Computational Thinking

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F-10

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VICTORIAN CURRICULUM AND ASSESSMENT AUTHORITY

VICTORIA State Government

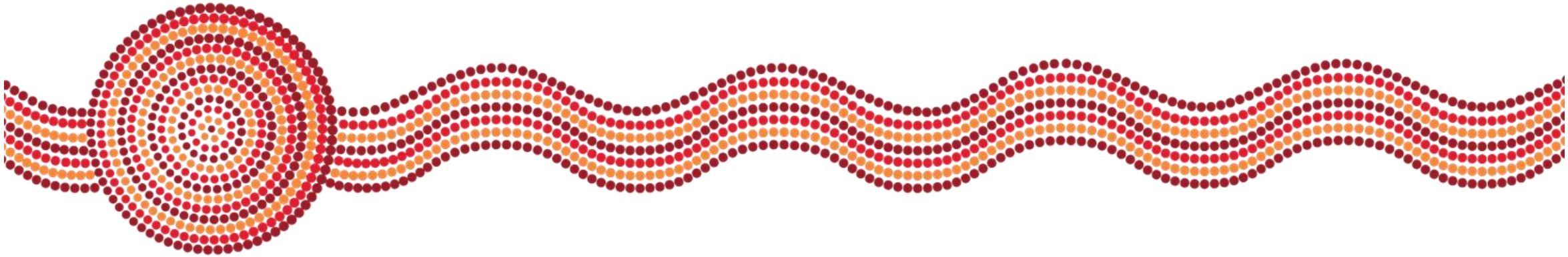
Acknowledgment of Country

I would like to acknowledge the traditional custodians of the many lands across Victoria on which each of you are living, learning and working from today.

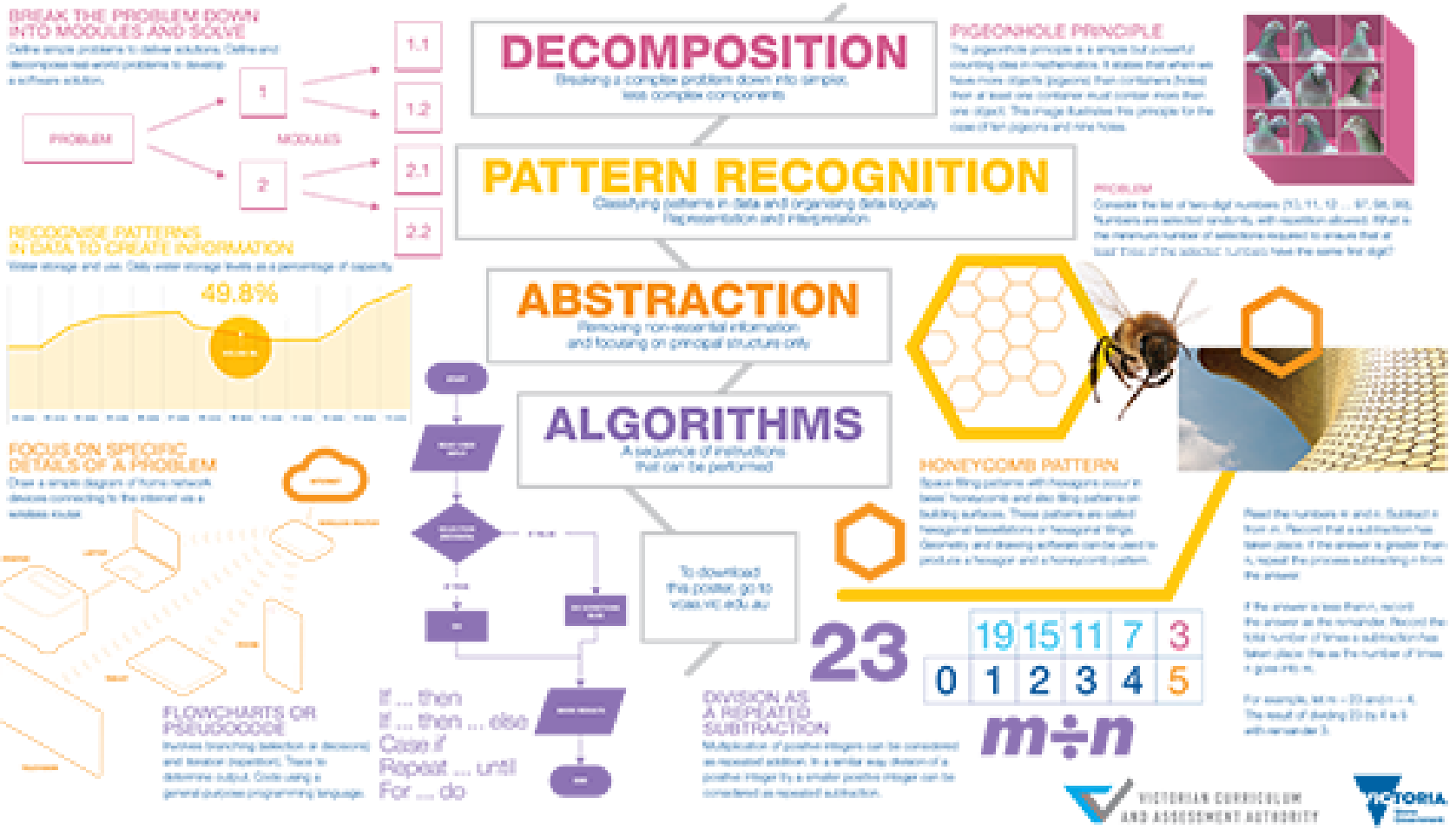
For myself and those of us in the Melbourne metropolitan area, we acknowledge the traditional custodians of the Kulin Nations.

