



Computational Thinking?

Session-1



Were you able to finish pre-class work for Computational Thinking?



Students choose an option

Today's Topics



- ▶ What is Computational Thinking?
- ▶ Decomposition
- ▶ Pattern Recognition
- ▶ Algorithms
- ▶ Abstraction

What is Computational Thinking?



Let's try to predict and discuss!

Come with an explanation in 8 minutes.





What is Computational Thinking?



Computational thinking is:

- Logical thinking
- Critical thinking
- Problem solving

If a problem is too hard, what should you try to do?



Pear Deck



Students, write your response!

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Some Questions to Think About Before Starting

If you find similarities in lots of solutions to different problems what does that probably tell you?

If you have a problem that is just a little different from a problem that you have a solution for, what would you do?



What is Computational Thinking?



Computational thinking is:

- Organising data/information logically (Abstraction)
- Breaking problems into parts (Decomposition)
- Interpreting patterns and models (Pattern Recognition)
- Designing and implementing algorithms (Algorithms)

What is programming?



Pear Deck



Students, write your response!

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What is Computational Thinking?



Computational Thinking is the must step between having a problem and having a solution to that problem.

Computational Thinking aims to teach how to form a solution such that can be programmed into a computer.

**programming
= algorithms
+ coding**

Architects or Bricklayers



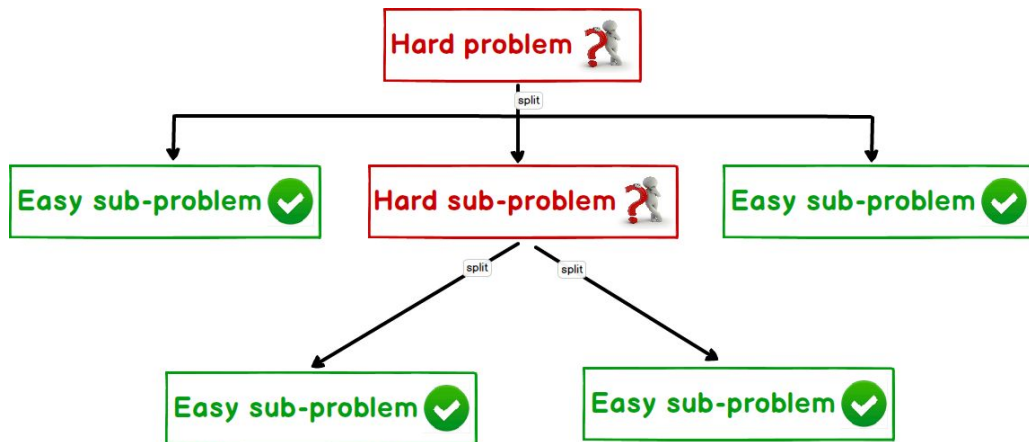
Four pillars of Computational Thinking

- ▶ Decomposition
- ▶ Pattern Recognition
- ▶ Abstraction
- ▶ Algorithm Design



Decomposition

It basically means breaking a problem into smaller pieces.



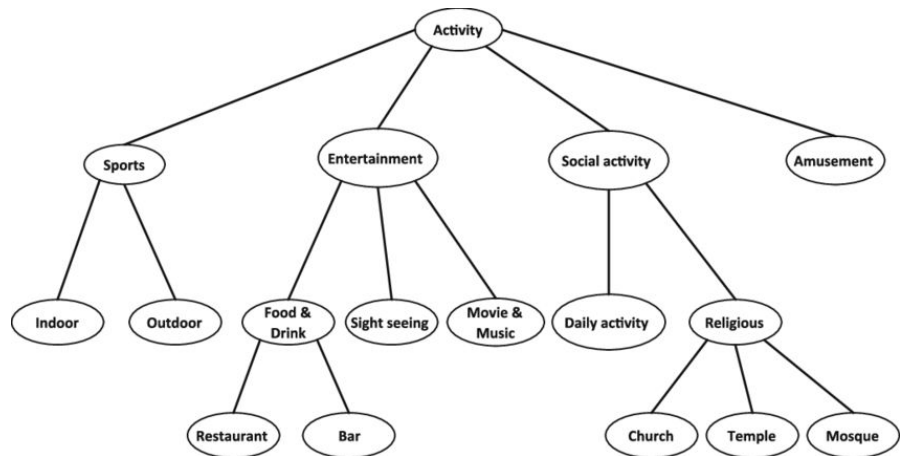
Let's think of some examples of decomposition!



