



## Binary Resource

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### What is Binary?

We, as humans, are used to working in the base 10 system, commonly known as decimal. Computers work in the base 2 system, known as binary.

Binary code is “computer language”. Computers don’t understand English, or Welsh, or German, or Spanish, or French or any of the other languages that are used by humans around the world. **Binary code is the only language a computer understands.**

Binary code only consists of 0’s and 1’s which means computers only have 2 ways of representing anything. Each letter, number and symbol has its own binary sequence as shown on the binary alphabet included in this resource.

## Binary Alphabet

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

| Lower case |          |
|------------|----------|
| A          | 01100001 |
| B          | 01100010 |
| C          | 01100011 |
| D          | 01100100 |
| E          | 01100101 |
| F          | 01100110 |
| G          | 01100111 |
| H          | 01101000 |
| I          | 01101001 |
| J          | 01101010 |
| K          | 01101011 |
| L          | 01101100 |
| M          | 01101101 |
| N          | 01101110 |
| O          | 01101111 |
| P          | 01110000 |
| Q          | 01110001 |
| R          | 01110010 |
| S          | 01110011 |
| T          | 01110100 |
| U          | 01110101 |
| V          | 01110110 |
| W          | 01110111 |
| X          | 01111000 |
| Y          | 01111001 |
| Z          | 01111010 |



## Activity One – Binary nametags

### About this activity

This activity provides a perfect platform for pupils to begin learning about binary code and is a great way of encouraging pupils to think about how computers interpret data.

For this activity each pupil will need binary nametag template (found below) and a copy of the binary alphabet (found above).

Each pupil needs to write their name out in binary by copying out the binary equivalent for each letter in their name.

For example if your name is Will, you would write:

(W) 01010111

(i) 01101001

(l) 01101100

(l) 01101100

### Key Skills used:

- Numeracy
- Problem solving



## Binary nametag Templates

Hello, my name is...



Hello, my name is...





## Activity Two – Binary messages

### About this activity

Once the pupils have had the chance to write their names in binary, they now need to use the binary alphabet and work out what the messages (found below) are.

This activity, can be used as an extension task for M.A.T pupils or set as a piece of homework, The activity provides a perfect platform for pupils to begin learning about decoding and is great way of encouraging pupils to think about how computers interpret data.

For this activity each pupil will need a copy of binary messages (found below) and a copy of the binary alphabet (found above).

Each binary sequence had an empty box underneath, this is where the pupils will write the letter.

Alternatively, using the binary alphabet, the pupils could write their own message and send it to a friend in the class.

Alternatively, using the binary alphabet, the pupils could write their own message and send it to a friend in the class.

message 1: computer science is fun  
message 2: Just a random messages

### Key Skills used:

- Numeracy
- Problem solving

## Binary messages print outs

Can you solve these messages sent in binary?

|          |          |          |          |          |          |          |
|----------|----------|----------|----------|----------|----------|----------|
| 01001010 | 01110101 | 01110011 | 01110100 |          |          |          |
|          |          |          |          |          |          |          |
| 01100001 |          |          |          |          |          |          |
|          |          |          |          |          |          |          |
| 01110010 | 01100001 | 01101110 | 01100100 | 01101111 | 01101101 |          |
|          |          |          |          |          |          |          |
| 01101101 | 01100101 | 01110011 | 01110011 | 01100001 | 01100111 | 01100101 |
|          |          |          |          |          |          |          |

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|          |          |          |          |          |          |          |
|----------|----------|----------|----------|----------|----------|----------|
| 01001010 | 01110101 | 01110011 | 01110100 |          |          |          |
|          |          |          |          |          |          |          |
| 01100001 |          |          |          |          |          |          |
|          |          |          |          |          |          |          |
| 01110010 | 01100001 | 01101110 | 01100100 | 01101111 | 01101101 |          |
|          |          |          |          |          |          |          |
| 01101101 | 01100101 | 01110011 | 01110011 | 01100001 | 01100111 | 01100101 |
|          |          |          |          |          |          |          |



## Activity Three – drawing an image with binary

### About this activity

As stated earlier, computers work in the base 2 system, known as binary. This means that the computer works in a True or False way.

This activity demonstrates drawing an image using binary where 1 is true and therefore should be coloured in and 0 is false and therefore could be left alone.

Below, is a blank 10x10 grid, next to the blank grid is a 10x10 grid where each cell has either a 1 (true) or a 0 (false).

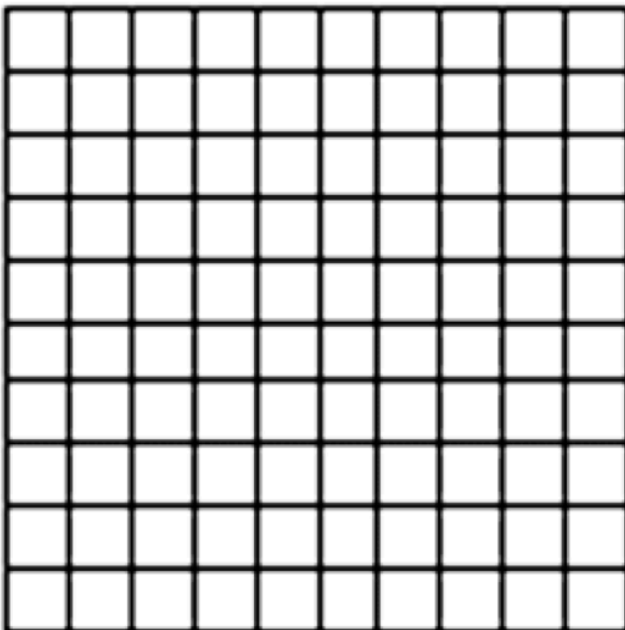
By colouring in the correct cells, the pupils will produce an image. There are 4 examples found below: a smiley face, a dog, pacman ghost, and a heart.