When acknowledging country, we recognise Aboriginal and Torres Strait Islander peoples' spiritual and cultural connection to country and acknowledge their continued care of the lands and waterways over generations, while celebrating the continuation of a living culture that has a unique role in this region.

I would like to pay my respects to Elders past, present and emerging, for they hold the memories, traditions, culture and hopes of all Aboriginal and Torres Strait Islander peoples across the nation, and hope they will walk with us on our journey.



– COMPUTATIONAL THINKING –
IN THE VICTORIAN CURRICULUM
DIGITAL TECHNOLOGIES AND MATHEMATICS



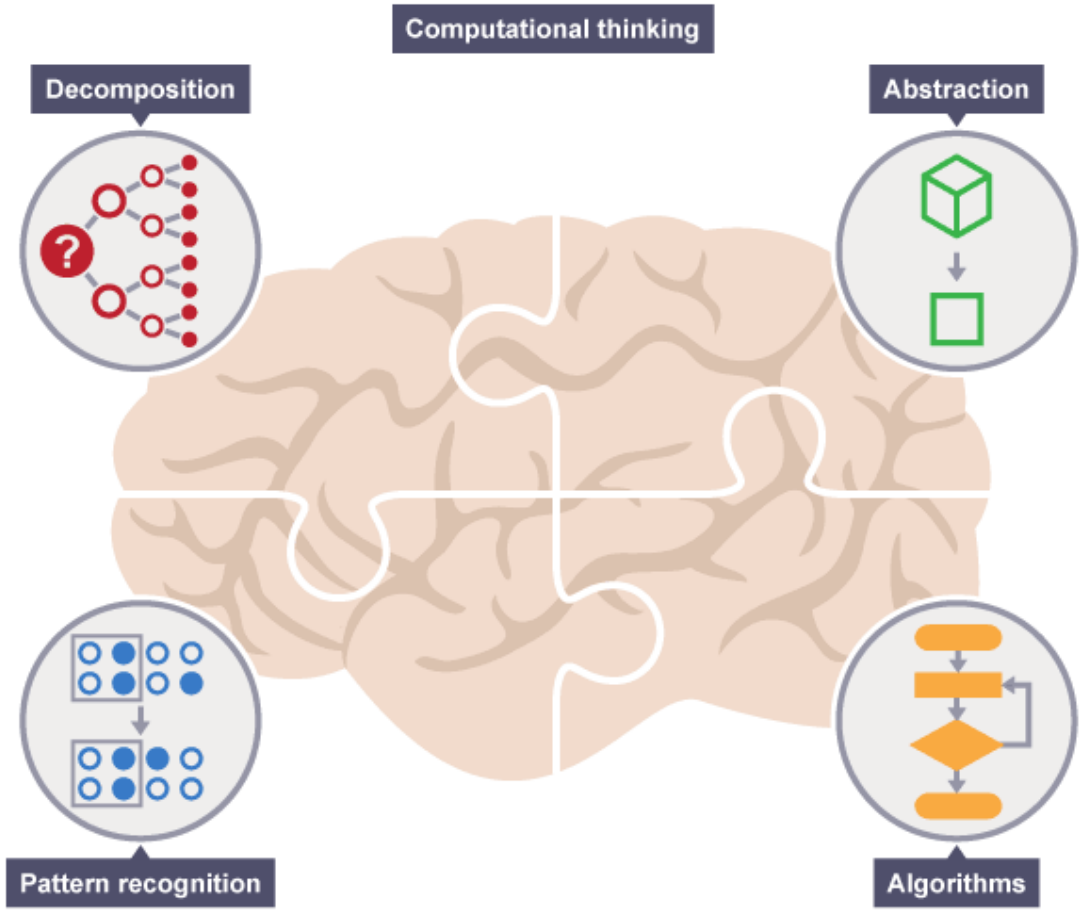
Guess the 4 Digit Number

- I am thinking of a 4 digit number
- You can only ask questions that have a yes/no answer
- Type the question into the chat and I will answer
- The aim is to use the least number of questions to discover the answer

Computational Thinking

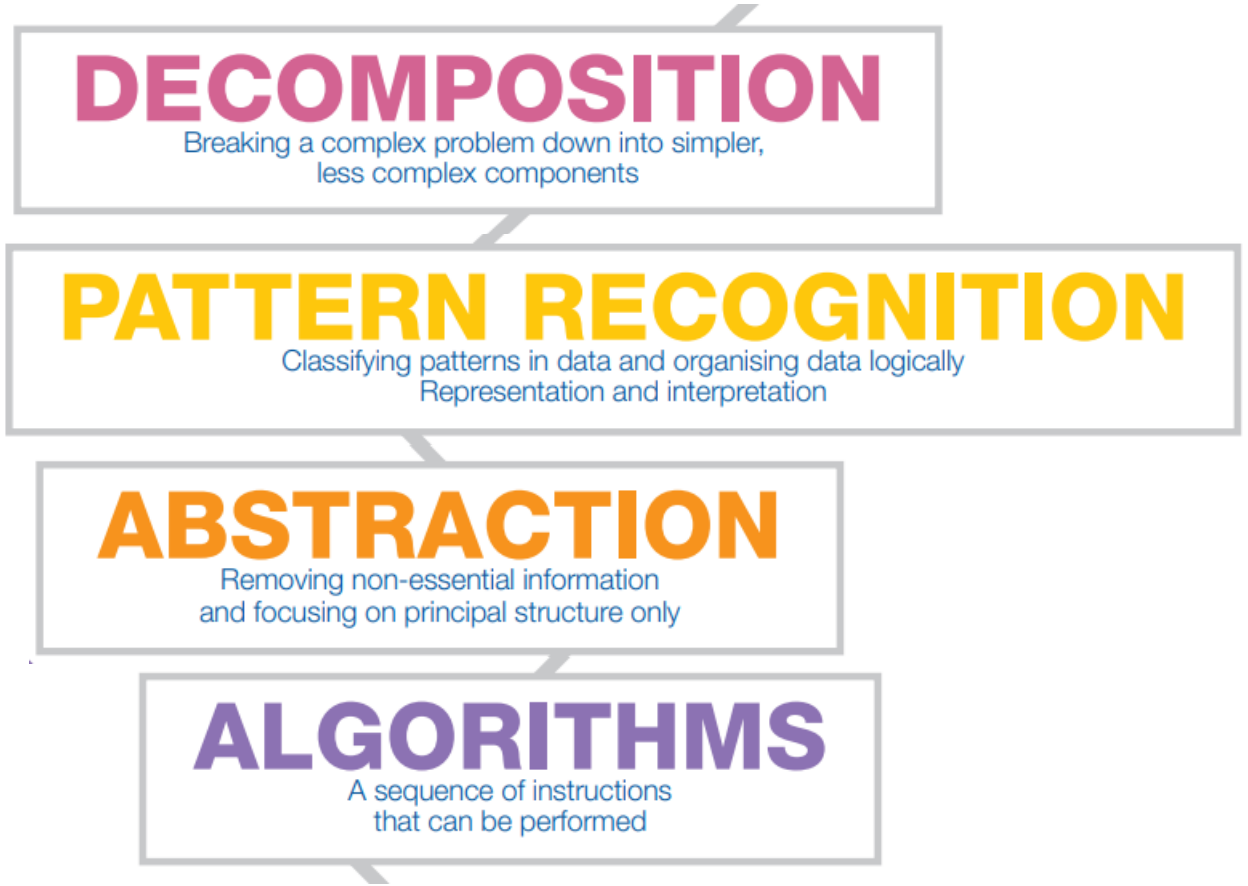
- **“is the thought processes involved in formulating a problem and expressing its solution(s) in such a way that a computer—human or machine—can effectively carry it out” - Jeannette M. Wing Professor of Computer Science at Columbia University**

