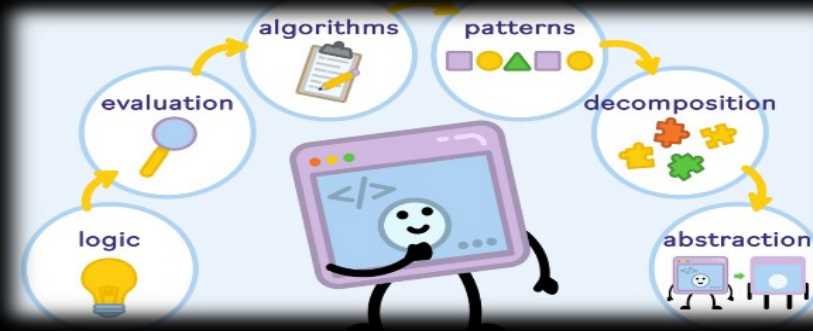


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Developing Computational Thinking

With Unplugged Coding Activities

“Skills to Catch the Future”

Erasmus+ KA220

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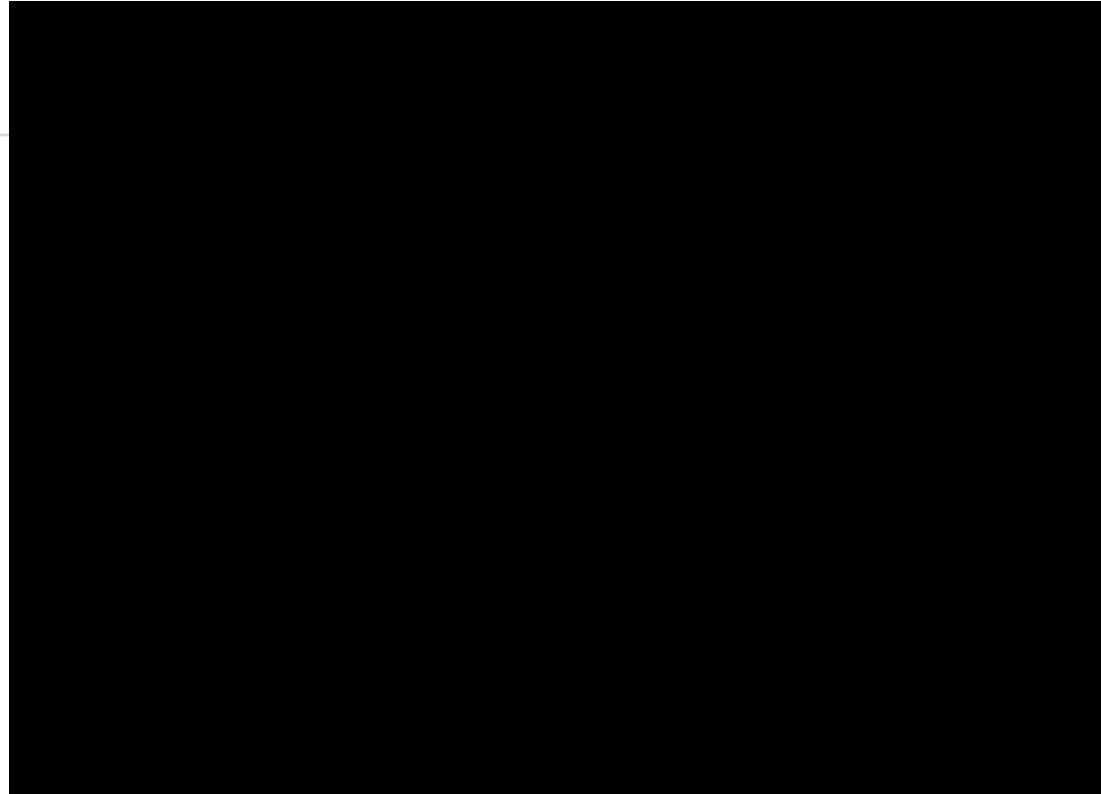


