juniors

CODING
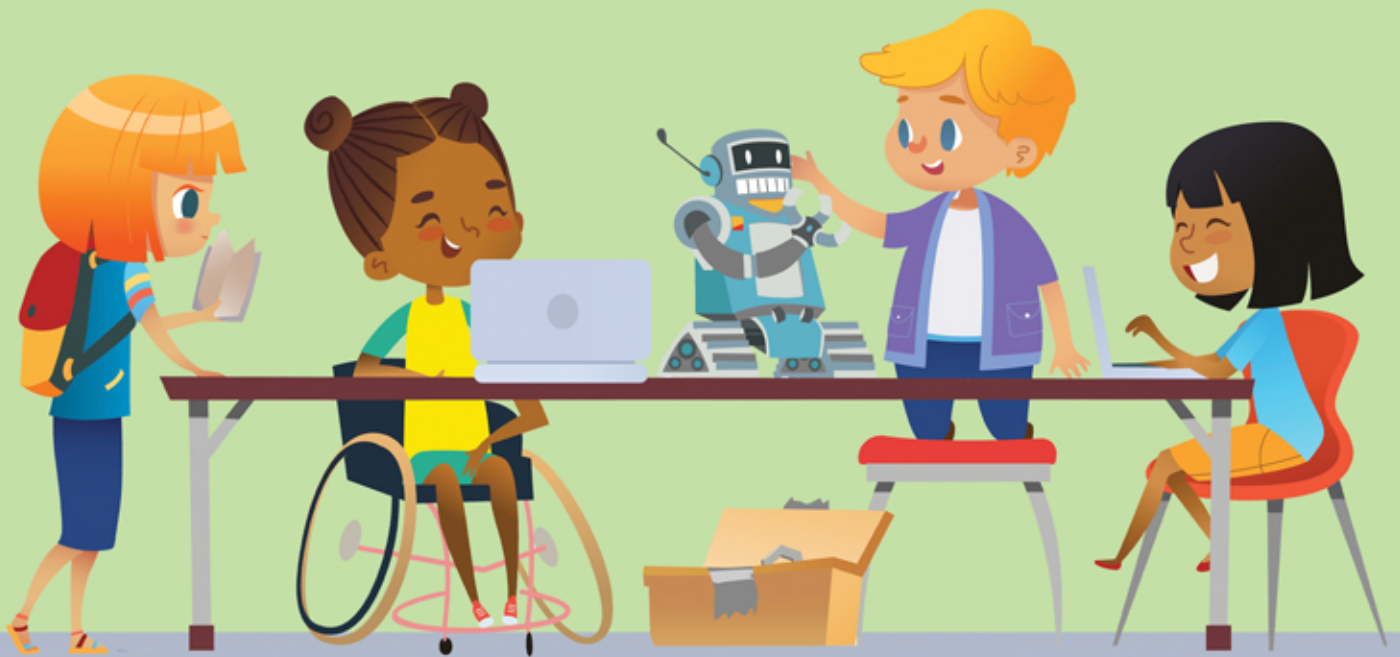## THEMED PROGRAMME

AIM

Coding is a skill that is becoming more and more important in this ever-increasing technological world. Explore the basics of code with some simple activities in your meeting space. Link with National Coding Week (19th September).

ACTIVITIES

- Coding: Key Terms
- If... Then Game
- Robot Cup Stacking
- Binary Bracelets
- 'If... Then' Bible Code

THE BOYS' BRIGADE
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CODING

» INTRODUCTION

Coding is what tells a computer how to function. Code is used everywhere from websites to games, apps to online shops. It may sit quietly in the background, hidden from view, but code is crucial in making all these things work.

Learning and understanding basic code is becoming increasingly important as our reliance on technology becomes greater. It is thought more and more jobs of the future will require some understanding of coding.

? DID YOU KNOW?

- There are around 700 separate programming languages. Examples include Java and HTML.

- Coding is behind almost everything that is powered by electricity.

- Computer programming was instrumental in helping end WW2, thanks to Alan Turing and the Enigma machine.

- Learning to code has other benefits such as improving your problem solving and creative thinking skills.

GET LEARNING: STEM
CODING: KEY TERMS

GET LEARNING

15 MINUTES

PREPARATION NEEDED

Start your coding theme by learning some of the key words that are used in coding.

1 ⬇ Download and print the Coding: Key Words activity sheets. Cut the 10 key words into their individual strips and stick them onto bowling pins / plastic bottles (or similar).

