9

SELF-LEARNING PACKAGE IN

ICT 9

Quarter 1 | Week 2

Elements of Computational Thinking

Learning Competency:

Identify the elements of computational thinking skills
(SSP_TLE-CT8CP -IIa-c-2.1)

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WRITERS

Ready to Launch!

In the previous lesson, you have been aware on the importance of computational thinking and how do we apply it in our day to day activity particularly in solving complex problems.

Computational thinking involves breaking a problem down into its parts, deciding which parts are important and which aren't, looking for patterns that can help solve the problem and then creating a series of steps to solve the problem. These techniques are called Decomposition, Abstraction, Pattern Recognition and Creating an Algorithm.

In this lesson, you'll understand the elements of computational thinking.

Aim at the Target!

At the end of this module you are expected to:

1. *Identify each elements of computational thinking.*

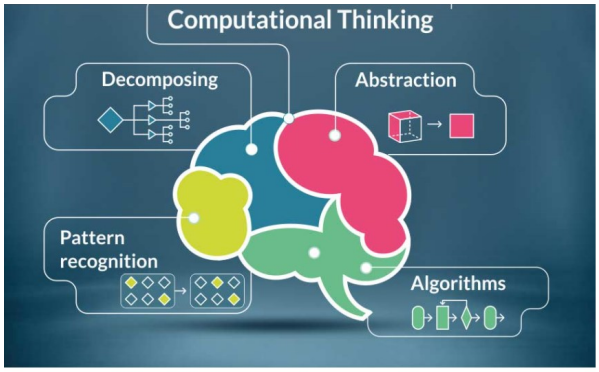
Try This!

Activity 1. Unscramble the following words.

WORD	CLUE	ANSWER
CWFTOLAHR	Making steps or rules.	
NDOEICTOIMSPO	Breaking down into parts.	
TNAPERT NROEICTOING	Spotting and using similarities.	
BNAOITCTARS	Removing unnecessary details.	
LCOANMPOIUA ITGNKINH	Problem-solving methods that involve expressing problems and their solutions	

Keep This in Mind!

There are four elements of Computational thinking as shown in the picture. Each element is as important as the others. They are like legs on a table - if one leg is missing, the table will probably collapse.

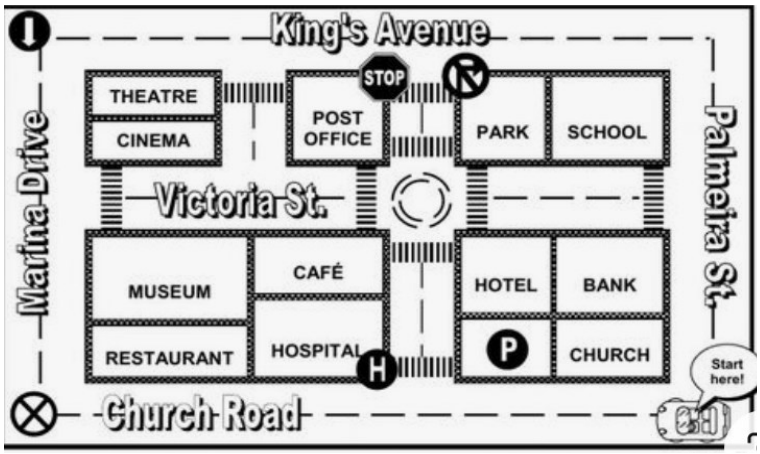


Activity 2. Finding similarities

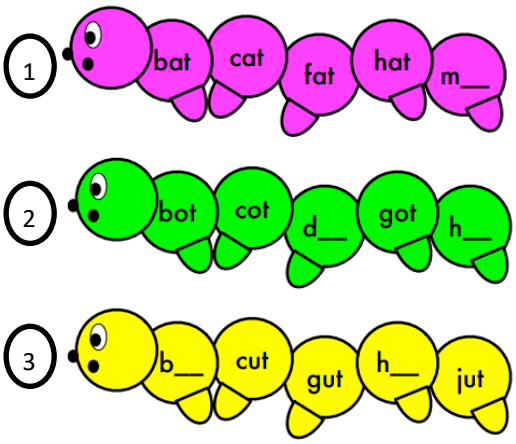
I Complete the conversation using the words in the box. Look at the Map as your guide.

