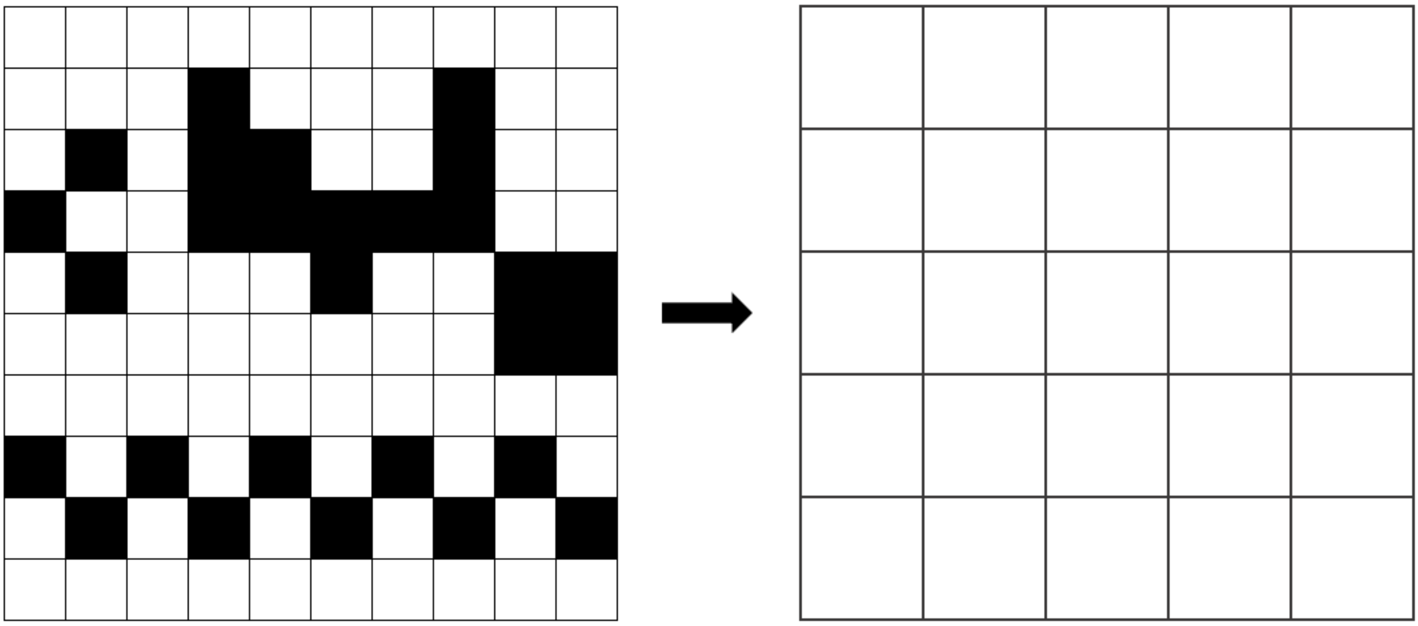


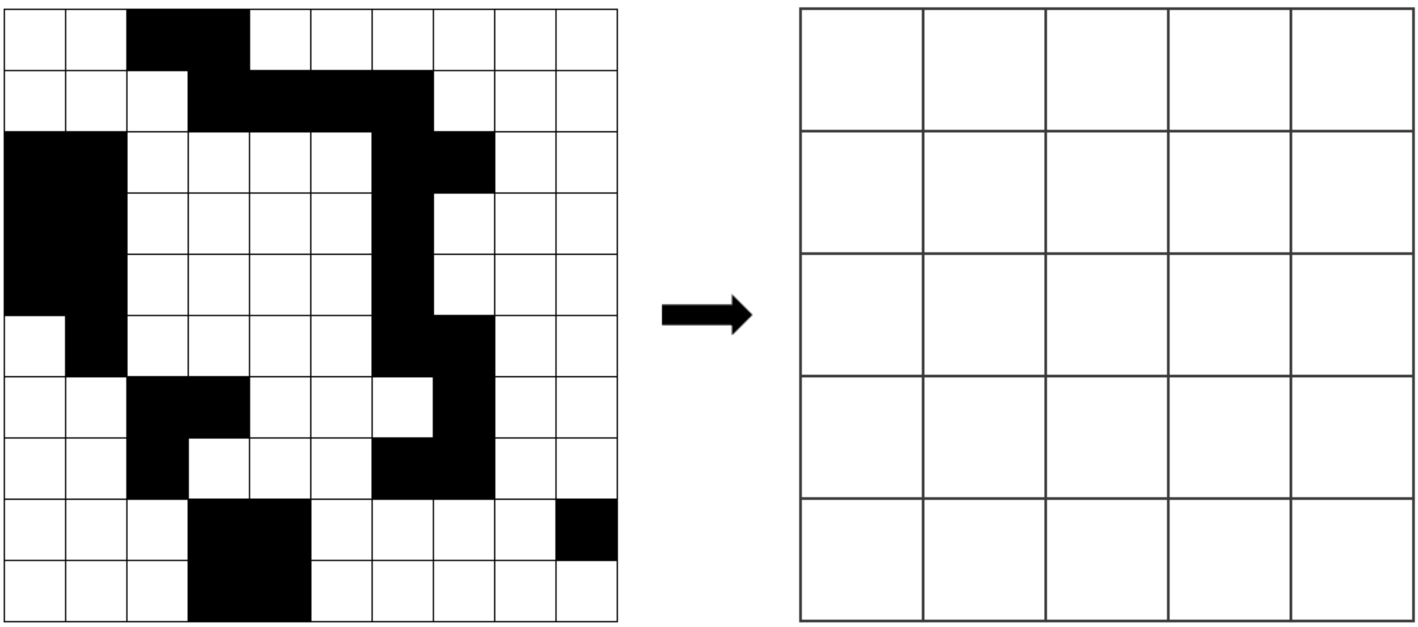
L7A3

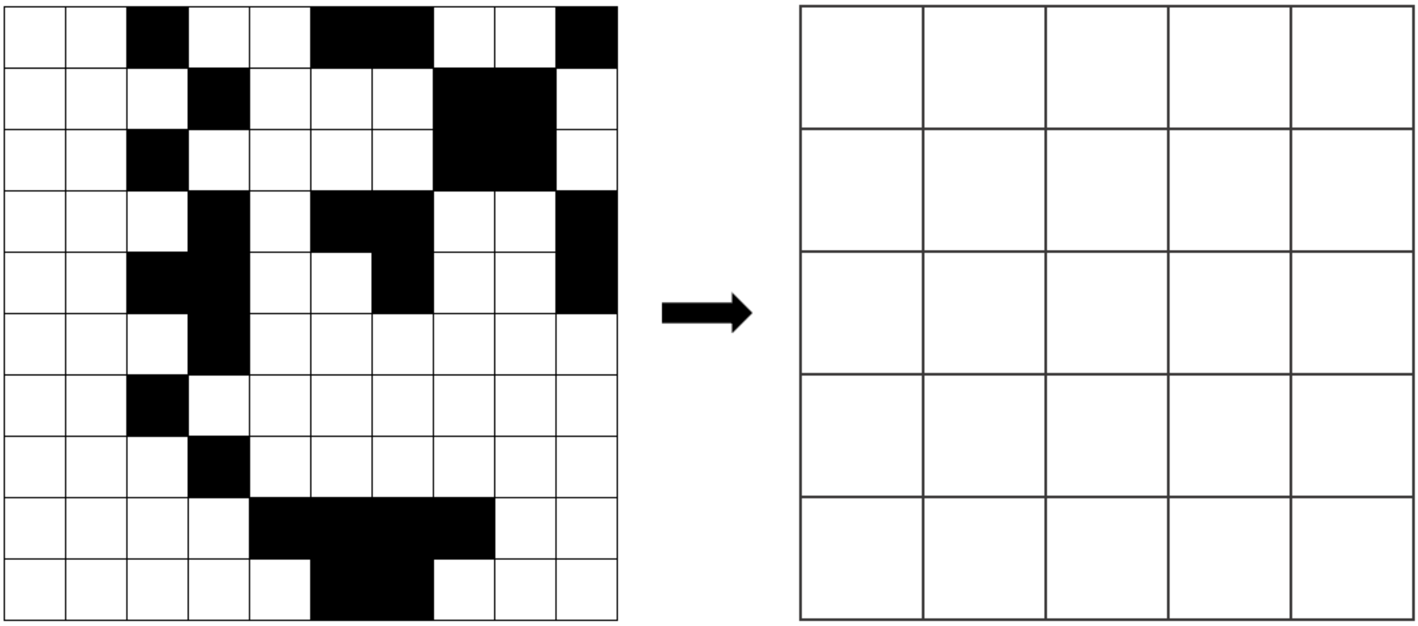