2 Split the group into two or more teams. Place the key words at one end of the room and the teams at the other end. Each team should be given a beanbag. Place a cone for each team about 5 metres away from the key words.

3 Before each round, teams should nominate one person to play. They should go and stand by their cone with the beanbag.

4 A leader should read out one of the descriptions (not saying the key word). Teams should then try to correctly identify which of the key words has just been described. The first team to knock over the key word with their beanbag wins. If children hit the wrong key word or everyone misses, then those children should run to collect their beanbag, return to their cone and try again until someone is successful.

5 The team who correctly identifies the most key words, win.

6 After the activity you could recap what children have learnt, by calling out some of the key words and asking for volunteers to try and give a definition.
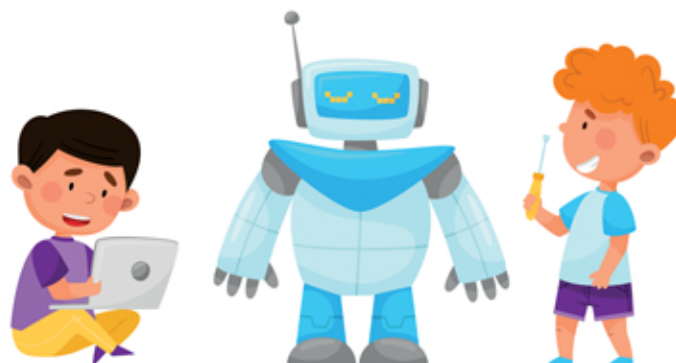
GET LEARNING: STEM
ROBOT CUP STACKING

Programme a 'robot' to stack cups into a tower using code.

1 Split into pairs. Give each pair a stack of cups and a pen and paper (or copies of the arrows provided in the activity sheets).

2 Explain that one of the pair will be the robot and the other person will be the programmer. The programmer must write a 'code' using arrows that will let the robot know how to stack cups.

3 The programmer will be able to use arrows. **Up arrow** = lift up the cup. **Left / right arrows** = move the cup ½ cup width. **Circle arrow** = Flip the cup over. **Down arrow** = place the cup down.

4 When moving the cups left and right, this should always be done ½ width of a cup at a time. This is to ensure that cups can be stacked correctly into towers during the activity.

5 Once the programmer has written the code they should give it to the robot for them to complete. The robot should follow the code exactly (even if it isn't right). Can the robot stack the cups or will there be an issue? If there is an issue, the programmer can try to 'debug' the code and make improvements.

6 After a while the robot and programmer should swap role. The programmer doesn't have to stack cups into traditional towers, but can create different shaped towers or designs.

We've provided a leader's sheet to help visualise the activity and see the solution for a 6 cup tower.

GET ACTIVE: PLAYING GAMES
IF... THEN GAME

An if statement uses 'conditional statements' to help computers make decisions. i.e. 'If hot then turn on the fan'.

1 Explain that this game will use if statements, just like in coding.

2 The object of this game is to follow the programmer's commands as they shout them out. For example, if the programmer says 'Jump', then everyone must jump. However, it would be more fun for the programmer to try and confuse the group with if statements such as 'If I say 'Jump' then everyone must spin', or 'If I say 'touch your head', then everyone must touch their toes'

3 The programmer should introduce 6 if statements to begin with. More can then be introduced to the game later on, if children have remembered those 6 and can cope with more.

4 If a 'computer' goes wrong then they are out of the game. The last person left is the winner.

5 Play more rounds, this time letting the winner of the first game become the programmer giving the commands.

GET CREATIVE: ARTY & CRAFTY
BINARY BRACELETS

What is Binary Code? A numeric system made up of zeros and ones that allows computers to function. Everything you see on a computer is actually made up of strings of 0's and 1's. This computer language helps computers to work more efficiently and complete complex tasks.

1 Explain to the group that they are going to make a bracelet from beads that will use the binary alphabet to make the letters of their initials.

2 For this activity you'll need string and 3 colours of beads. One colour will represent 1's, one colour will be the 0's and another colour will be used to show the gap between letters.

3 Give children a copy of the binary alphabet sheet, showing the alphabet in binary code.

4 Cut some string roughly 20cm long. Tie a knot at one end.

5 Using the binary code alphabet, children can start making their bracelets. Start with 2 'gap colour' beads. Then create the first letter of their initials. If red = 0 and black = 1, then H (01001000) would be RBRRBRRR.

