Pixel art

Overview

This activity meets **requirement one** of **stage two** of the **Digital Maker Staged Activity Badge** ('Create a piece of interactive or animated digital art using software'). It shows people how to create and code their own pixel art on paper to teach them how computers represent and display images.

20 to 30 minutes (up to 60 minutes for younger groups)

Flexible

Print the resources before you begin

Flexible

Key messages

- Computers represent pictures through numbers.
- Computer screens are made up of a grid of tiny squares called pixels (picture elements). Each square on the grid represents one pixel.
- Everything you see on a computer screen uses different coloured pixels.
- A pixel can be represented by its coordinates on the grid.
- Pixel coordinates on the grid start from (0,0) in the top left-hand corner. The grid's x-axis goes from left to right, and its y-axis goes from top to bottom.

You will need:

- Large pieces of square paper and pens to draw grids (alternatively, print out the template from the end of this document)
- Printed resources
- Markers, crayons, or pencils to colour in the grids

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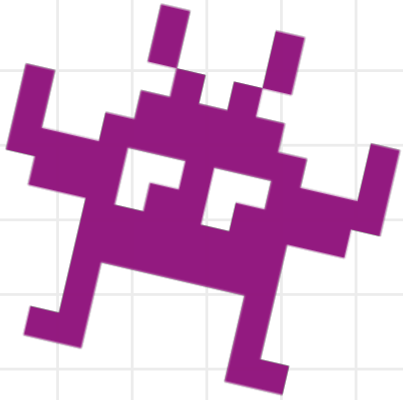
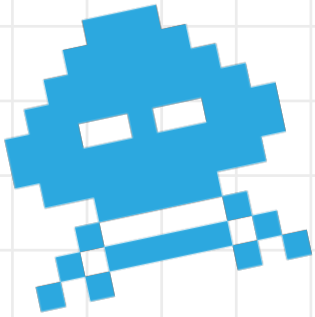
Adaptability

- Use colours to fill in the grids, instead of black and white. Young people could make up their own code to show the colours, for example, (2,6b) to show a blue pixel or (2,7r) to show a red one. Why not see if they can come up with their own way to code colours?
- Get young people to draw simple shapes (for example, triangles, squares, or rectangles) first, to get used to the concept. Once they're more confident, they could draw more complex shapes like trees and insects.
- If you're short on time, just decode one image in step four, and draw fewer images in step five. As an extra challenge, can young people code the first letter of their name? What about a whole word?
- As an extra challenge, can young people figure out how to animate the bug in the example? Can they draw a sequence of pictures that could be animated?
- Using colours:
  - For step five, young people could use colours when drawing their own images.
  - For step six, young people could come up with their own method of coding their colours.
  - To challenge your group, ask them to draw a scene using colours.

Alternatives

- You could draw grids on the ground outside using natural materials or chalk.
- Use larger grids if anyone needs them – scale them up or draw your own.





