# CODE FOR FUN
# KEY TAKEAWAYS

## Computational Thinking

**Computational thinking** is a **problem-solving process** that allows us to understand a problem and tell a computer the exact instructions needed to solve the problem!

**The 4 techniques of Computational Thinking are:**

**Decomposition**
Breaking down a problem into smaller pieces

**Abstraction**
Focusing on what's important and leaving out what's not

**Pattern recognition**
Finding similarities and patterns

**Algorithm design**
Coming up with a set of step-by-step instructions to solve the problem

We learnt to decompose & recognise patterns by creating our own pseudocode to eat chicken rice!

We designed our very own algorithms to find Wally in Where's Wally!

**DID YOU KNOW?**

- Computational Thinking has been around since the 1950s!
- The 4 techniques of Computational Thinking don't have to be used in sequence!

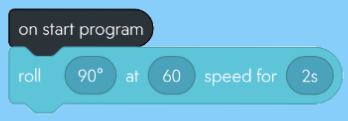
**Take it further!**

**Computational Thinking at Google:**
https://www.youtube.com/watch?v=VknL4d2KvV0

**Find out more about algorithms:**
https://youtu.be/6hfOvs8pY1k

## Programming & Robotics with Sphero Bolt

**Programming** is all about giving **clear and specific instructions** to a robot or computer!





**Good Programming Principles**

1. Think before you code
2. Don't repeat yourself
3. Keep it simple and sweet

**We used block-based programming to program the Sphero to:**

- Light up in different colours
- Move around and draw shapes
- Repeat instructions using loops
- React to events using sensors

**We even completed some exciting challenges using the Sphero :**

**Traffic Light Function :**
We created a function to make the Sphero act like a traffic light!

**Individual Sphero Dance:**
We planned our own Sphero Dance using the different blocks of code that we have learnt!

**Create a game:**
We used Conditional Programming to create a game of Scissors, Paper, Stone on our Spheros!

**DID YOU KNOW?**

- Many tech innovators such as Steve Jobs started out by coding games for fun!
- The first computer programmer was a woman named Ada Lovelace!

**Take it further!**

**Learn about programming with Hour of Code:**
https://code.org/hourofcode/overview

**Create your own program with SCRATCH**
https://scratch.mit.edu

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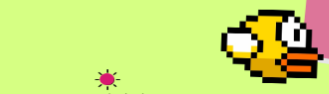
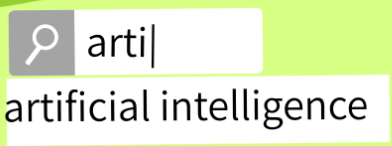
## Artificial Intelligence (A.I.)

**Artificial Intelligence (A.I.)** is about programming machines and computers to operate in a way that **resembles human beings!**

We explored how A.I. uses data to learn and improve from experience without being programmed to do so.

We saw how A.I. learnt to play Flappy Bird by learning from experience!






We learned that we have been already interacting with A.I. in our daily lives. For example, a search engine that suggests search terms even before we finish typing.

In the future, A.I. is likely to help improve our lives at home, in school and even in public spaces!

**DID YOU KNOW?**

- An A.I. software model of a human successfully taught itself to walk without being programmed to do so!

**Take it further!**

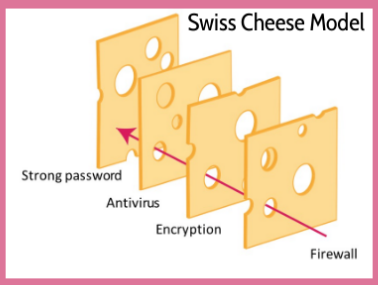
**Learn more about A.I. with Google A.I. experiments:** https://experiments.withgoogle.com/collection/ai

**Quick, Draw! with A.I.:** https://quickdraw.withgoogle.com

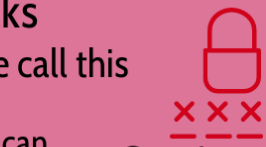
## Cyber Security

Cyber Security is about learning how to keep ourselves and our data safe from cyber attacks

Cyber security works a lot like slices of Cheese, and we call this **The Swiss Cheese Defence**



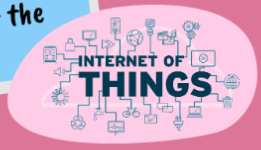

- No single layer of protection can perfectly prevent all cyber attacks.
- Each layer has imperfections and loopholes
- Putting multiple layers together makes our systems safer!



Creating a **strong password** is the first step in protecting our personal data.

We learnt how to encrypt and decrypt secret messages using Caesar Cipher!

We learnt about why it is important to ensure that IoT devices are protected from hackers when they are communicating over the internet!




**DID YOU KNOW?**

- Caesar Cipher is one of the oldest forms of encryption used to scramble and unscramble messages!
- There are more IoT devices than humans in the world!

**Take it further!**

**Find out how strong your password is:** http://go.gov.sg/pwchecker

**Try out this cyber security crossword puzzle:** https://www.cdse.edu/multimedia/games/wordfind/cyber/game-01.html

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