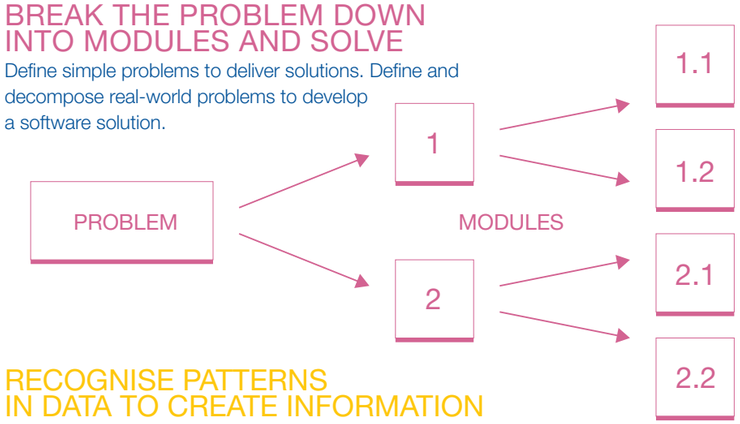
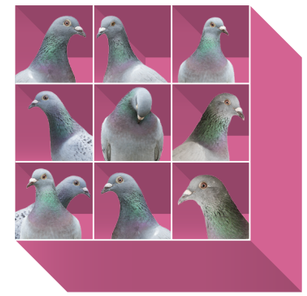
# – COMPUTATIONAL THINKING –
# IN THE VICTORIAN CURRICULUM
## DIGITAL TECHNOLOGIES AND MATHEMATICS

## DECOMPOSITION
Breaking a complex problem down into simpler, less complex components

### 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.



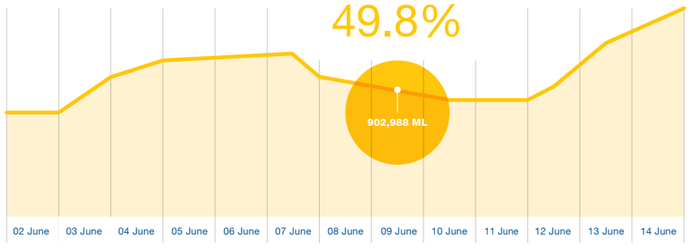

### PIGEONHOLE PRINCIPLE
The pigeonhole principle is a simple but powerful counting idea in mathematics. It states that when we have more objects (pigeons) than containers (holes) then at least one container must contain more than one object. This image illustrates this principle for the case of ten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



## PATTERN RECOGNITION
Classifying patterns in data and organising data logically
Representation and interpretation

### 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?

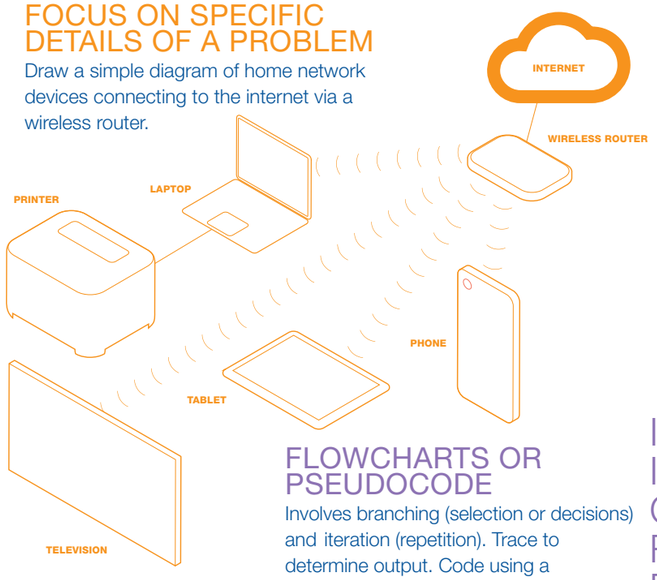
### RECOGNISE PATTERNS IN DATA TO CREATE INFORMATION
Water storage and use. Daily water storage levels as a percentage of capacity.



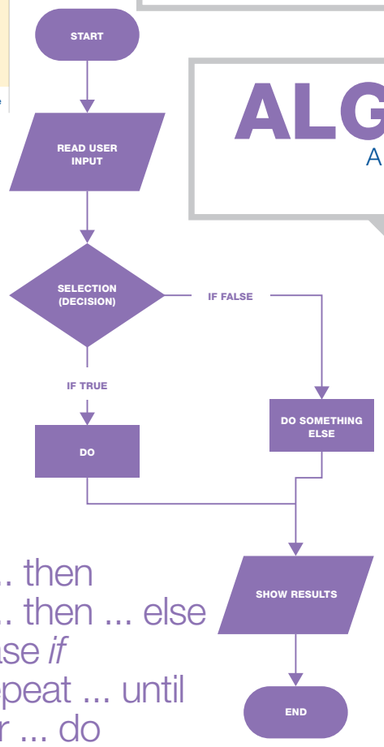

## ABSTRACTION
Removing non-essential information and focusing on principal structure only

### 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.

### FOCUS ON SPECIFIC DETAILS OF A PROBLEM
Draw a simple diagram of home network devices connecting to the internet via a wireless router.




## ALGORITHMS
A sequence of instructions that can be performed




### 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

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**23**

| 19 | 15 | 11 | 7 | 3 |
|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 |

### 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**

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.

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