6 Place a 'gap colour' bead in next and then repeat the process for the next two letters of the initials. Finish the bracelet with a final 2 'gap colour' beads.

7 Tie off the bracelet and then it's ready to be worn.

GET INTO THE BIBLE: MY BIBLE ADVENTURE
'IF... THEN' BIBLE CODE

1 Ask if anyone can remember what an 'if statement' is. Ask how 'if statements' can be used by computers to make good decisions? These statements allow computers to respond to situations, based on the wisdom of the programmer.

2 What about humans? Wouldn't it be great it we had 'if statements' that we could follow to help us make good decisions and navigate life successfully?

3 Well, the good news is that we do! The Bible has lots of 'If statements' written by people full of wisdom, to help us to make good decisions in our life and support us when we get into difficulty.

4 Split into small groups and give each group a bible and one (or more) of the if statements. Challenge the groups to look up the Bible verse for their if statement. What is the verse telling us to do in response to our 'if statement'? Encourage groups to share what they have found out.

5 Finally remind children that there are lots more pieces of wisdom in the Bible to help us navigate our lives. It's our job to open our Bibles, read the 'code' and then use it to live our lives.

IF **scared** THEN... Joshua 1:9	IF **angry** THEN... James 1:19-20
IF **worried** THEN... Philippians 4:13	IF **thankful** THEN... Psalm 106:1
IF **tempted** THEN... 1 Corinthians 10:13	IF **unkind** THEN... Ephesians 4:32

BINARY

IF STATEMENT

PROGRAMMER

CODE

LOOP

COMMAND

DEBUG

BIT

EVENT

BUG

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CODING: KEY TERMS

Below are some key terms that are connected to and used in coding.

Programmer
A person who writes code for computers.

Code
A set of step-by-step instructions that tells a computer what to do.

Command
A specific instruction given to a computer programme that tells it what to do.

Bug
An error in a computer programme.

Debug
Finding and fixing errors in a computer programme.

Binary
Computer language. Information is represented using only two options.

Bit
A single unit of information, usually shown as a 0 or a 1.

Event
An action that causes something to happen in computing.