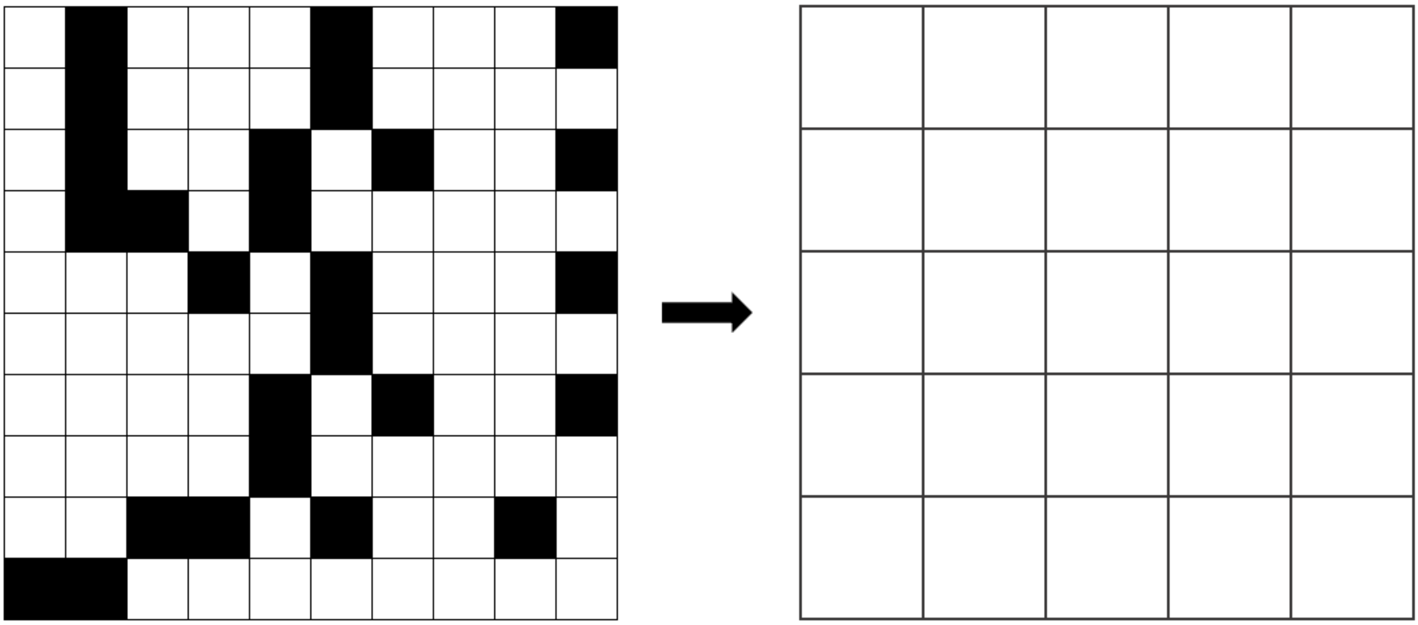


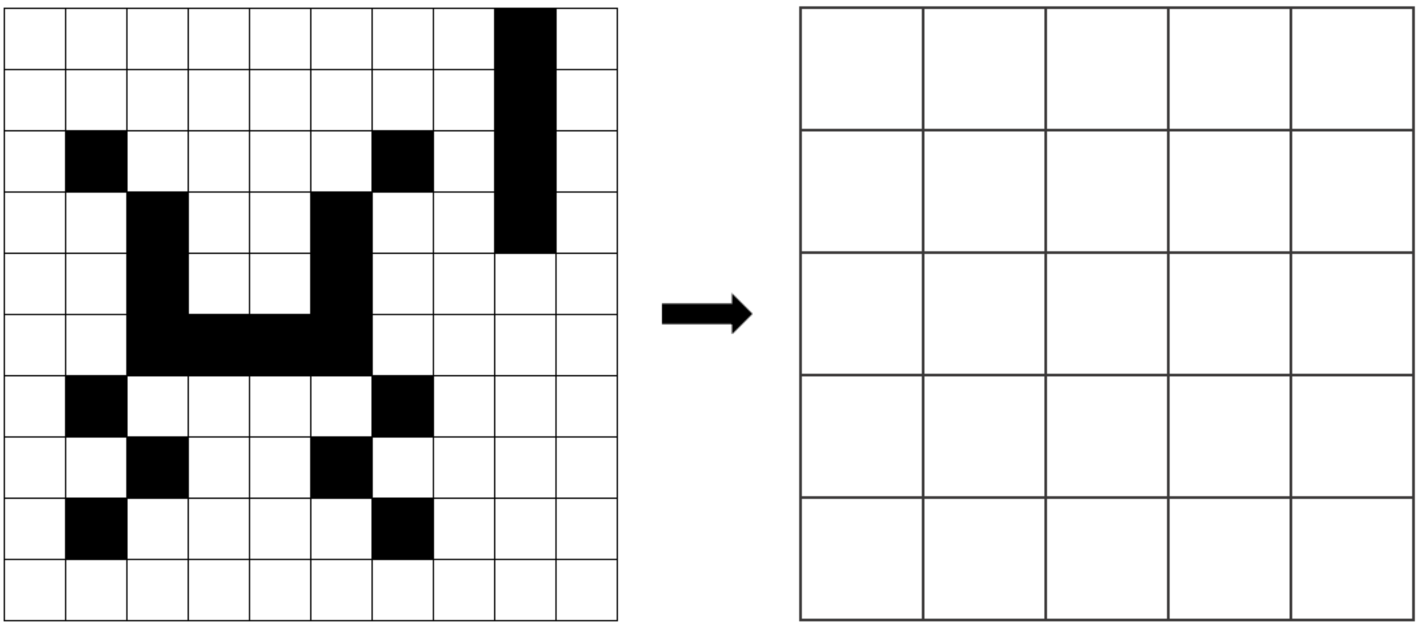


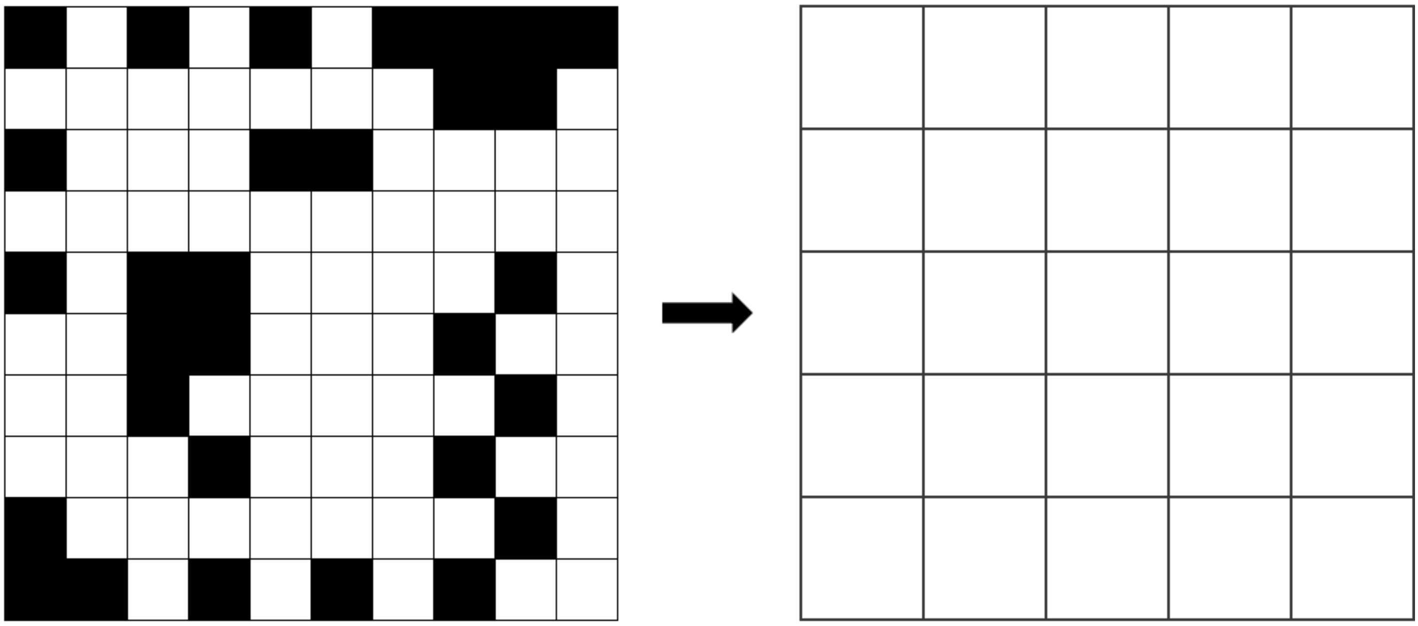


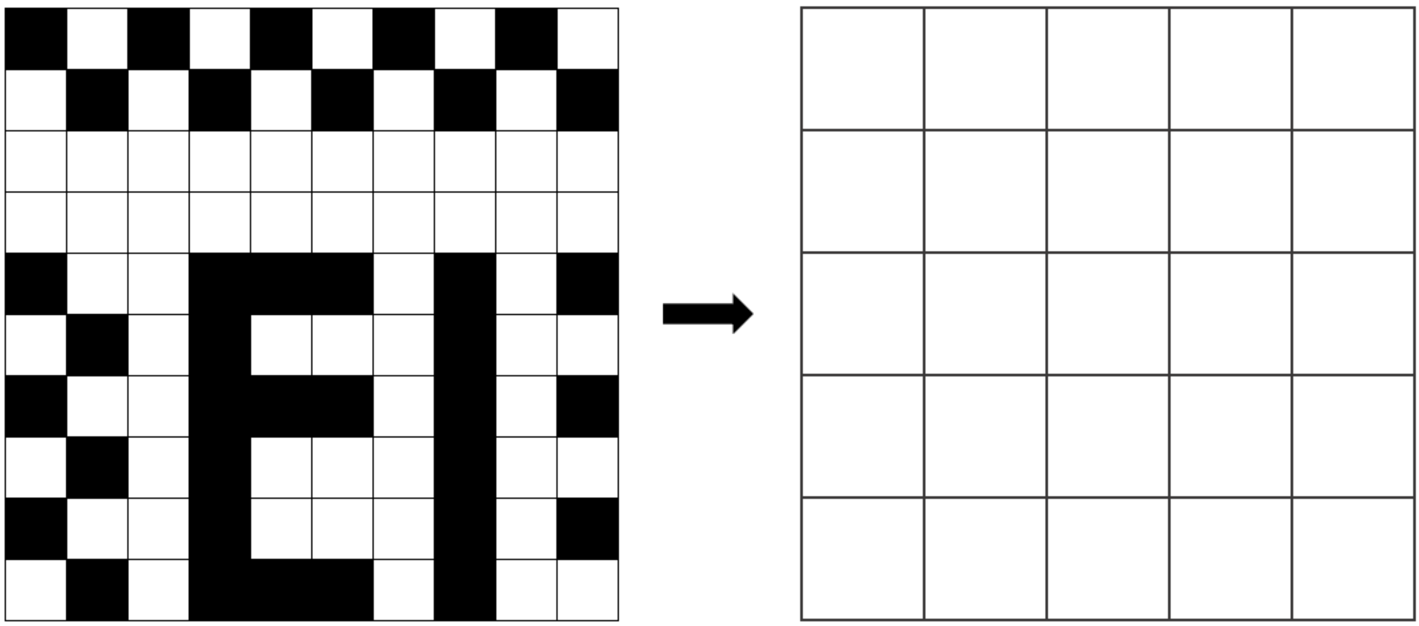