Computational Thinking Techniques



Source : What is computational thinking? - Introduction to computational thinking - KS Computer Science Revision - BBC Bitesize

Computational Thinking in Practice

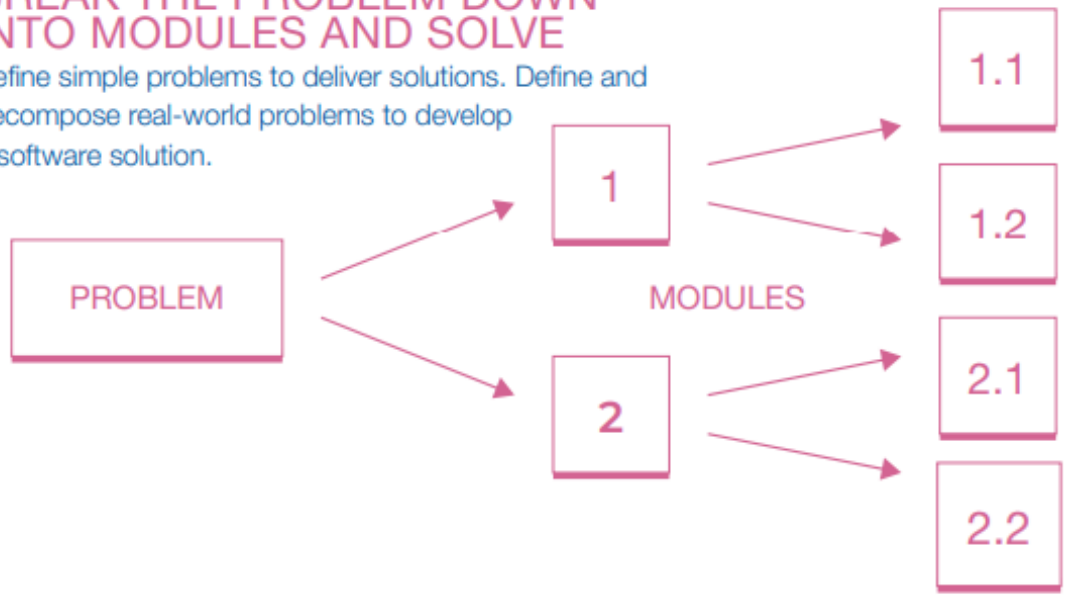


Thinking Computationally

Decomposition

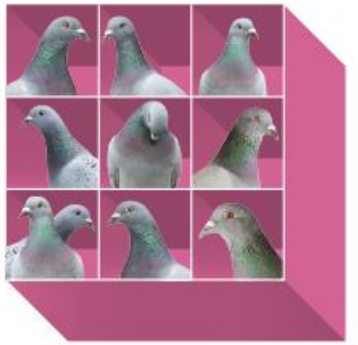
BREAK THE PROBLEM DOWN INTO MODULES AND SOLVE

Define simple problems to deliver solutions. Define and decompose real-world problems to develop a software solution.



PIGEONHOLE PRINCIPLE

The pigeonhole principle is a simple but powerful counting idea in mathematics. It states that when we have more objects (pigeons) than containers (holes) then at least one container must contain more than one object. This image illustrates this principle for the case of ten pigeons and nine holes.