Loop
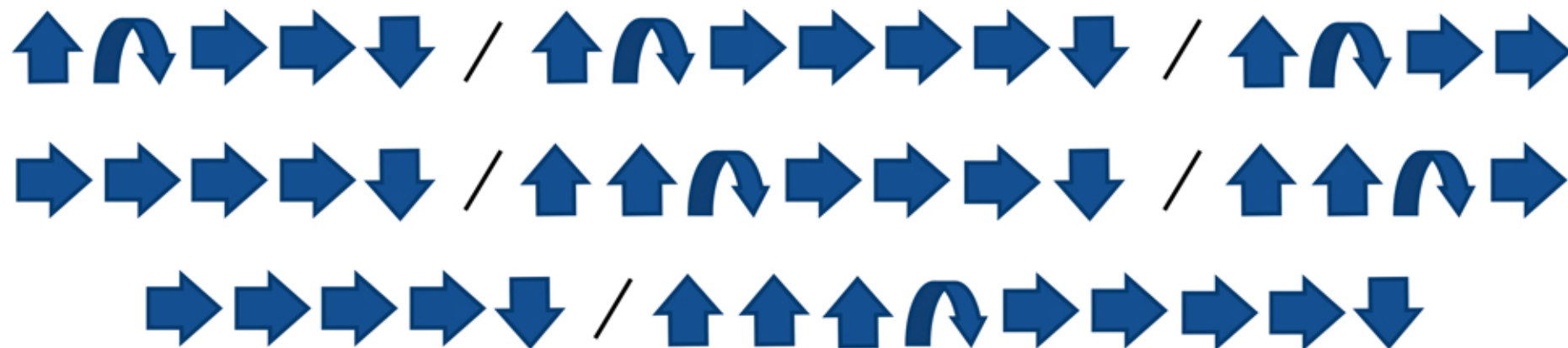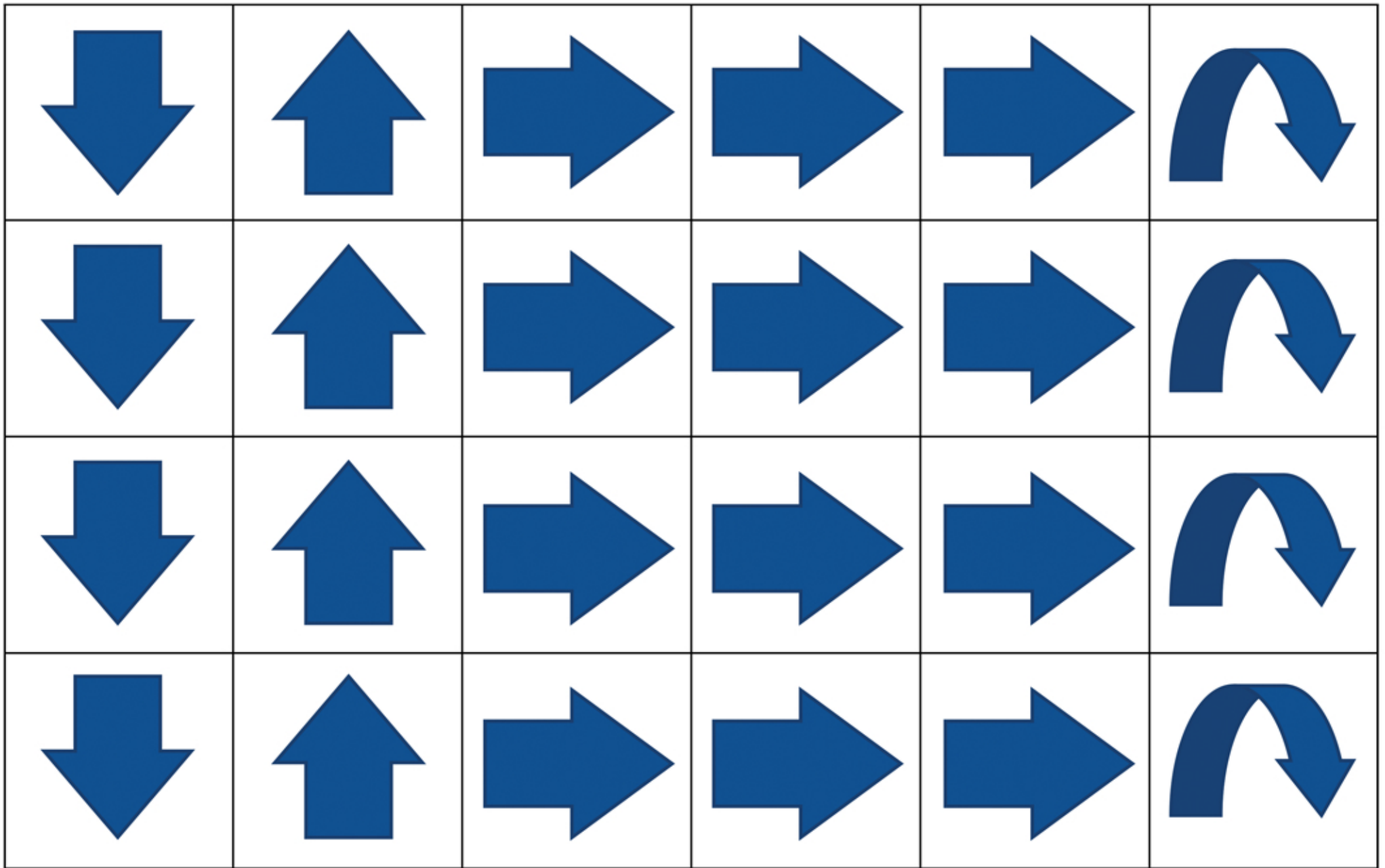The action of doing something repeatedly.

If Statement
Uses 'conditional statements' within code to help computers make decisions. i.e. 'If hot then turn on the fan'.

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ROBOT CUP STACKING

|0 |1 |2 |3 |4 |5 |6

START

|0 |1 |2 |3 |4 |5 |6

FINISH

ROBOT CODE FOR A 6 CUP PYRAMID

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BINARY CODE ALPHABET

Letter	Binary		Letter	Binary
A	01000001		N	01001110
B	01000010		O	01001111
C	01000011		P	01010000
D	01000100		Q	01010001
E	01000101		R	01010010
F	01000110		S	01010011
G	01000111		T	01010100
H	01001000		U	01010101
I	01001001		V	01010110
J	01001010		W	01010111
K	01001011		X	01011000
L	01001100		Y	01011001
M	01001101		Z	01011010

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