Decomposition

We use **tree structures** to visualize decomposition

- ▶ Tree structures help us decompose problems into sub-problems.
- ▶ It consists of blocks connected by branches.
- ▶ Each block that is connected to its parent block which is above it, represents a sub problem of that block.





Making A Chocolate Cake



Challenge



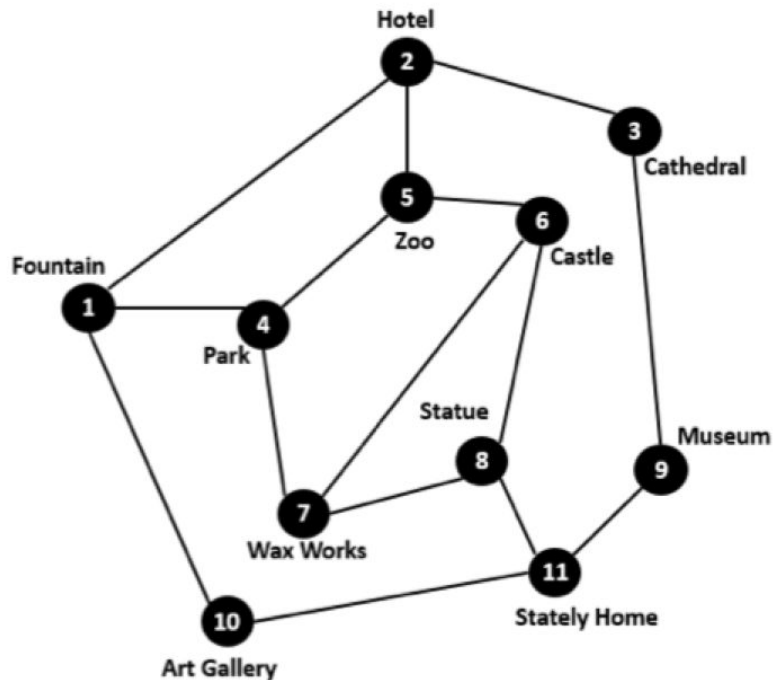
add all the numbers from 1 to 200

- ▶ Big problem?
- ▶ Did you try?
- ▶ A lot to do in your head?



Decomposition Challenge

You are a tour guide. Tourists have booked a tour visiting all the city's attractions starting from the hotel they are staying in. This map shows where the attractions are and roads that connect them. You must work out a route that takes your tour group to every tourist site. The tourists will not be happy if they pass through the same place twice. They also want to end up back at their hotel that evening.



Students, write your response!

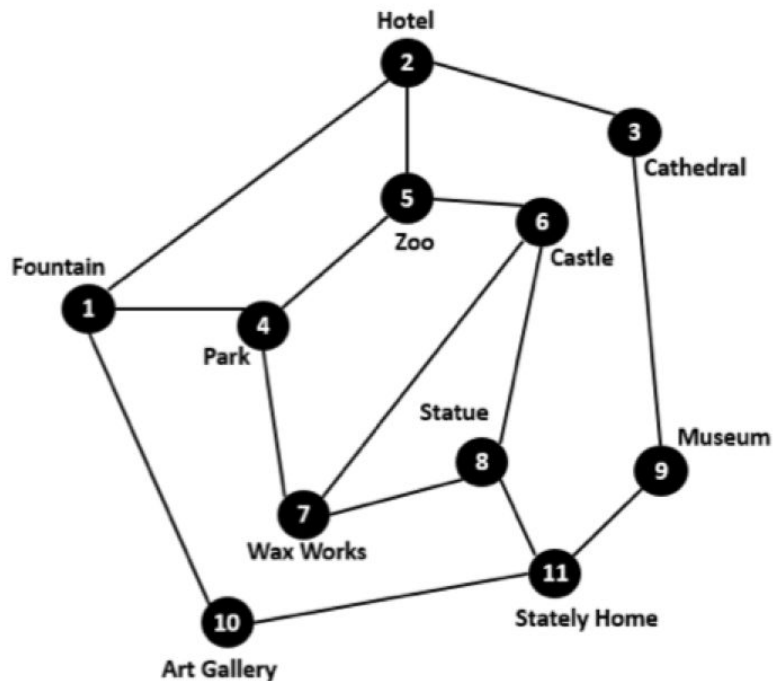
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Decomposition Challenge