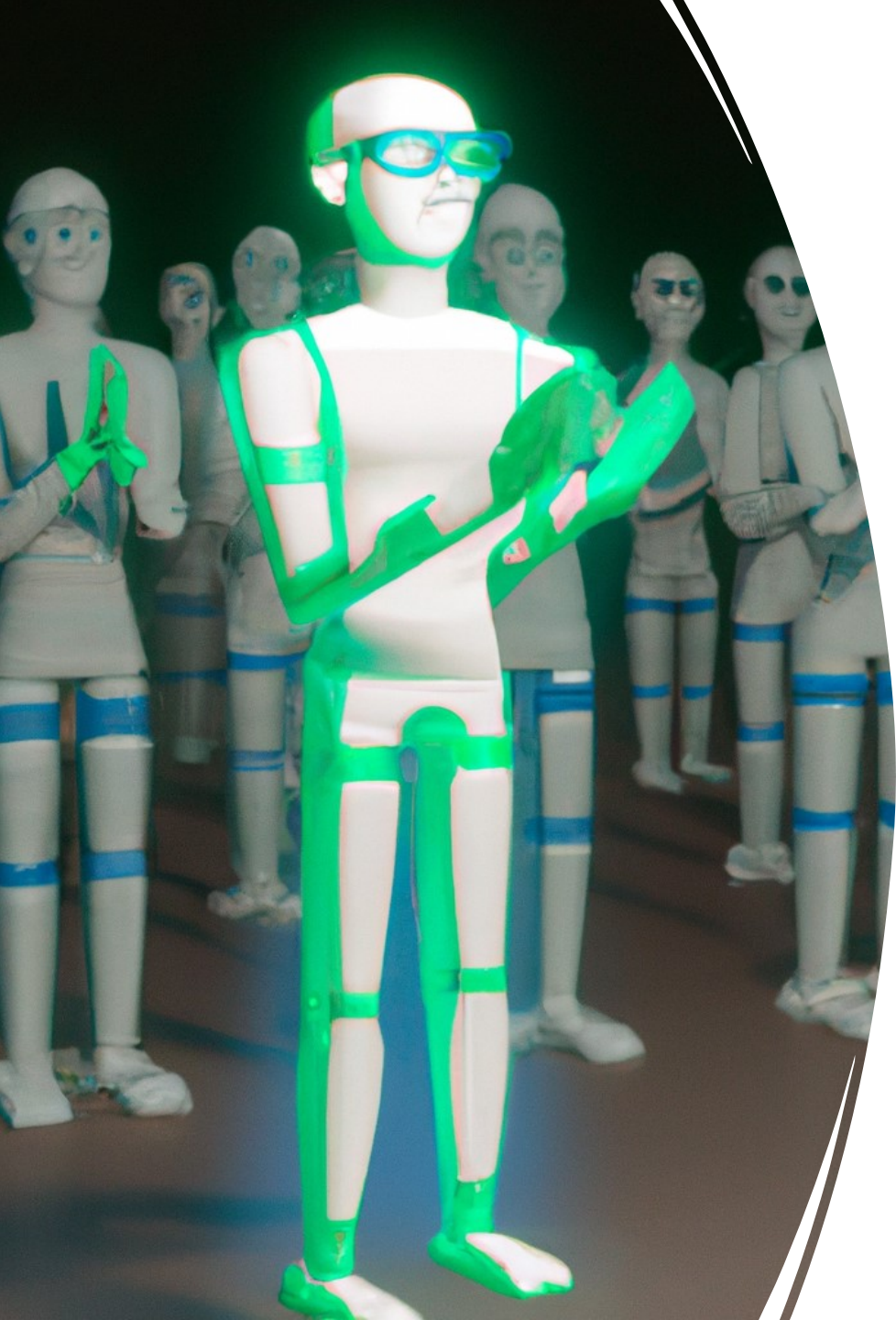
What are Unplugged Coding Activities ?

Unplugged coding activities are programming concepts taught through games or activities that do not require technology and can be done offline using tangible objects, such as paper and markers. These activities aim to engage younger students in learning about coding and computational thinking skills in a hands-on and interactive way . Some examples of unplugged coding activities include loop activities, coding with Hotwheels, origami coding activities, and solving Sudoku puzzles.



Benefits of Unplugged Computational Thinking Activities





Using Unplugged Computational Thinking Activities in the Classroom

Unplugged activities

- can be used in the classroom to help children develop problem solving and computational thinking skills. These activities can be used to teach concepts such as coding, debugging, and algorithms in a fun and interactive way. Unplugged activities can also help children understand the basics of coding and algorithms, as well as how to debug and troubleshoot problems.
- can also be used to teach children how to use a systematic approach to solve challenges
- can also help children develop their creativity and ability to think outside the box.
- are also great for teaching children to think creatively and develop their own unique solutions to problems.

