# Kaleidoscope HomeKaleidoscope Program

## Background

Kaleidoscopes are awesome and have entertained kids before there were fancy computers. However, kids these days deserve to experience the awesomeness of kaleidoscopes too and you’re here to help. Armed with a strong understanding of binary and file formats you set out to create a way of **encoding** a kaleidoscope display so it can be saved as a file and then later **decoded** and viewed. The idea is a program will then read a file in that special format and reproduce the original kaleidoscope display.

## Encoding Scheme

|  |  |  |
| --- | --- | --- |
| Binary | Decimal | Shape |
| ­­­001 | 1 | Rectangle |
| 010 | 2 | Circle |
| 011 | 3 | Triangle |
| 100 | 4 | Star |

We’re MVP-ing (minimal viable product) our solution so we’re going to just support kaleidoscope displays in a maximum of a 4x4 grid. The dimensions of a kaleidoscope display grid are represented by two 3 bit numbers – the width and height – placed one after the other. Following the width and height, we indicate the number of shapes in our kaleidoscope (we are permitted to use between 1-4 shapes) by including another 3 bit binary number. Then, for each shape, we write a 3 bit x-coordinate, y-coordinate and a shape number. The interpretation of each 3 bit number is outlined in the table on the right hand side of this page.

## Example

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 |
| Display Grid Width | | | Display Grid Height | | | # Shapes | | | Shape #1 X | | | Shape #1 Y | | | Shape #1 Type | | |
| 2 | | | 2 | | | 2 | | | 1 | | | 2 | | |  | | |

## Activity

Pair up with ONE other person and create a kaleidoscope, then encode it in the above-mentioned format. Then swap kaleidoscopes with another group and try to reconstruct their kaleidoscope by reversing the encoding! Check you got it right!