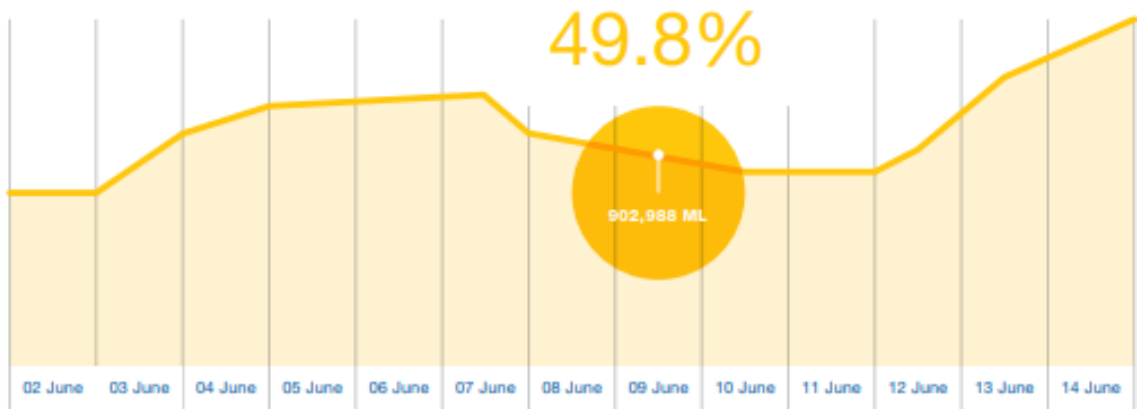
PROBLEM

Consider the list of two-digit numbers {10, 11, 12 … 97, 98, 99}. Numbers are selected randomly, with repetition allowed. What is the minimum number of selections required to ensure that at least three of the selected numbers have the same first digit?

Pattern Recognition

RECOGNISE PATTERNS IN DATA TO CREATE INFORMATION

Water storage and use. Daily water storage levels as a percentage of capacity.