On	**straight**	**past**	**left**	**next to**
Turn	**behind**	**up**	**in front of**	**right**
Left	**opposite**	**near**		

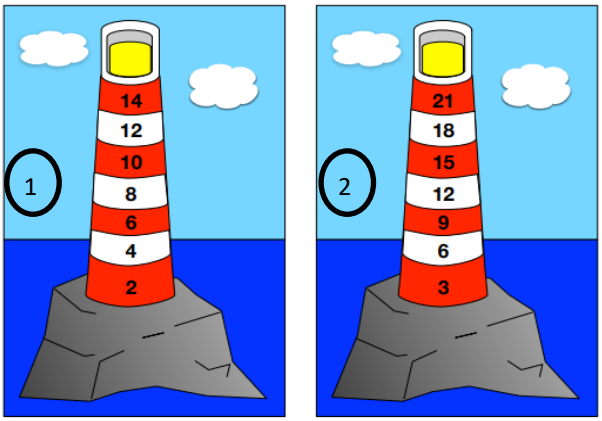
" Excuse me! Could you tell me the way to the cinema?"
"Yes, certainly. Go (1) _____ ahead until the end of this street, and turn (2) _____. Go (3)_____ the restaurant and the museum and (4)_____ right into Victoria Street. The cinema is (5)_____the museum. (6) _____ the theatre.
"Thank you so much!"
"You're welcome!"



II. complete the words to complete the pattern.



III. Identify the number that continues the pattern



Analysis.

1. Explain in detail how were you able to provide solutions to the problem in the activity.
   I.
   II.
   III.

Abstraction and Generalization

Element of Computational Thinking

1. **Decomposition**

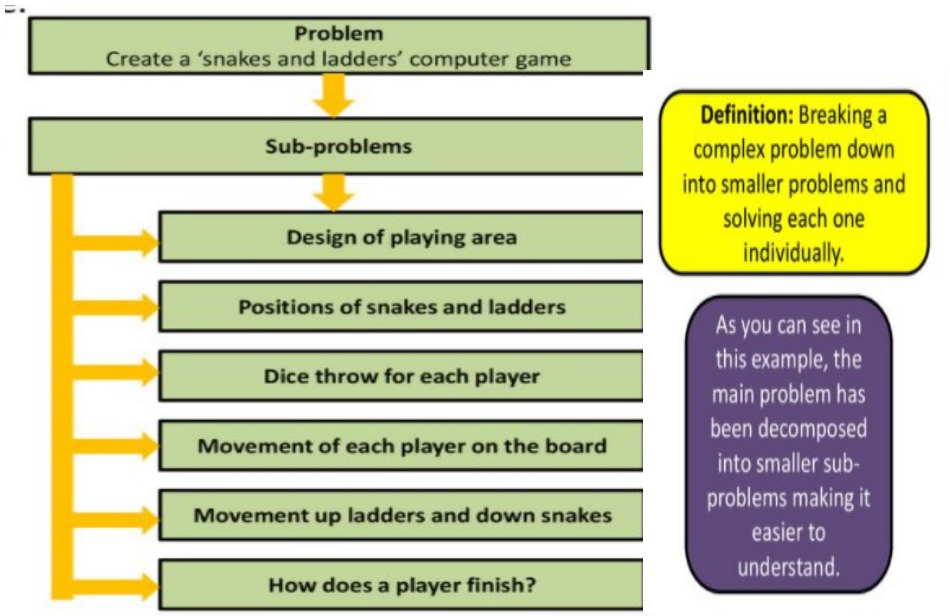
- Decomposition means breaking down a complicated problem into its components and working on one component at a time.
- Decomposition (sometimes called deconstruction) is the process of breaking down ideas or objects into smaller pieces. Whereas a system may be made of moving parts, decomposition looks at each of those parts individually. Sometimes decomposition can act as an iterative process, with something being broken down into parts, then subparts, then sub-subparts and so on.

Example 1: You want to go to the cinema. How will you breakdown the problem into smaller ones?

This is how we breakdown the problem into sub problems:

- What films are out now?
- Which film genres interest to you?
- What time will the be film be shown?
- How will you get to the cinema?
- Do you have enough money on you for a ticket?