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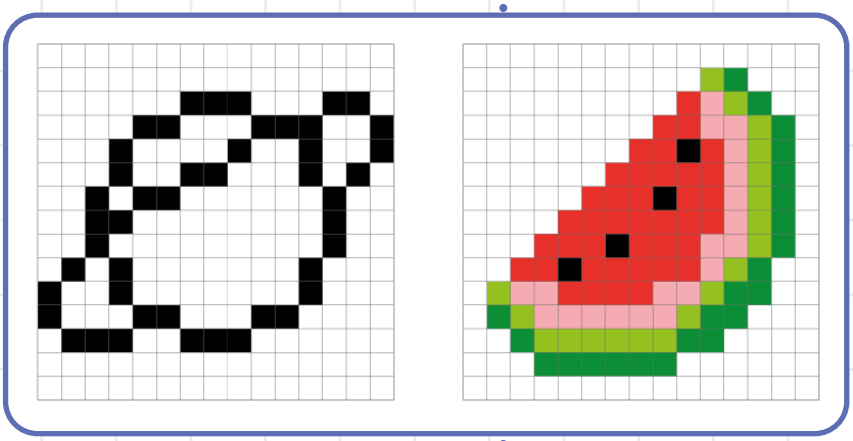
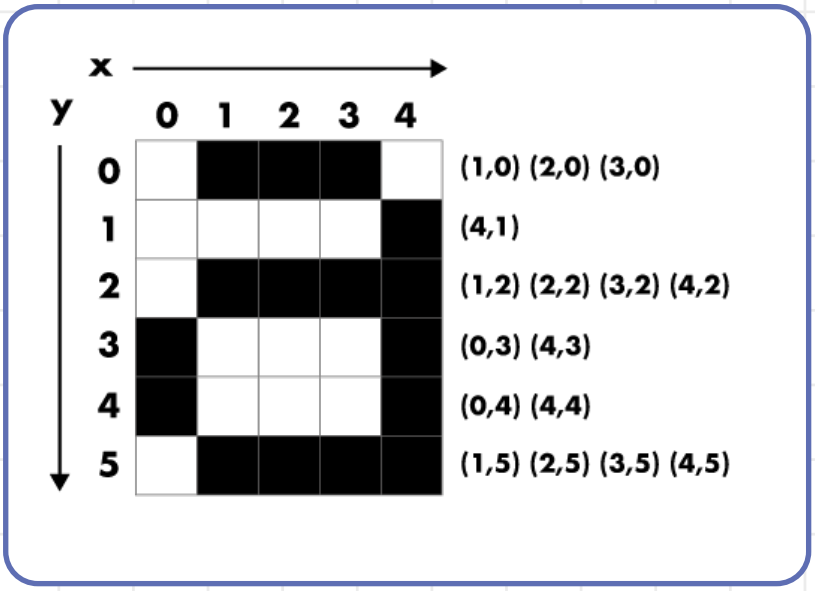
Instructions

1 Where do you see images on computers? What sorts of images do you see?



2 Computer screens are divided up into a grid of small dots called pixels (picture elements). In a black and white picture like the planet, each pixel is black or white. In a colour picture like the watermelon, each pixel is a single colour.



3 Computers represent everything through numbers, including pictures. Computers code images by reading the coordinates of pixels. In this picture of an 'a', you can see how each square on the grid is labelled with a coordinate.

The grid numbering starts from (0,0) at the **top left-hand corner** of the grid (the opposite to maps). Computers use the same coordinates as old-fashioned televisions, which display images in horizontal lines from left to right and top to bottom.

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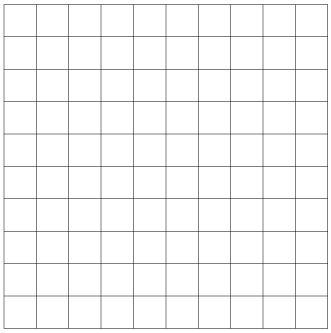
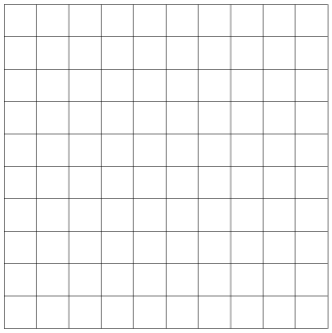
Instructions

4 Decode these images by colouring in the right squares. You can use whichever colour you like. What images do you see?





(1,1) (2,1) (6,1) (7,1)
(0,2) (3,2) (5,2) (8,2)
(0,3) (4,3) (8,3)
(0,4) (8,4)
(1,5) (7,5)
(2,6) (6,6)
(3,7) (5,7)
(4,8)



(3,0) (6,0)
(0,1) (4,1) (5,1) (9,1)
(0,2) (1,2) (2,2) (3,2) (6,2) (7,2) (8,2) (9,2)
(2,3) (7,3)
(0,4) (2,4) (7,4) (9,4)
(0,5) (1,5) (2,5) (7,5) (8,5) (9,5)
(2,6) (7,6)
(0,7) (1,7) (2,7) (7,7) (8,7) (9,7)
(0,8) (3,8) (6,8) (9,8)
(4,9) (5,9)

5 Use the blank grids to create three of your own pixel art images. Can you create any outdoor themed images? For example, you could try to draw an insect, a plant, or a mountain.

