# Mini STEM Showdown

An Adelaide University, School of Education
STEMpire program

## Technology

**Name:**_____

*Mini STEM Showdown is a series of STEM (Science, Technology, Engineering and Maths) activities to complete. Have fun!*

### Binary Code

Binary code is like a secret language made up of just two numbers: 0 and 1. It's how computers understand instructions. Each number or "bit" (short for binary digit) can either be a 0 or a 1 and computers use teams of eight (called 8 bit) to represent different letters.

Imagine you have a torch. If you turn it on, it's a "1", like saying "yes" or "on". If you turn it off, it's a "0", like saying "no" or "off". Every video game you play, or YouTube video you watch, is just billions of these 1s and 0s switching on and off really fast.

For example:

- The letter **A** in binary is written as **01000001**.
- The letter **B** would be **01000010**.

Each group of 8 bits (like 01000001) represents one character or piece of information. So, binary is the way computers turn everything, words, pictures, even videos, into numbers that they can understand!



**Did you know the on/off symbol is a 1 (on) and 0 (off) combined. It originated from binary code and was made the standard symbol for the power button.**

### Activity 1 - Binary Bracelets

**Task –** Make your own binary bracelet representing three letters*.

Using the binary code on the next page, write each of your initials (including your middle name if you have one), and their matching binary 8-bit codes, on the worksheet provided.

After you have worked out the code for each letter, colour code your letters on the 'Bracelet Bead Pattern' page. Use one colour for 0 and another colour for 1 and then count how many of each colour bead you will need.

Collect your beads and elastic and make your bracelet.

***Three letters will give you the right size bracelet.**

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## Binary Code chart

Use the binary code below to work out your initials. Write the letter and the code in the spaces provided.

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

First letter of your first name

☐ ____ ____ ____ ____ ____ ____ ____ ____

Middle Initial (if you have one)

☐ ____ ____ ____ ____ ____ ____ ____ ____

First letter of your surname/last name

☐ ____ ____ ____ ____ ____ ____ ____ ____

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# Bracelet Bead Pattern!

Colour the squares for each letter below using this key

0 = ☐ 1 = ■

**Bracelet pattern**

Make your first ▨ a glow in the dark bead.

Now add the beads for your first letter.

_____ ▨☐☐☐☐☐☐☐☐

Add a glow in the dark bead and then start your second letter.

_____ ▨☐☐☐☐☐☐☐☐

Add a glow in the dark bead and then start your last letter.

_____ ▨☐☐☐☐☐☐☐☐

How many of each bead do you need?

▨ = _____3_____ ☐ = _____ ■ = _____

When you have finished the last bead for the last letter, see the teacher and they will help tie your bracelet to the correct size.



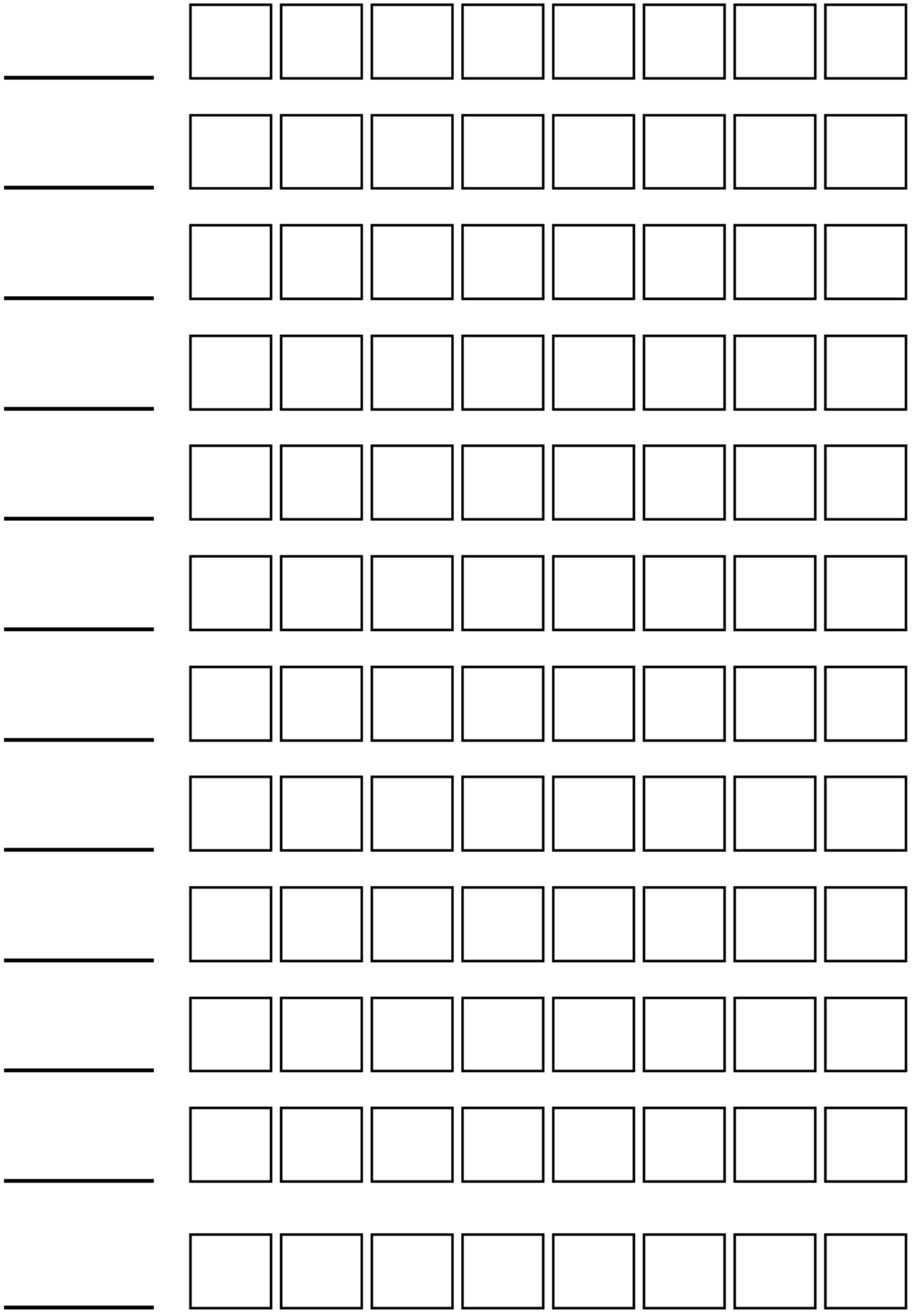

**Congratulations! You have coded your initials in binary!**

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**Activity 2 -Crack the code.**

Write a secret word using binary for someone else to solve



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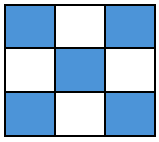
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## Extension Activity – Try it Yourself

### Code your Canvas

Make pictures on the grids below by:

- colouring in a square (1) or
- leaving it blank (0)



| | | |
|---|---|---|
| 1 | 0 | 1 |
| 0 | 1 | 0 |
| 1 | 0 | 1 |

### 8x8 binary pictures

### Now try a bigger 30 x 30 picture