Example 2.



2. Pattern and Recognition

- Recognizing which part are the same and the various attributes we can define them.
- Observe patterns and trends in data.
- During pattern recognition in computational thinking, you learn to recognize trends and similarities. Supposed, you successfully finished a project and you want to consider doing another project. What will you consider then? Probably you might contemplate on these questions? What worked successfully last time you ran into a problem? What didn't work? If you have run into this problem before, what did you learn that worked well or didn't work that you can apply to this situation?

Example 1:

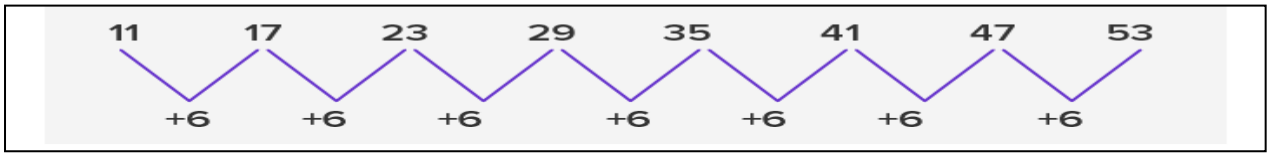
Your football team are playing your arch rivals this weekend. What tactics will you use?

- What tactics worked well last time you played them?
- What tactics didn't work so well against them?
- Who are their best players?
- Our point shooting guard is fast and skilful, but short. Should I cross the ball in high or play it on the ground?

Example 2:

What is the pattern of the following sequence of numbers?

11, 17, 23, 29, 35, 41, 53



In this pattern, we see that every term in the sequence has grown or increased by 6 or the difference between any two consecutive numbers is 6. So, we can get the next term by adding 6 to the previous.

3. **Algorithm**

- Computational thinking also encompasses algorithm design, which is a step-by-step process for solving problems. Think of an algorithm as being like a recipe: very specific, measured ingredients combined in a clearly defined order.

Example 1:

Procedure for giving a direction from school going home.

Step 1: From school

Step 2: Walk for half kilometer , to reach the Qatar Street.

Step 3: From the Qatar street, walk straight ahead, and turn left .

Step 4. Cross the road and walk for 2 minutes towards right.

Step 5. Reach home

Example2. Compute for the perimeter and area of a rectangle.

Algorithm:

Step 1: Get the length of the rectangle

Step 2: Get the width of the rectangle

Step 3. Compute for perimeter of the rectangle

Perimeter = 2 x (L + W)

Step 4. Compute for area of the rectangle

Area = length x width

Step 5: Display the result perimeter and area

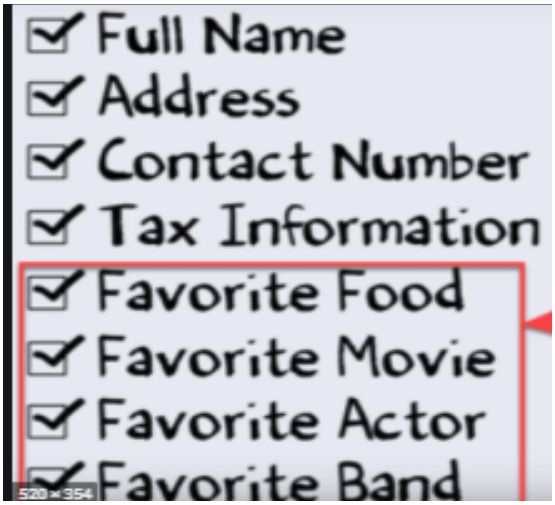
4. Abstraction.

- Is the art of taking the details out of a problem so that you can make a solution work for many different things.
- Abstraction is about focusing on the most relevant aspects of a problem, ignoring what is unnecessary.

Example 1:

You have been asked to draw a cat. Your image must be representative of all types of cats. To draw a basic cat, we do need to know that it has a tail, fur and eyes. These characteristics are relevant. We don't need to know what sound a cat makes or that it likes fish. These characteristics are irrelevant and be filtered out.

Example 2.



Application:

Activity 3. Identify and describe each elements of computational thinking as shown by the figures below.