Exercises

Plant a seed

Decompose the problems into subproblems

1. Get the pot
2. Put a layer of gravel in the bottom
3. Fill the spot with soil
4. Poke hole in soil and put the seed inside the hole
5. Cover seed with soil
6. Water pot
7. Put pot in sunlight – keep it warm
8. Fertilize plant

Enjoy your plant

1. Get the pot	
2. Put a layer of gravel in the bottom	
3. Fill the spot with soil	
4. Poke hole in soil and put the seed inside the hole	
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6. Water pot	
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8. Fertilize plant	



Draw a schema

Exercise 1)

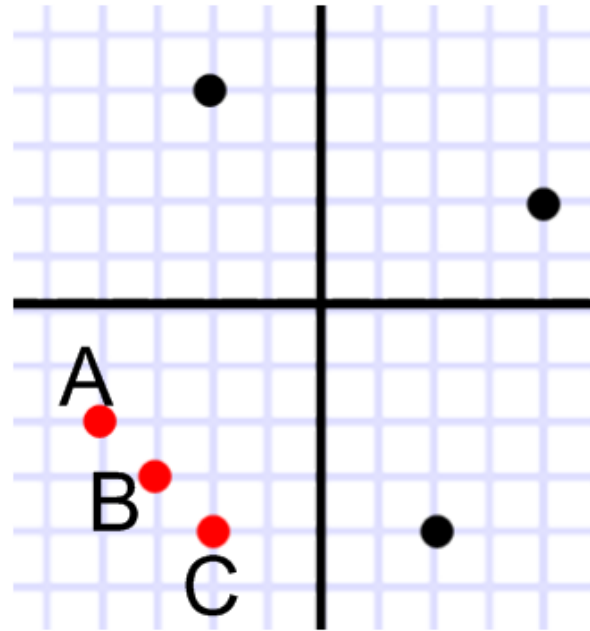
Patterns Using Arithmetic Warmup

18, 15, 12, 9, ...

What is the next term?

[Brain Game: Pattern Matrix - Improve your Pattern Recognition \(braingymmer.com\)](http://braingymmer.com)

Exercise 2)



Which point (A, B, or C) fits with the pattern?



Exercise 3)

Pattern Recognition: Level 1 Challenges

Assuming the pattern below continues, how many squares will be in Figure 5?

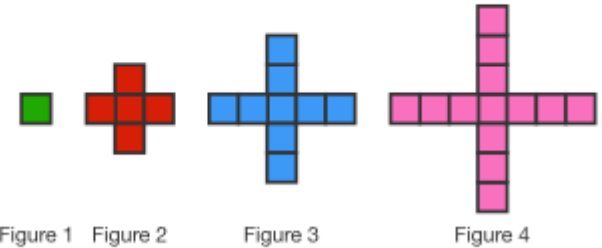


Figure 1

Figure 2

Figure 3

Figure 4

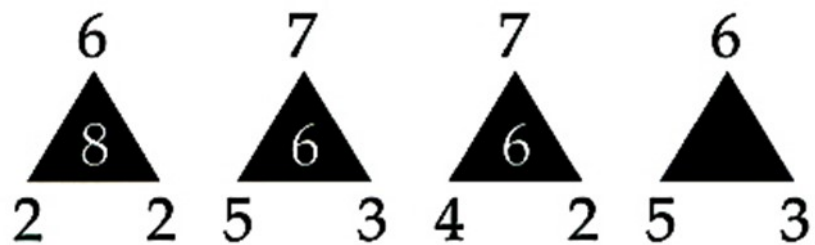
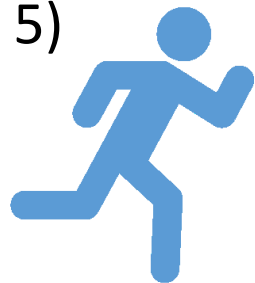
Can you find any pattern – equation ?

Exercise 4)