Alternatively, the pupils can create their own images by drawing a blank grid (of any size) and drawing another grid and filling it with 0's and 1's corresponding to where you would colour in the cells.

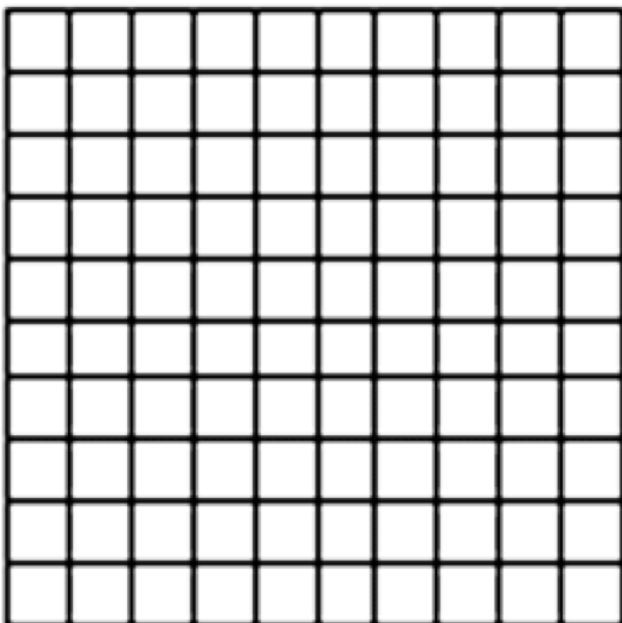
### Key Skills used:

- Numeracy
- Problem solving

## Drawing an image with binary – Print outs

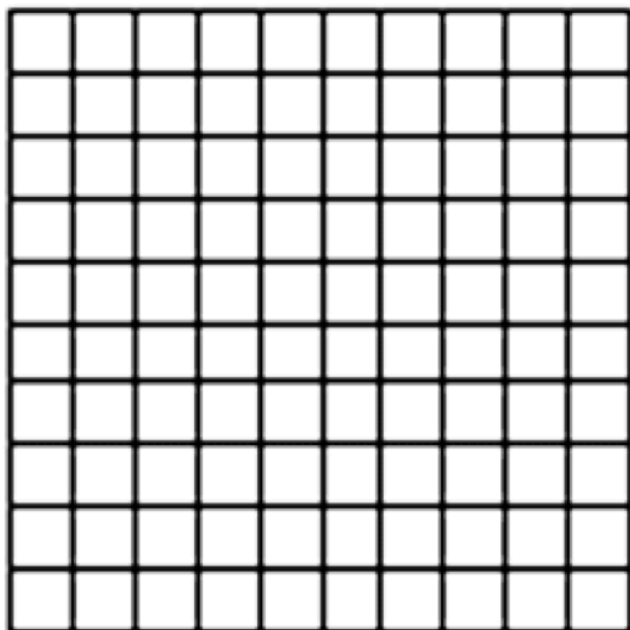


|   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| 0 | 1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

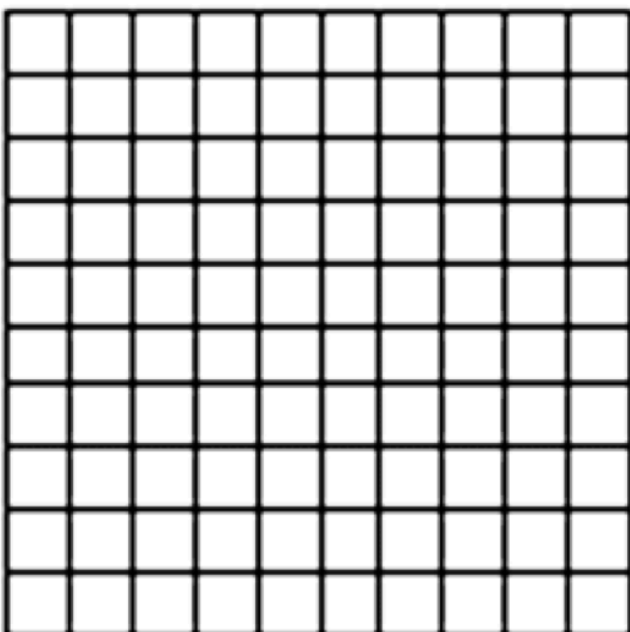


|   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 |
| 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 |
| 1 | 1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





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



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



## Binary Resources

We hope you use these resources in your classroom and hope to inspire you to develop and create your own imaginative ideas and activities.

If you have any questions, or would like any future assistance please email

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