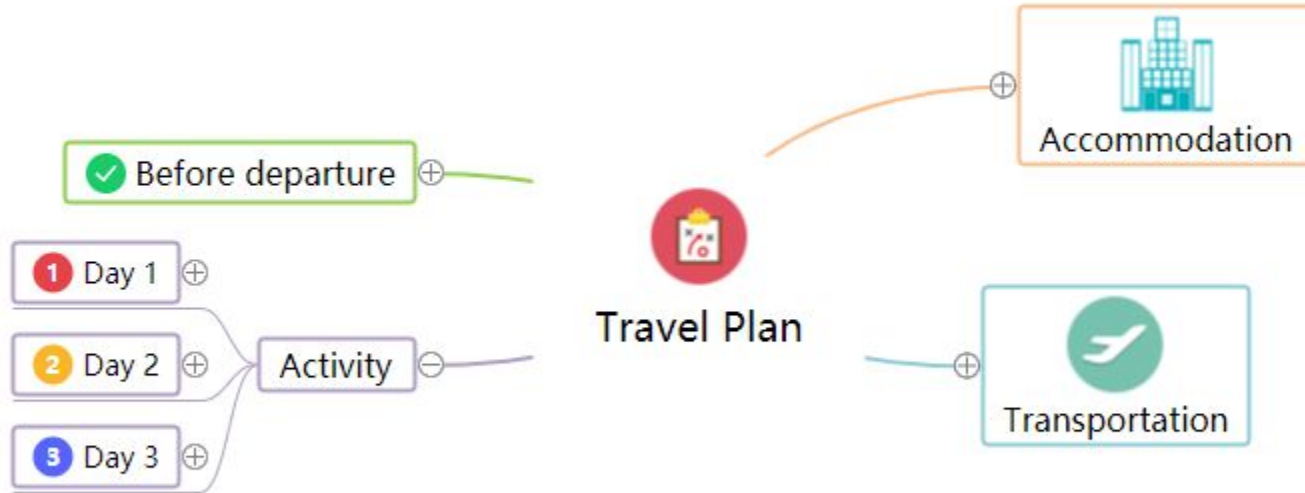
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2, 3, 9, 11, 10, 1, 4, 7, 8, 6, 5, 2