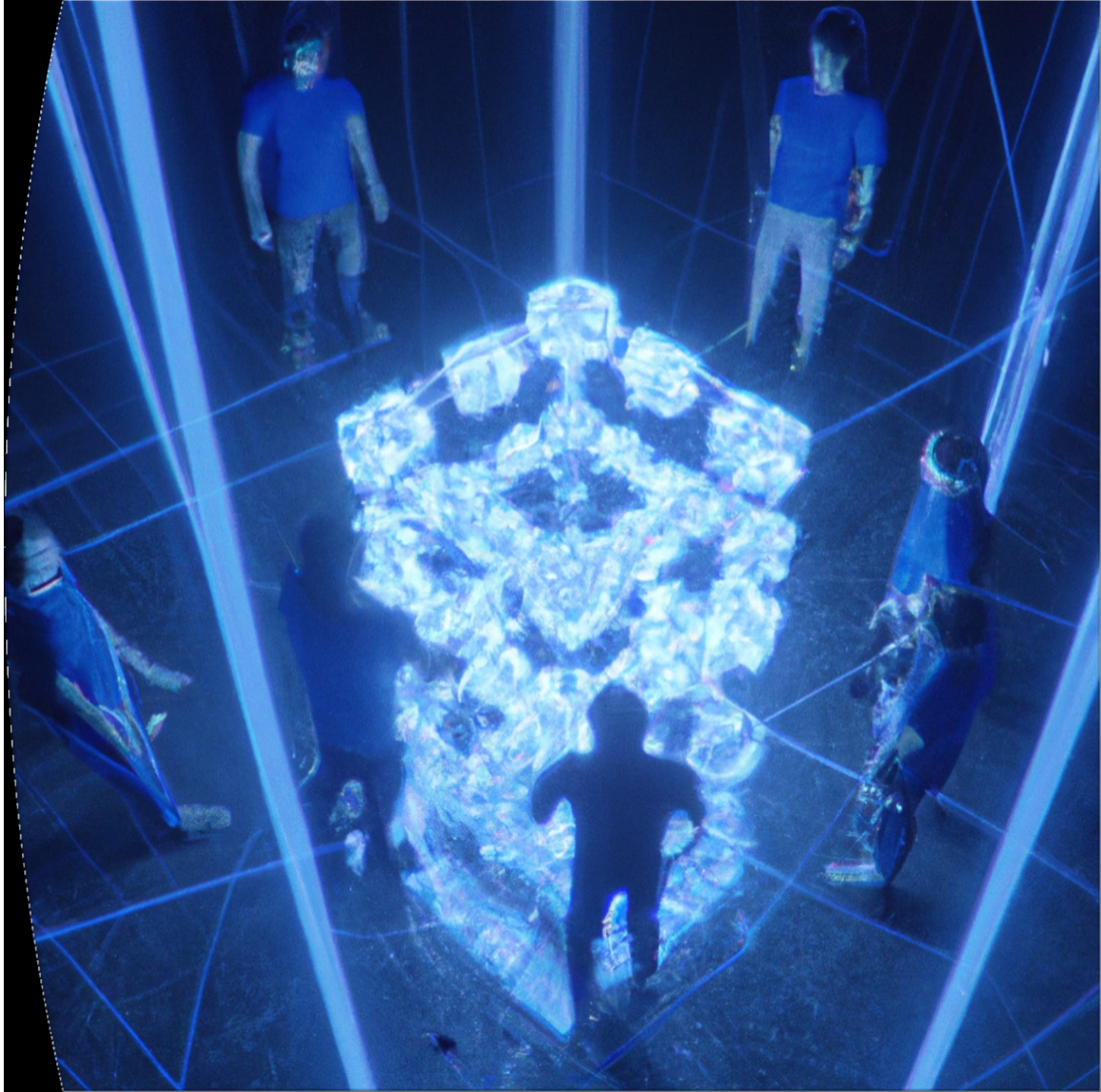
- What is the missing number?

7	4	8
3	9	7
6	5	10
?	8	4

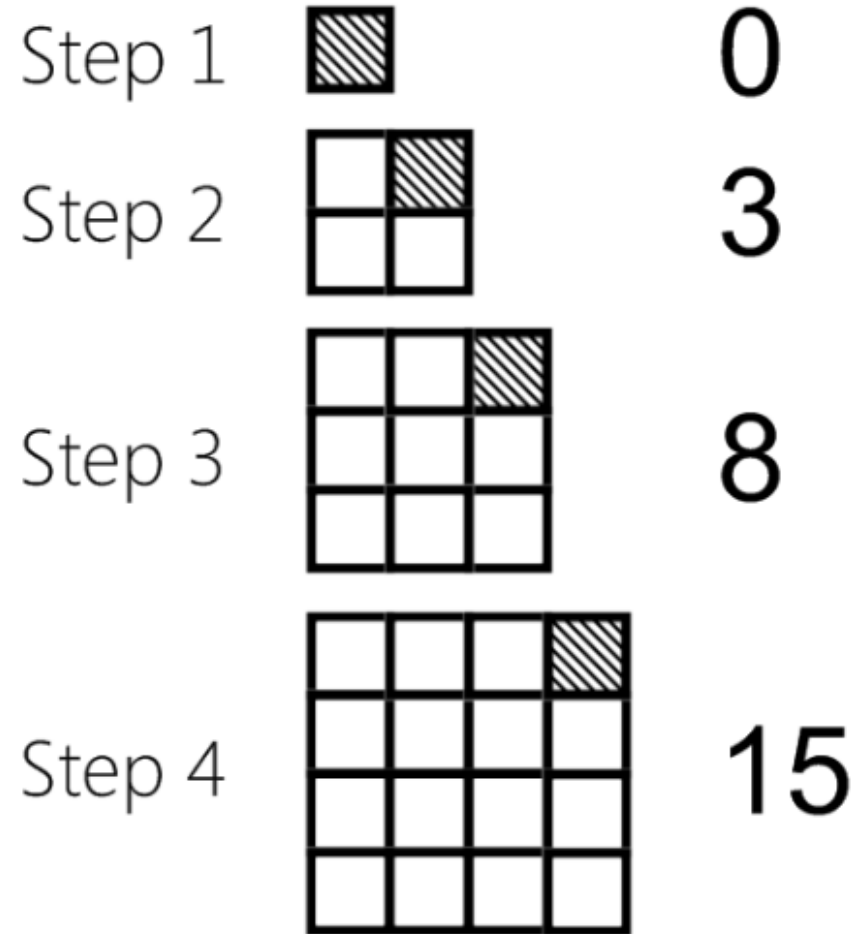
Exercise 5)