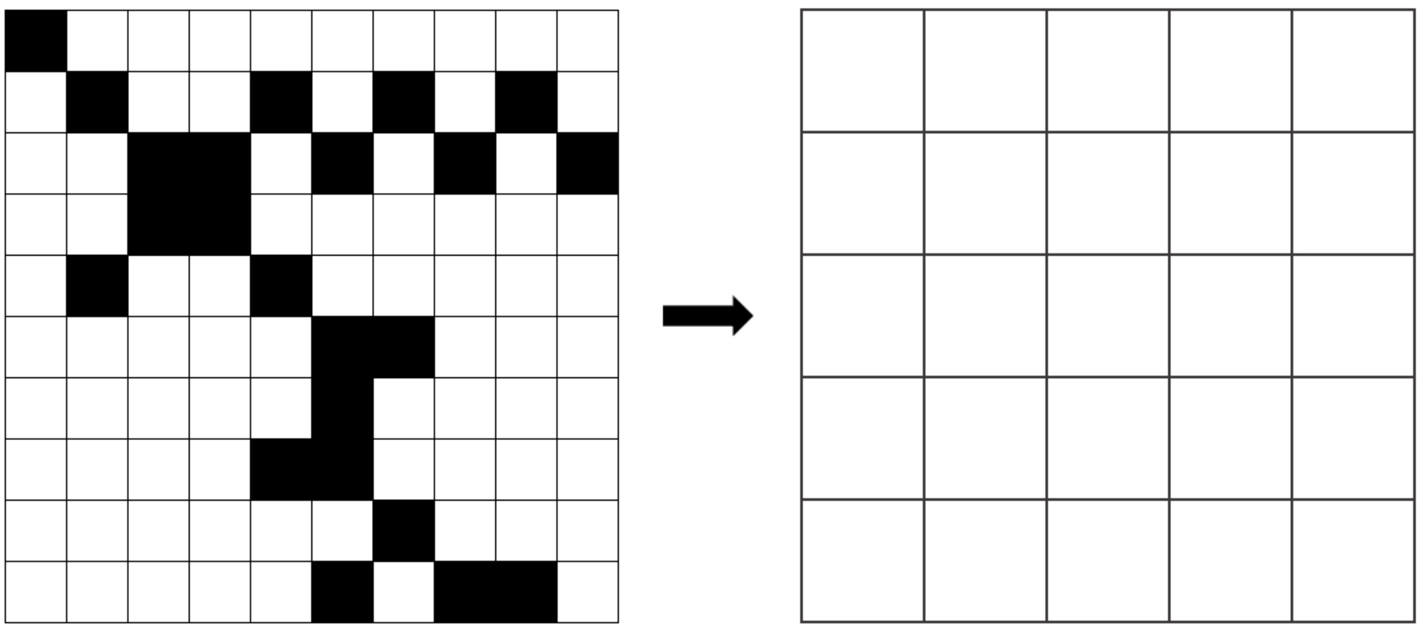








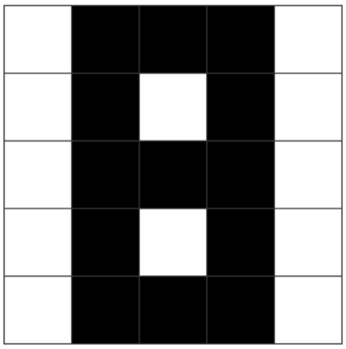




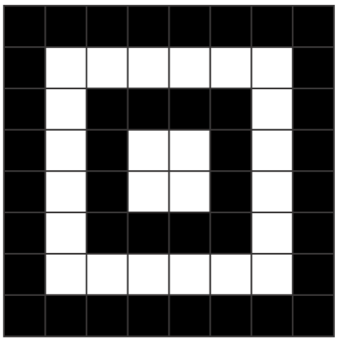
L7A4