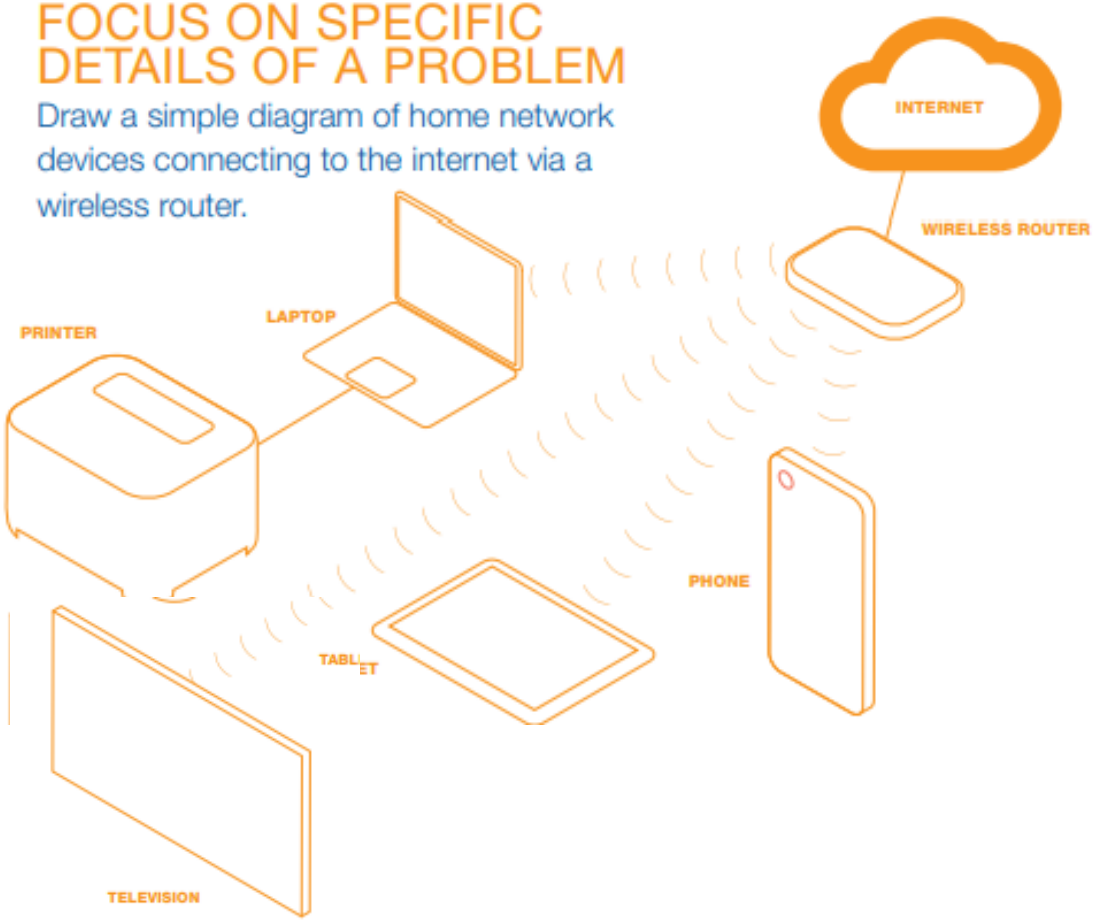
HONEYCOMB PATTERN

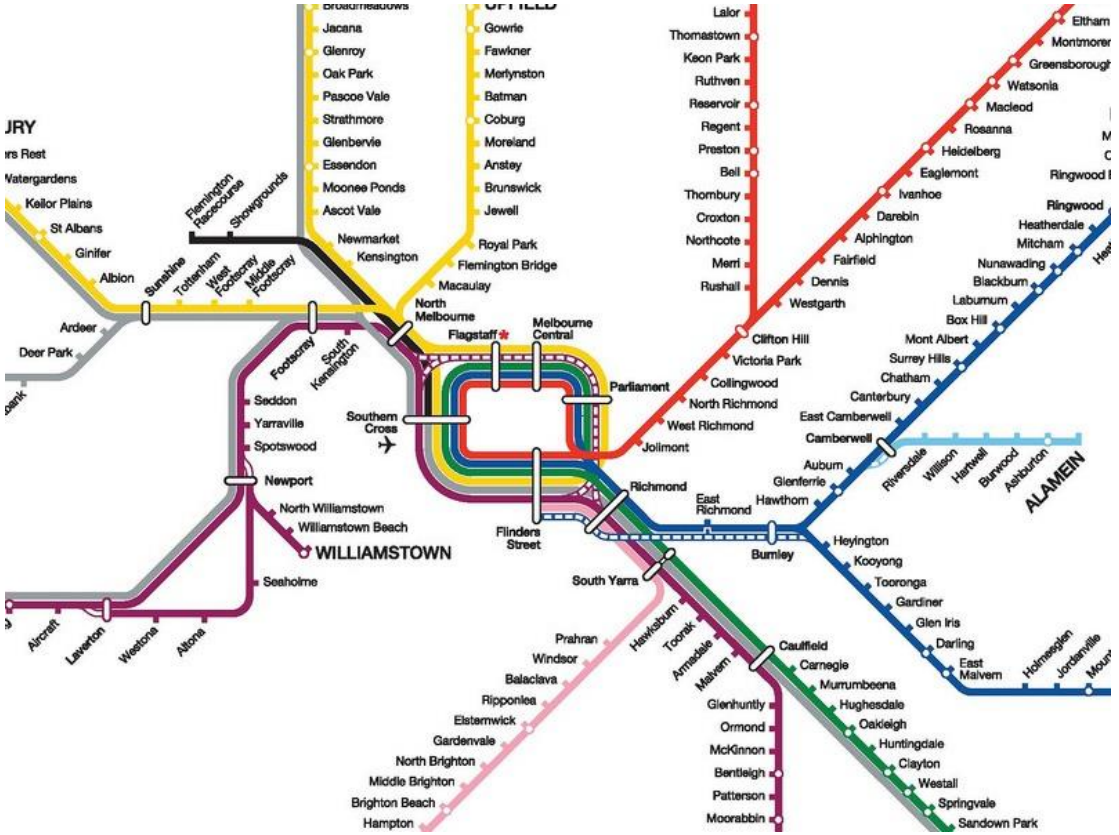
Space-filling patterns with hexagons occur in bees' honeycomb and also tiling patterns on building surfaces. These patterns are called hexagonal tessellations or hexagonal tilings. Geometry and drawing software can be used to produce a hexagon and a honeycomb pattern.