What is the missing number?

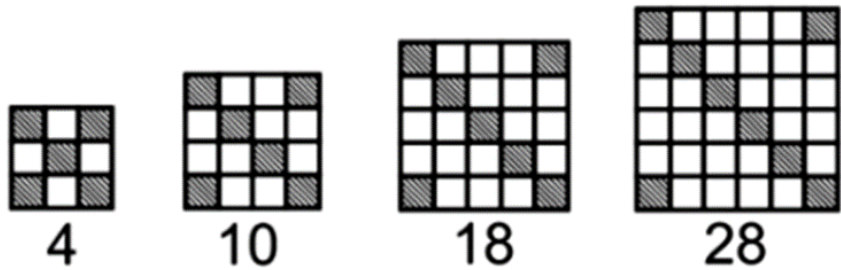


Exercise 6)



What comes next?

Exercise 7)



What number comes next?

How many **white** squares are on the 7x7 perfect square?

Do you recognize any pattern – equation ?





Exercise 8)

Find the sum of the sequence of numbers

$$1+2+3+\dots+100+\dots+198+199+200$$

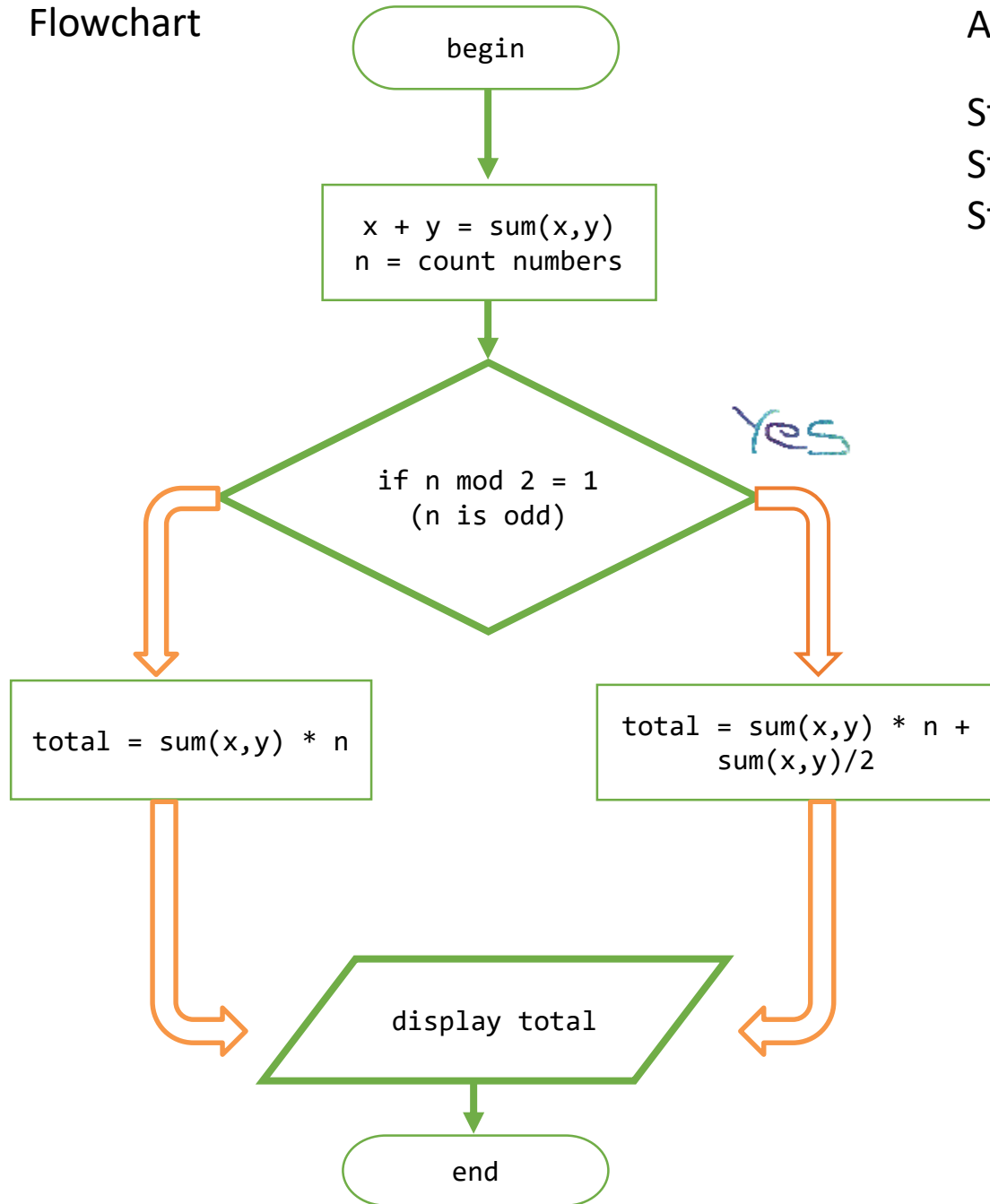
Find the sum for following sequence

$$320+321+322+\dots+400+\dots+498+499+500$$

Do you recognize any pattern – equation ?

Solution

Flowchart



Algorithm

Step 1: add the inner (x) and outer (y) number

Step 2: count the number of pairs (n)

Step 3: if pairs are odd the total sum is

$$\text{sum}(x,y) * n + \text{sum}(x,y)/2$$

elseif pairs are even the total sum is