6 On a separate piece of paper, code your images by writing down the coordinates. The paper should only have the list of coordinates on it – not the picture you're coding.

7 Find a partner and swap coordinates. Decode each other's images onto a new grid (without looking at the images first). Do the copies match the originals?

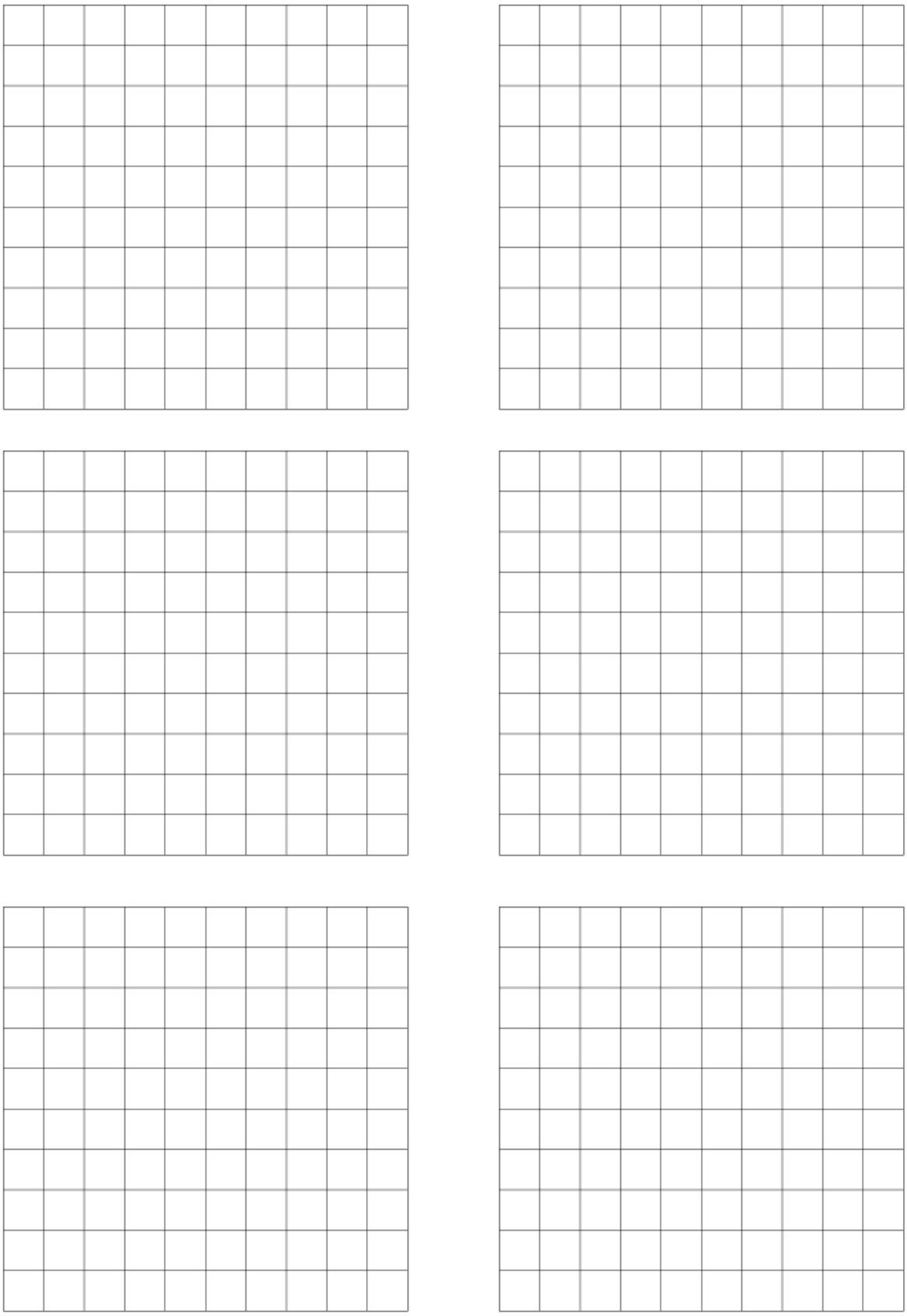
Trivia

Did you know that the most common computer screen size that people use (1366×768 resolution) contains 1,049,088 pixels? That's 10,491 copies of the (10×10) pixel grid you're using, scrunched into one single computer screen!