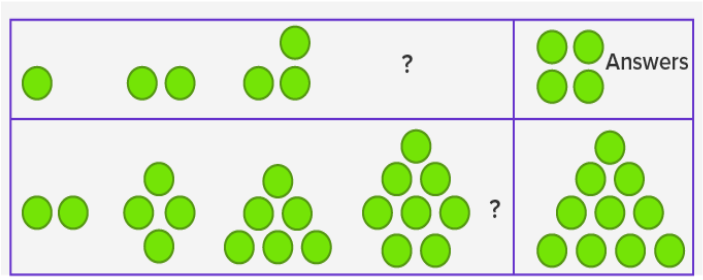


Figure 1

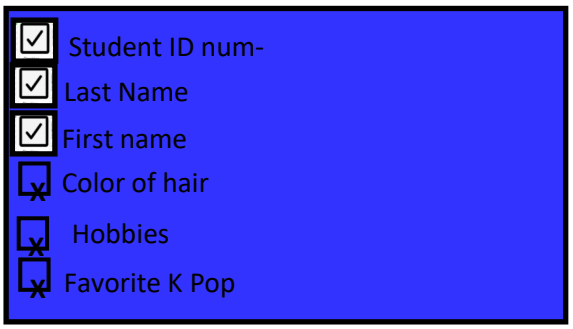


Figure 2

1. reheat oven t0 350 Fahrenheit
2. Add the vanilla, sugar, brown sugar, eggs, and butter to a bowl.
3. Whisk flour, salt, and baking soda into another bowl.
4. Mix dry and wet ingredients until fully blended, without over-mixing.
5. Apply cooking spray to a pan so that the cookies won't stick to the baking pan.
6. Take a small quantity of your cookie dough and roll it in you hands into a ball shape.
7. Take a small quantity of your cookie dough and roll it in you hands into a ball shape.
8. Flatten each cookie dough ball with a fork.
9. Put cookies in the oven for about 8-10 minutes.
10. Take the cookies out of the oven and let them sit on a wire cooling rack for about 15 minutes to cool.

Figure 3

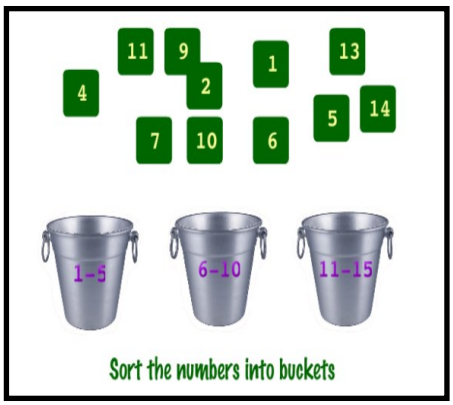


Figure 4

Reflect

Complete the statements below.

I understand _____

_____

I don't understand _____

_____

I need more information about _____

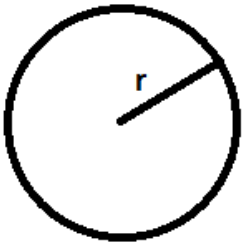
_____

Reinforcement & Enrichment

Activity 4. Read and answer each questions.

1. You have volunteered as a peer counselor in our school and you have been assigned to help your fellow students who are experiencing difficulties in their academic performance . With your knowledge in decomposition, how will you help the students in this situation?

2. Using Algorithm, show how you solve for the radius of a circle.



$A = \pi r^2$

Assess Your Learning

Direction. Read each item carefully and select the letter of your choice from the box.(items number 1-4

A. Decomposition	C. Abstraction
B. Algorithm	D. Pattern and Recognition

1. Picking out the important bits of information from the problem, ignoring the specific details that don't matter.
   A. Decomposition B. Abstraction C. Coding D. Pattern Recognition
2. Breaking a complex problem down into smaller problems and solving each one individually.
   A. Algorithm B. Pattern Recognition C. Abstraction D. Decomposition
3. Provide step-by-step process in solving problem.
   A. Coding B. Algorithm C. Computational Thinking C. Decomposition D. Abstraction

4. Shows trends and patterns in solving a problem.
   A. Pattern matching B. Pattern design C. Pattern recognition D. Pattern trends

5. Which of the following is NOT an element of computational thinking ?
   A. Decomposition B. Abstraction C. Coding D. Algorithm

References & Photo Credits

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