$$\text{sum}(x,y) * n$$

Mathematical

$$S1 = 1 + 2 + 3 + \dots + (n-2) + (n-1) + (n)$$

$$S2 = (n) + (n-1) + (n-2) + \dots + 3 + 2 + 1$$

$$S1+S2 = (n+1) + (n-1+2) + (n-2+3) + \dots + (n-2+3) + (n-1+2) + (n+1)$$

$$= (n+1) + (n+1) + (n+1) + \dots + (n+1) + (n+1) + (n+1)$$

$$= n * (n+1) \Rightarrow$$

$$(S1+S2)/2 = n * (n+1) / 2 \Rightarrow$$

$$\text{sum} = n * (n+1) / 2$$



Exercise

Let's start with a few problems to find the beginnings of a pattern.

1. What is the sum of the first 2 odd numbers: $1+3$?
2. What is the sum of the first 3 odd numbers: $1+3+5$?
3. What is the sum of the first 4 odd numbers: $1+3+5+7$?

Do you see a pattern emerging?

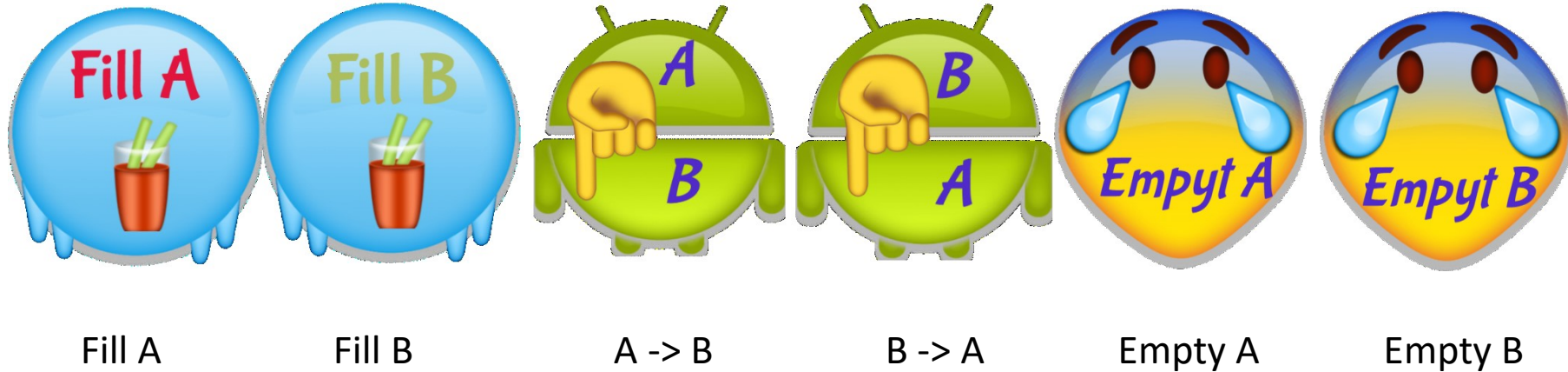
What is the sum of the first 9 odd numbers: $1+3+5+7+9+11+13+15+17$?