Exercise 1

Look at the following pictures. How is the first picture encoded? Try to encode the second picture the same way.



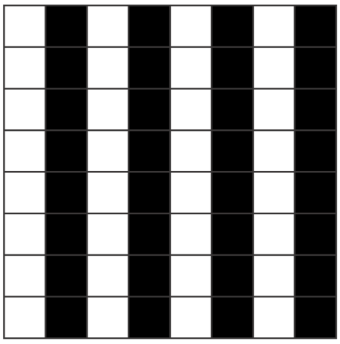
1W 3B 1W
1W 1B 1W 1B 1W
1W 3B 1W
1W 1B 1W 1B 1W
1W 3B 1W



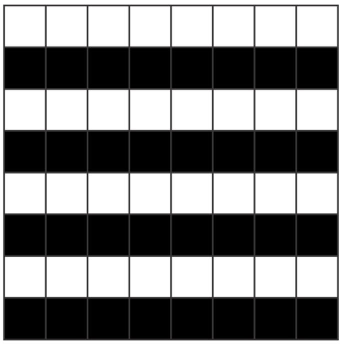
Exercise 2

Which picture has the longest code?
the shortest code?

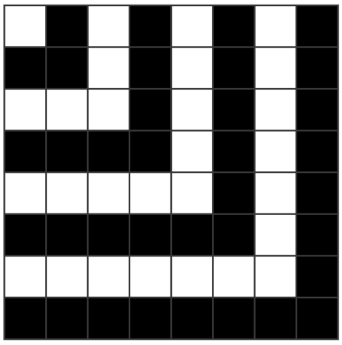
A



B

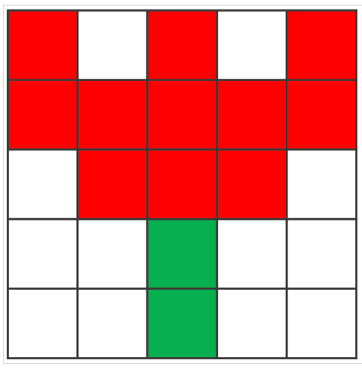


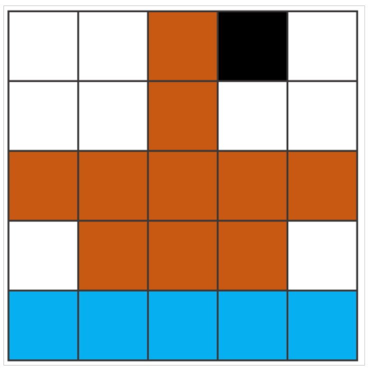
C



Exercise 3

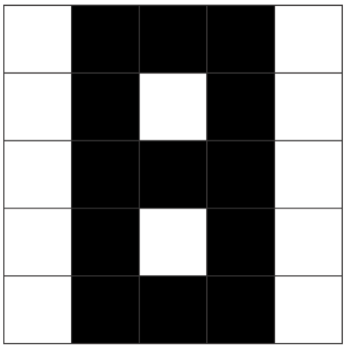
Look at the following pictures. Try to code them the same way as before.



