YEAR 7 DIGITAL TECHNOLOGIES

Computational Thinking – Algorithms

INTRODUCTION TO ALGORITHMS

What is an algorithm?

A step-by-step procedure to solve a problem.

https://youtu.be/CvSOaYi89B4

Why do we need algorithms?

A computer can't think for itself, so humans need to program or instruct the computer on what to do.

Humans program computers with algorithms, so that the computer can solve problems quickly and accurately.

WHAT DO ALGORITHMS LOOK LIKE?

Written form: Structured English

Example: Making a Cup of Tea

  Fill kettle with water and boil

  Get cup
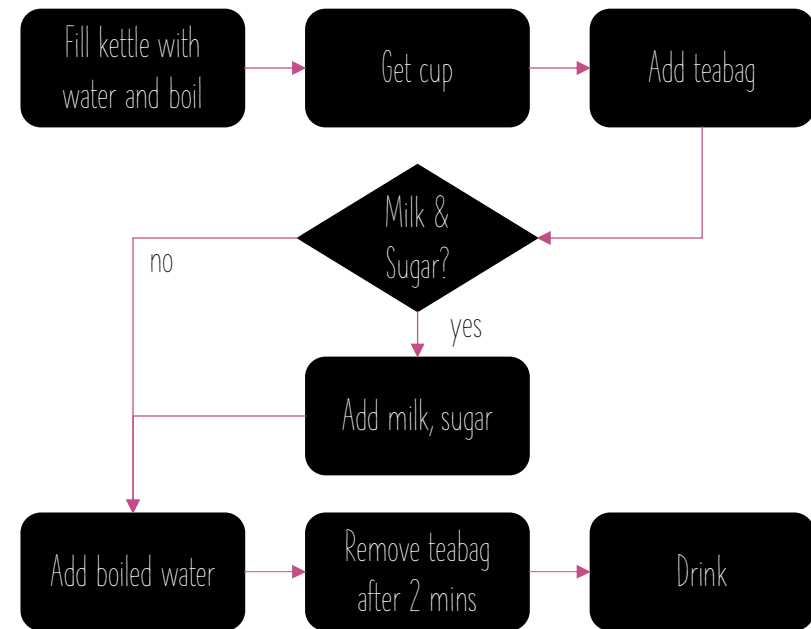
  Add teabag

  If desired, add milk, sugar to cup

  Add boiled water to cup

  After 2 minutes remove teabag

  Drink

Diagram form: Flowchart

THE THREE CONTROL STRUCTURES IN ALGORITHMS

What are control structures?

Control structures are the building blocks of an algorithm or computer program.

Sequence: The order in which the steps in an algorithm are executed. The flowchart represents sequence clearly.

Branching: This enables the problem to be solved via one path vs another, depending on conditions within the problem which the algorithm is solving. For example: If <condition> is TRUE Do <process 1> Else Do <process 2>

Iteration: This is the repetition of a step or series of steps. For example: Do <step> From N=1 To N=10.

Reference: Grover & Vinton 2017

LET'S PRACTICE CREATING AN ALGORITHM

Problem:

You work in the canteen of the local soccer club, making sandwiches. But really you have a robot make the sandwiches!

Your boss has asked you to make 12 sandwiches with specified fillings, to be made and stacked in a specific order:

- Every sandwich is buttered.
- Odd numbered sandwiches are made with white bread, ham and cheese.
- Even numbered sandwiches are made with wholegrain bread, ham and tomato.
- Every 3rd sandwich has mustard.
- Every 6th sandwich has mayonnaise.
- All sandwiches are wrapped in wax paper, placed in a sandwich bag, and stacked in the sandwich cabinet.

ANALYSE THE PROBLEM FIRST....

Can you see where we need to use SEQUENCE, BRANCHING, ITERATION?

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TIME TO PRACTICE:

Create the algorithm to solve the sandwich making problem in written form (Structured English) first.

Then we will convert the algorithm in written form into diagram form - a Flowchart.

REFERENCES

Grover & Vinton (2017)

   Digital Technologies for the Australian Curriculum: A Project Based Approach Years 7 & 8