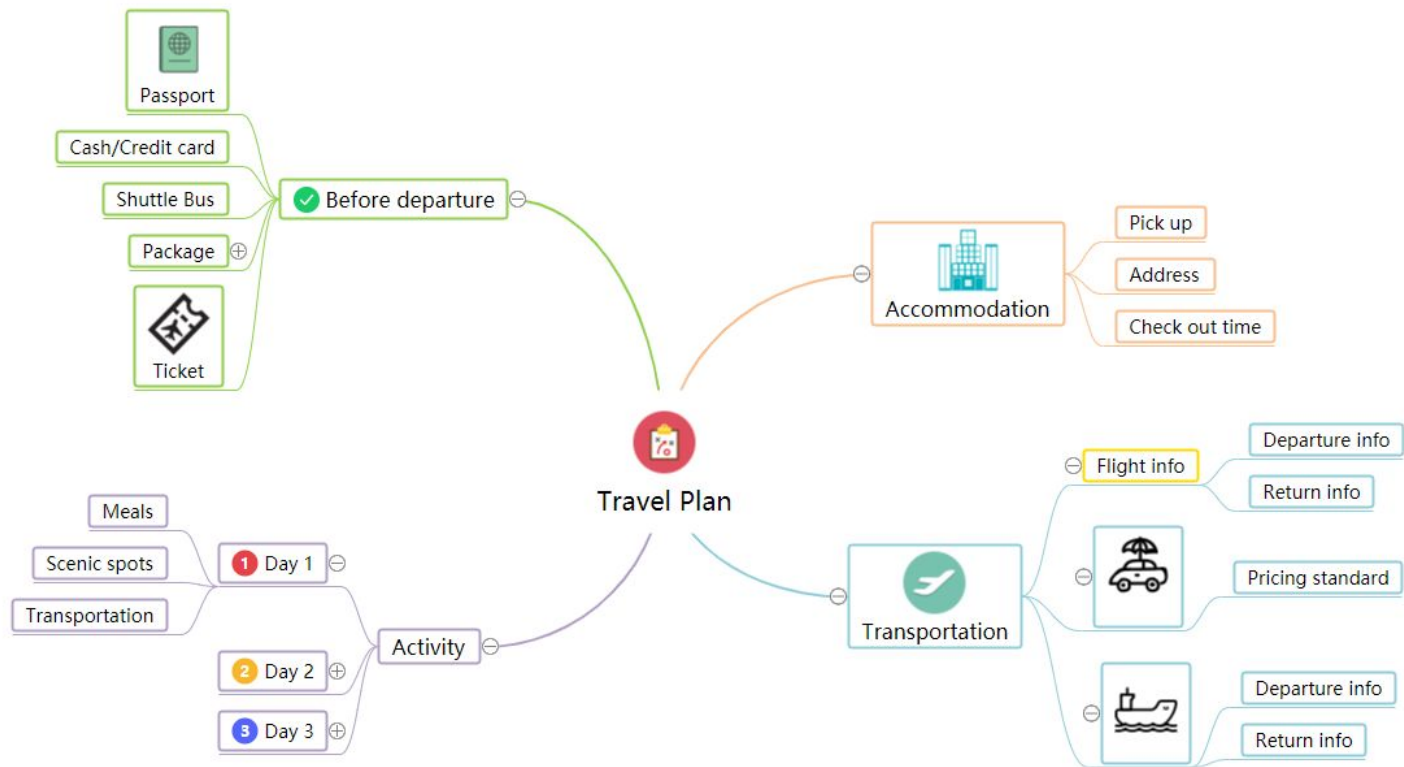


Preparing Vacation Plan

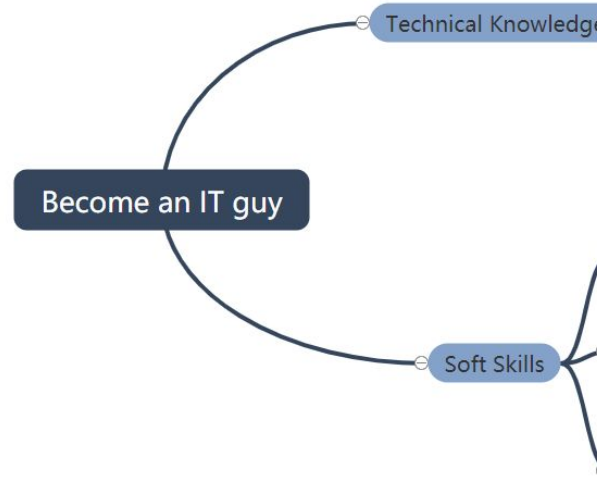




Preparing Vacation Plan