Exercise 9)

A dairy farmer has two containers, one of 4 liters and one of 7. What must he do so sell 5 liters of milk to a buyer?

All containers are empty at the beginning

This is a set of instructions



Do you recognize any patterns for the solution?

How many solution can you find ?

How to solve the problem

Fill A



Fill B

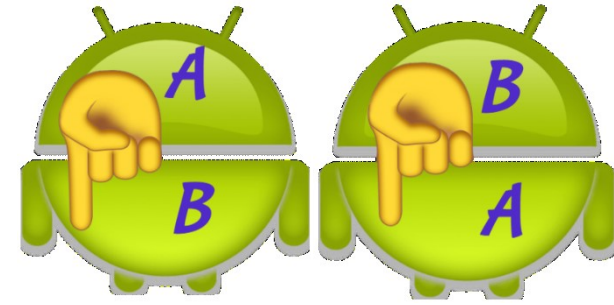
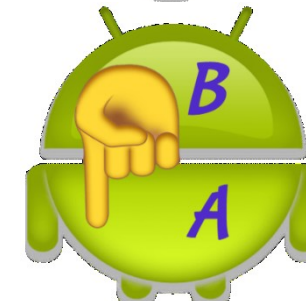


A -> B

B -> A

Empty A

Empty B

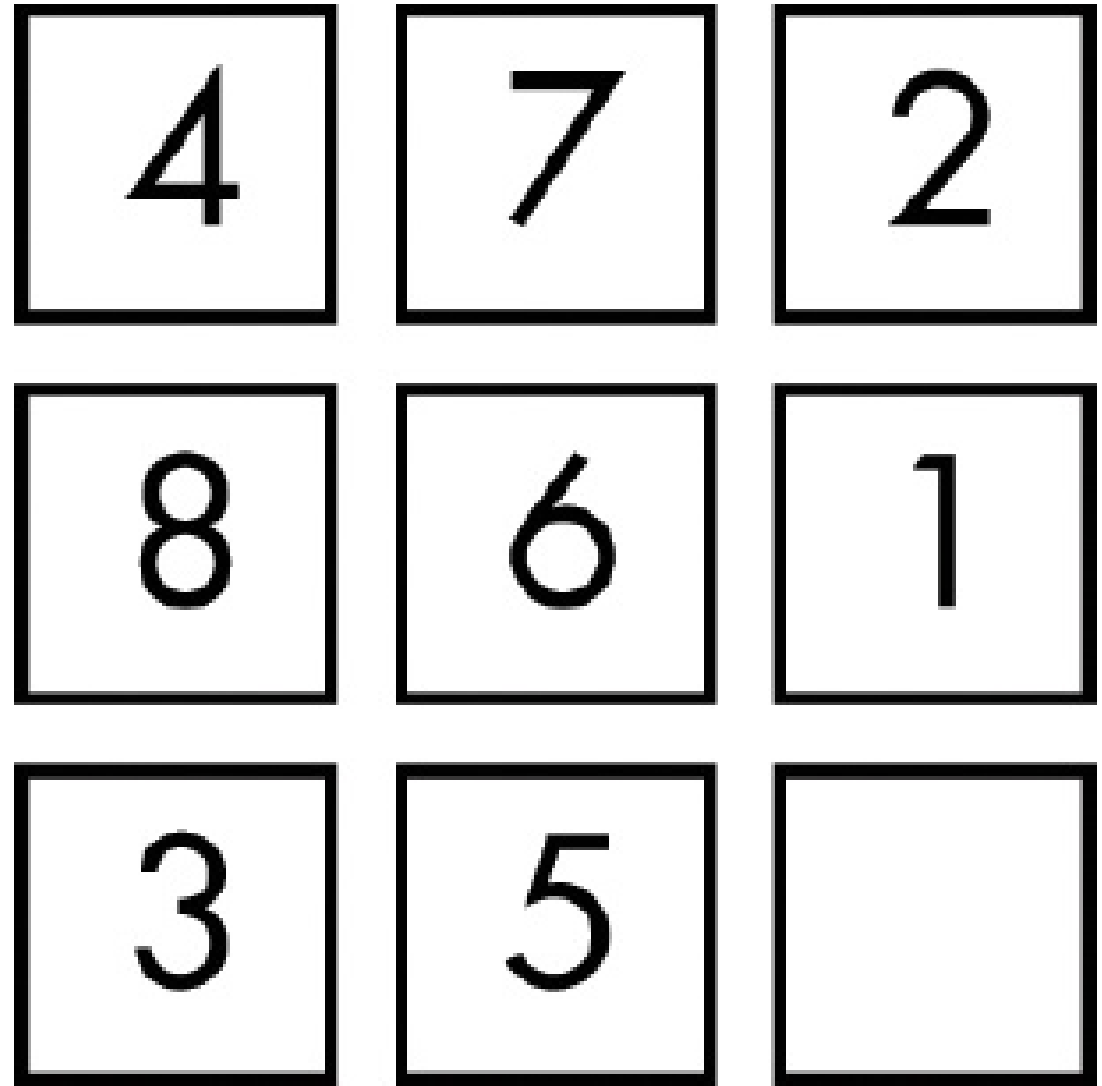


Exercise 12)