Abstraction

FOCUS ON SPECIFIC DETAILS OF A PROBLEM

Draw a simple diagram of home network devices connecting to the internet via a wireless router.



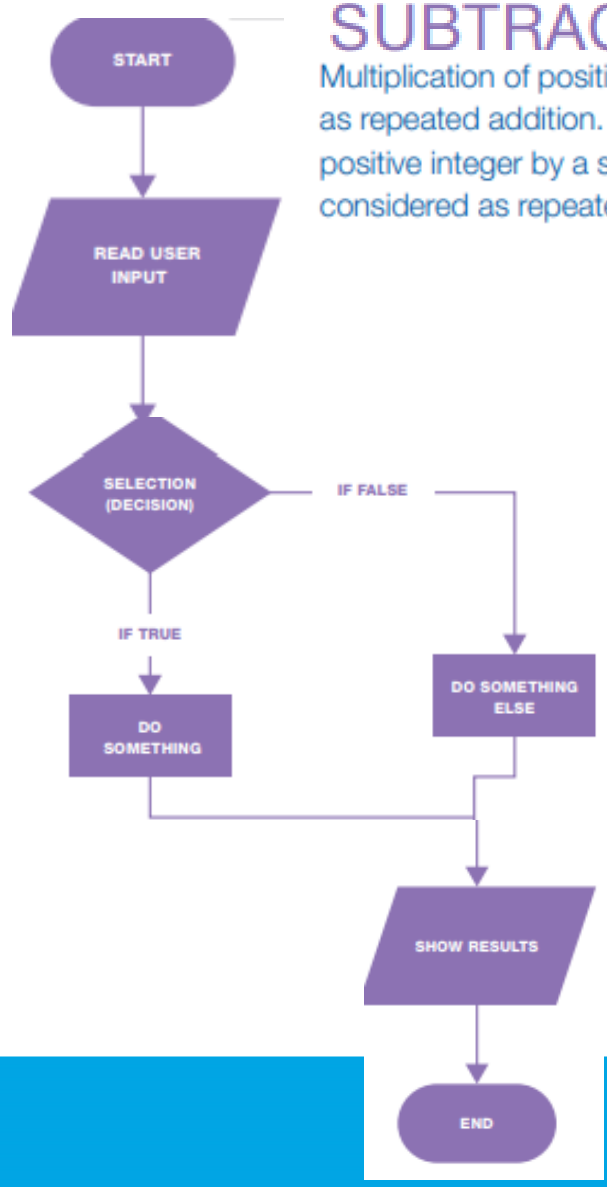


Algorithms

FLOWCHARTS OR PSEUDOCODE

Involves branching (selection or decisions) and iteration (repetition). Trace to determine output. Code using a general-purpose programming language.

If ... then
If ... then ... else
Case *if*
Repeat ... until
For ... do
While ... do



DIVISION AS A REPEATED SUBTRACTION

Multiplication of positive integers can be considered as repeated addition. In a similar way division of a positive integer by a smaller positive integer can be considered as repeated subtraction.

m ÷ n

23

	19	15	11	7	3
0	1	2	3	4	5

Read the numbers *m* and *n*. Subtract *n* from *m*. Record that a subtraction has taken place. If the answer is greater than *n*, repeat the process subtracting *n* from the answer.

If the answer is less than *n*, record the answer as the remainder. Record the total number of times a subtraction has taken place: this as the number of times *n* goes into *m*.

For example, let $m = 23$ and $n = 4$. The result of dividing 23 by 4 is 5 with remainder 3.

Unpacking the content descriptions

- Resources unpack the Victorian Curriculum F–10 Mathematics content descriptions that address computational thinking and algorithms at each level in the Patterns and algebra sub-strand of the Number and Algebra strand.
- Pages - Help me find a teaching resource (vcaa.vic.edu.au)

Sorting Algorithms

Contacts

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