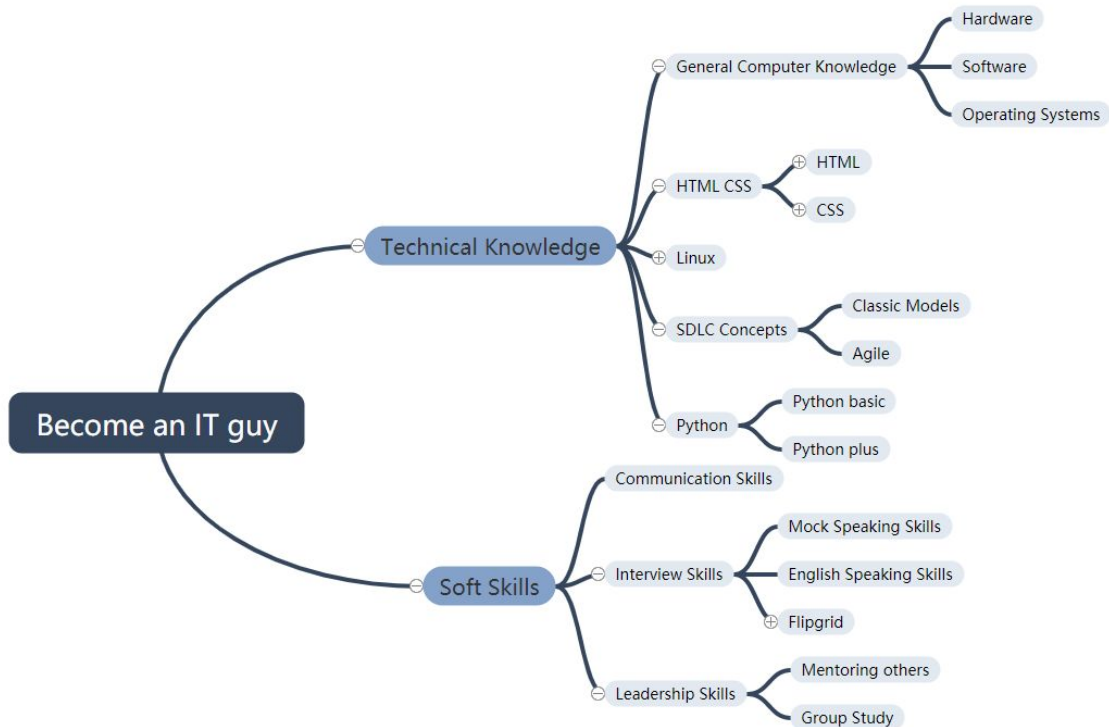


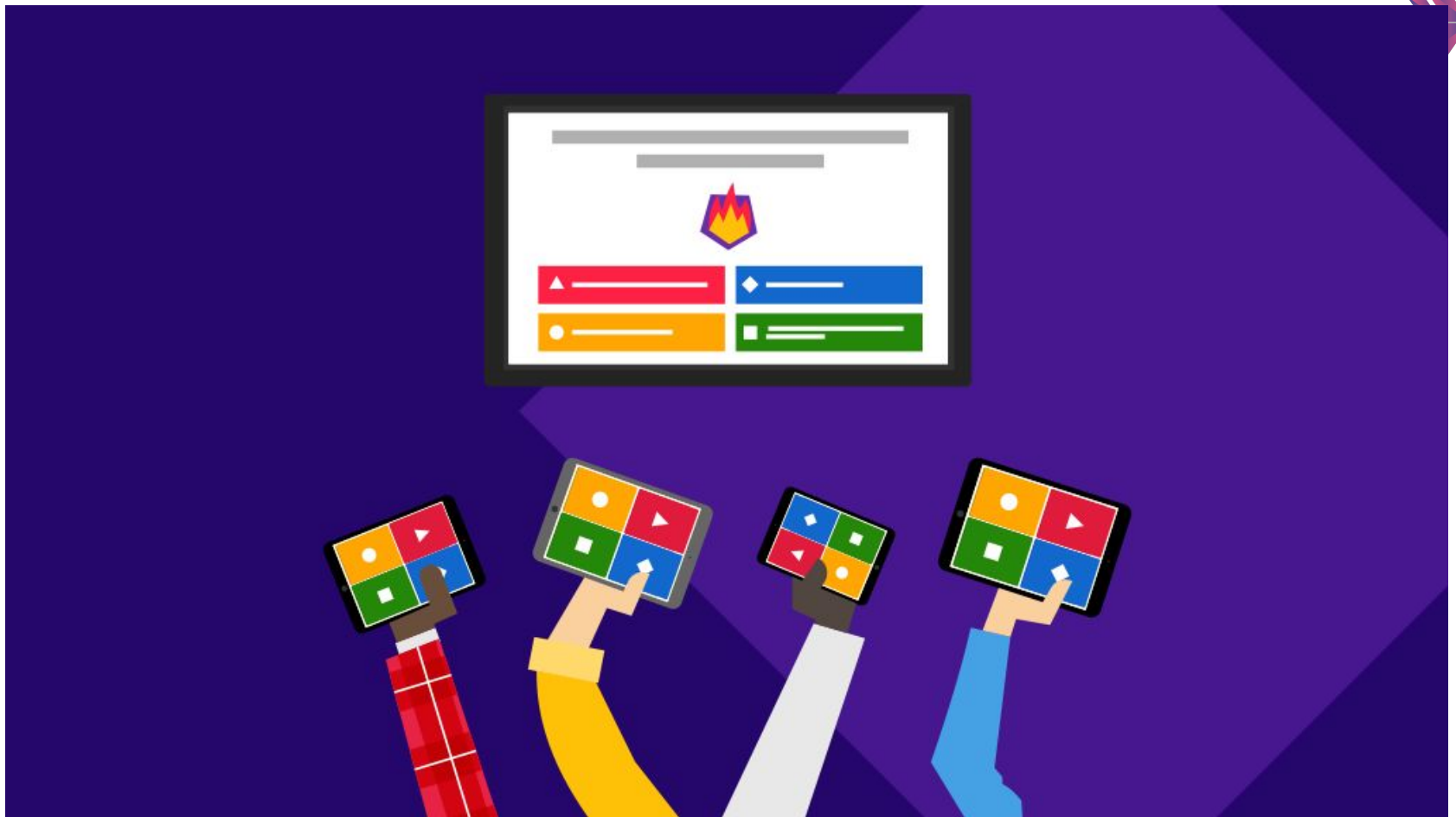
Let's decompose what you're doing right now?