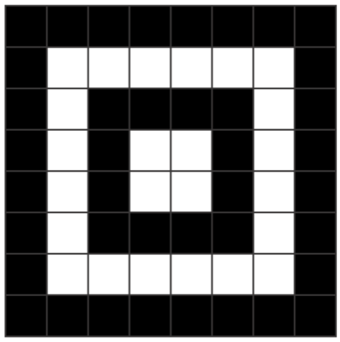


Exercise 1

Look at the following pictures. How is the first picture encoded? Try to encode the second picture the same way.



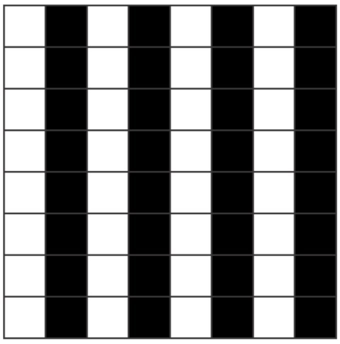
1W 3B 1W
1W 1B 1W 1B 1W
1W 3B 1W
1W 1B 1W 1B 1W
1W 3B 1W



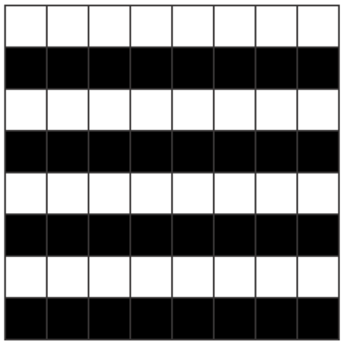
Exercise 2

Which picture has the longest code?
the shortest code?

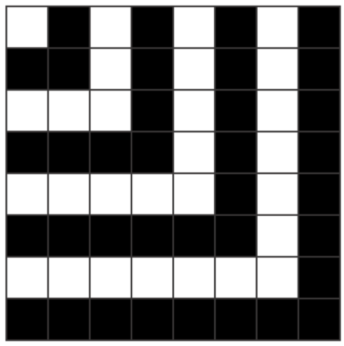
A



B



C



Exercise 3

What image is hidden in the text bellow?

Red White Red White Red
Red Red Red Red Red
White Red Red Red White
White White Green White White
White White Green White White

White White Brown Black White
White White Brown White White
Brown Brown Brown Brown Brown
White Brown Brown Brown White
Blue Blue Blue Blue Blue

Can you simplify these instructions?

L7A5

Exercise 1

Try to decode the image:

Code:

INSTAGRAM	**B1B15**
MESSAGES	**D1D6**
WHATSAPP	**F1F18**
TIKTOK	**H1H13**
OTHER	**J1J3**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A																				
B																				
C																				
D																				
E																				
F																				
G																				
H																				
I																				
J																				
K																				

Exercise 2

Fill in the gaps:

In the morning, I usually start my day by checking my messages. On average, I spend about ___ minutes _____________ (message) friends and family, catching up on the latest news and making plans.

As the day progresses, I find myself drawn to Instagram. It's my go-to platform for sharing moments from my day and staying updated on what my friends are up to. I typically spend around ___ minutes _____________ (scroll) through the feed and liking posts.

Around lunchtime, I enjoy a quick break with TikTok. This app is my guilty pleasure, and I can easily lose track of time while watching entertaining short videos. On average, I spend about ___ minutes _____________ (watch) TikToks.

Later in the day, I use WhatsApp to stay connected with friends and colleagues. Whether it's coordinating plans or discussing work-related matters, I spend approximately ___ minutes _____________ (chat) on WhatsApp.

In addition to these main apps, I also dedicate some time to other activities, such as checking emails and browsing the web. On average, I spend about ___ minutes _____________ (do) these tasks.