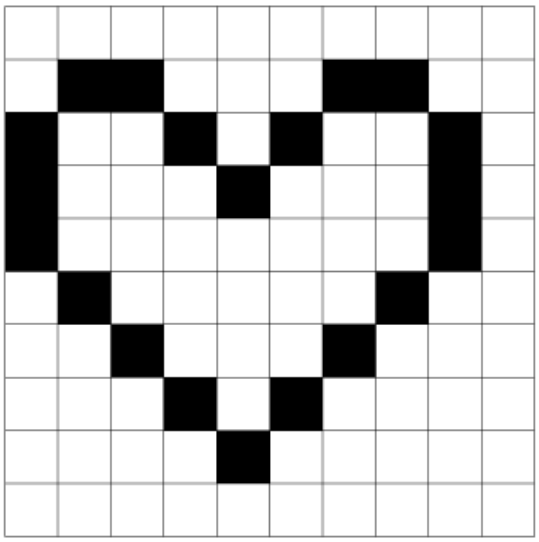
Tip

The grid starts at (0,0) in the top left.

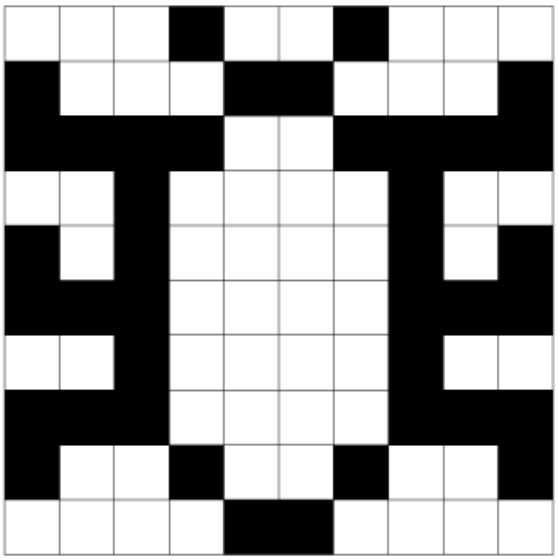
Grids



Pixel art answer sheet



(1,1) (2,1) (6,1) (7,1)
(0,2) (3,2) (5,2) (8,2)
(0,3) (4,3) (8,3)
(0,4) (8,4)
(1,5) (7,5)
(2,6) (6,6)
(3,7) (5,7)
(4,8)



(3,0) (6,0)
(0,1) (4,1) (5,1) (9,1)
(0,2) (1,2) (2,2) (3,2) (6,2) (7,2) (8,2) (9,2)
(2,3) (7,3)
(0,4) (2,4) (7,4) (9,4)
(0,5) (1,5) (2,5) (7,5) (8,5) (9,5)
(2,6) (7,6)
(0,7) (1,7) (2,7) (7,7) (8,7) (9,7)
(0,8) (3,8) (6,8) (9,8)
(4,9) (5,9)