Challenge

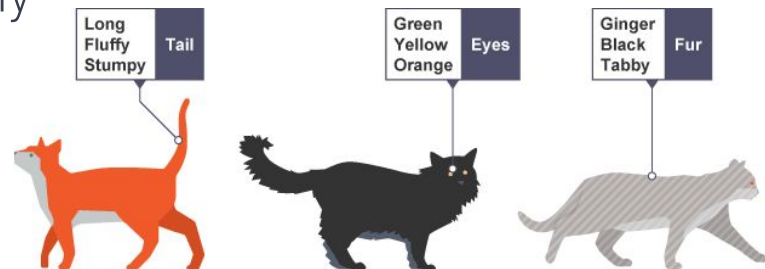






► Pattern Recognition

Pattern recognition is recognising patterns in different things (solutions) and being able to apply these patterns in the solutions of other similar problems.



Pattern recognition is good because we don't have to come up with a new solution each time we encounter the same problem. Instead, we apply the patterns that we have previously recognized.



Pattern Recognition Exercises



Look at the following number patterns and find the sequence.

1 2 5 10 17 ?





Pattern Recognition Exercises



Look at the following number patterns and find the sequence.

123 117 108 99 ?



Students choose an option

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Pattern Recognition Exercises



Look at the following number patterns and find the sequence.

849 352 768 493 527 ?





Pattern Recognition Exercises



Look at the following number patterns and find the sequence.

12 48 163 26 412 ????



Students, write your response!

REINVENT YOURSELF

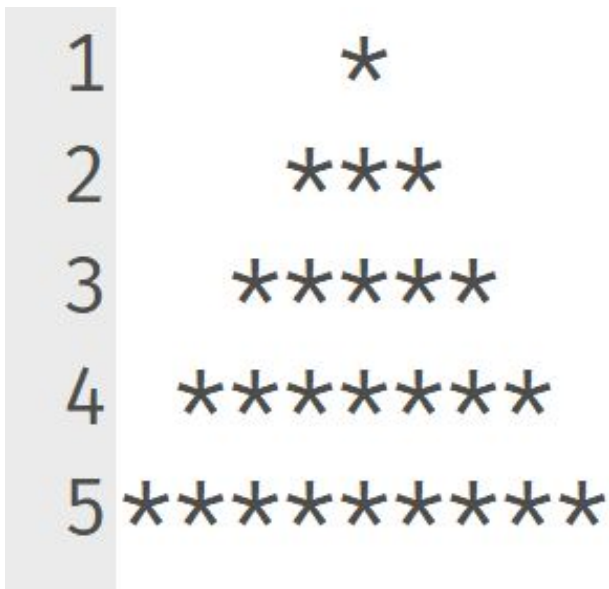
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Pattern Recognition Exercises

Look at the following number patterns and find the sequence.