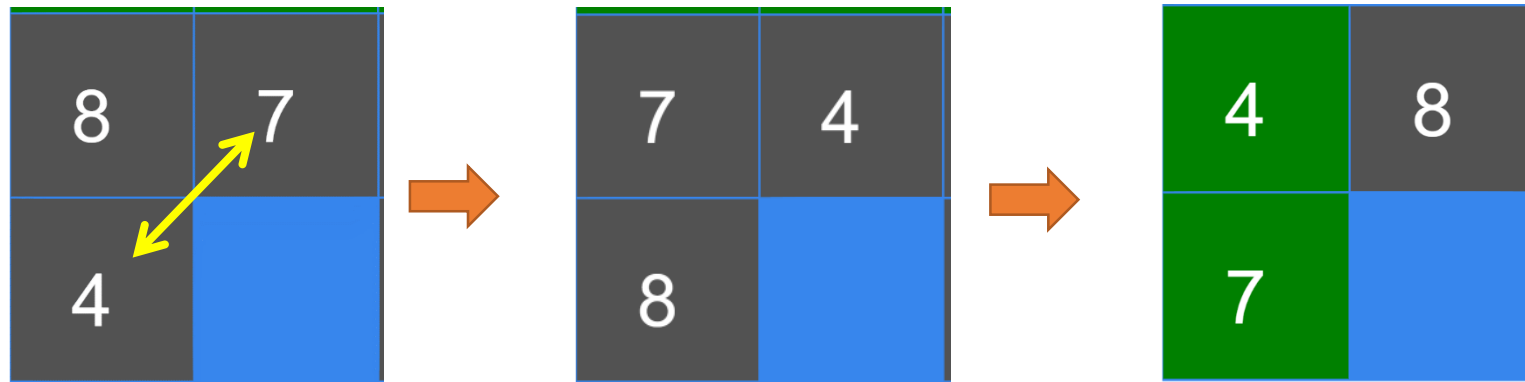
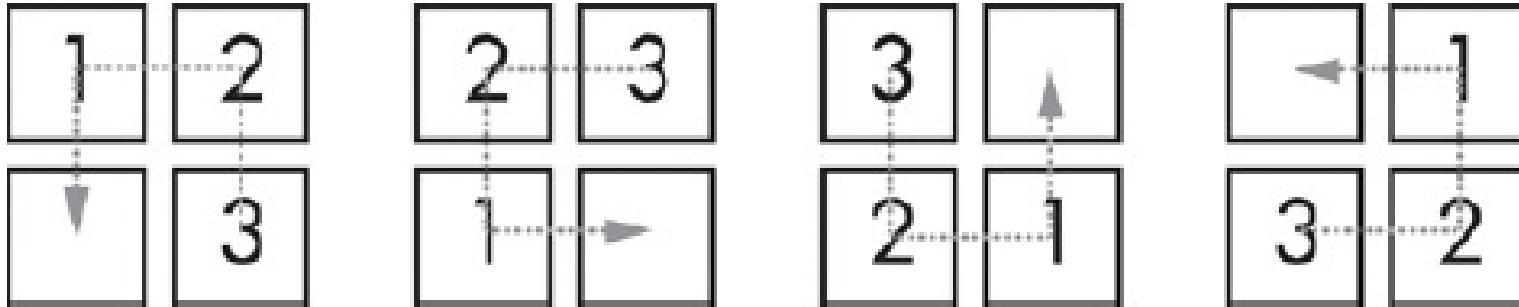
The sliding puzzle

Let's consider the puzzle for a smaller grid that is rectangular but not square.

Problem: The Sliding Puzzle 3x3



The train technique



Problem: The Sliding Puzzle 4x4

8	14	7	5
3	2	1	9
4	13	10	6
	12	11	15



13	9
12	



9	12
13	

A red flag on a silver pin is stuck into a map of a city street grid. The flag is positioned in the upper left quadrant of the map, and the pin is stuck into a green area representing a park or field. The map shows a dense network of streets and some green spaces.

End of Presentation

Asset yourself

<https://quizizz.com/join/quiz/63d010ce5eec7d001edf4d11/start>