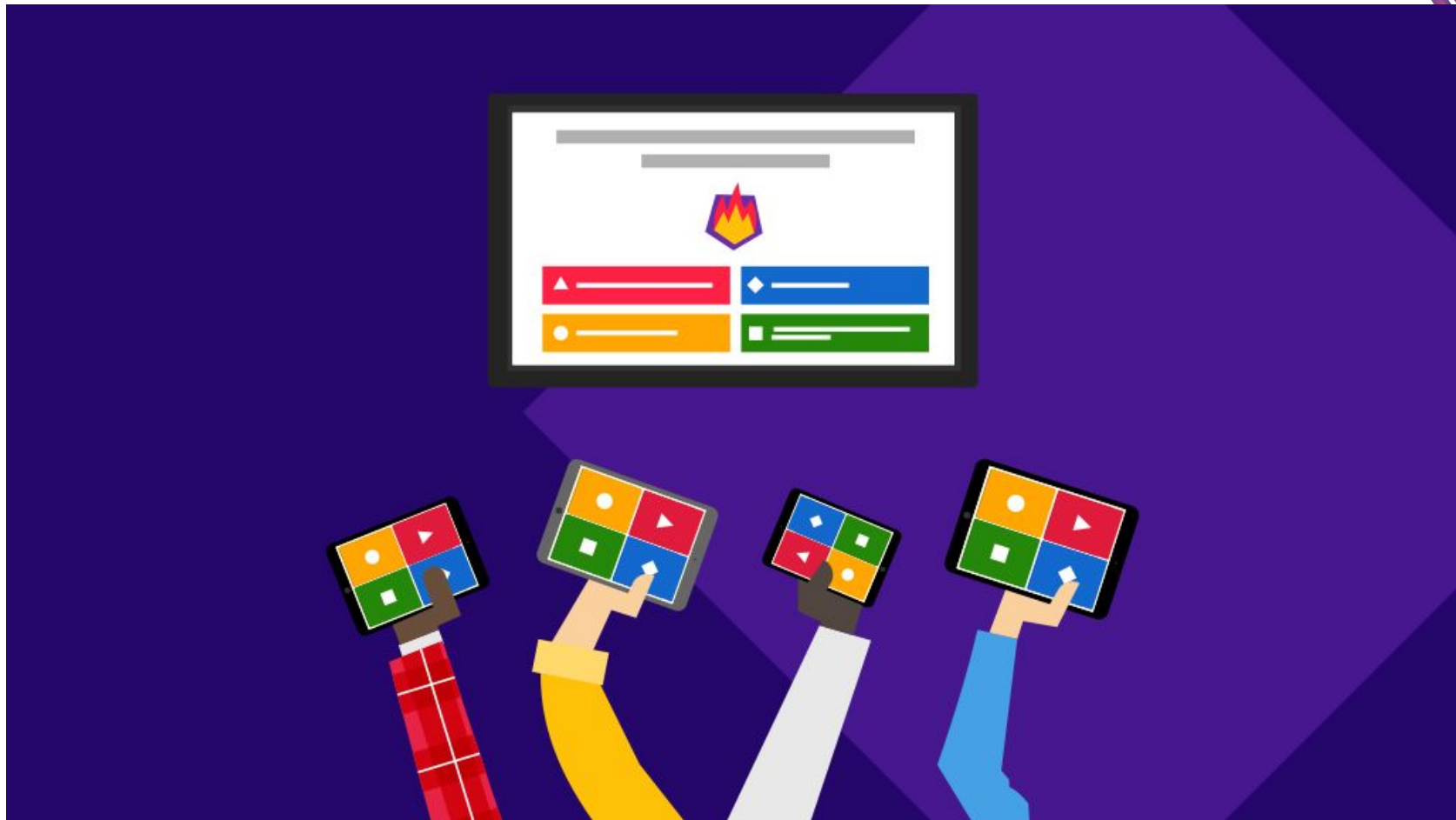
Students, write your response!

REINVENT YOURSELF



4

Algorithm Design





Brief Explanation of Algorithm

- ▶ An algorithm is a sequence of clearly defined steps to describe a process.
- ▶ Algorithms are useful when we wish to explain someone else or a computer how to carry out steps.
- ▶ Algorithms are important for programming because a correct algorithm is the ultimate basis of any computer-based solution.

Let's brew a coffee



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THANKS!

Any questions?

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