Digital Schoolhouse

Paint by Pixels

Suitable for all ages

What you need

An 8x8 grid (works best if it's square in shape) - either ask the pupils to produce their own or provide them with a pre-drawn template to use
Pens and pencils

What to do

1. Ask pupils to shade in certain cells of the grid to form a picture
2. On a separate sheet of paper write down a 1 or 0 for each cell, where 1 represents a shaded cell and a 0 represents a blank cell
3. Ask pupils to write the 1s and 0s in rows similar to the grid. The end result should be 8 rows of 1s and 0s
4. Pupils then give their sheet of 1s and 0s to another pupil (without the original image)
5. Receiving pupil then reads the numbers and shades in the corresponding cells on another blank grid
6. Pupils compare results

Adding complexity

Ask the pupils to investigate how colour is stored. The answer is that you need to dedicate more bits per pixel. This can be repeated using coloured pens and paper in the same way. However, this is an excellent opportunity to combine some digital literacy. Ask pupils to set it up in a spreadsheet instead. Adjust the column widths so that the cells are in squares and use conditional formatting to instruct the cell to change colour when a particular combination of 1 and 0 is entered. You can then go further to include formulae to calculate the number of bits being used and investigate the effect on file size.

Curriculum Links

Use the activity to explain to pupils how images are ultimately stored in binary. The attached PowerPoint slide deck has supplementary slides to explain this concept. The activity also partially begins to cover the following strands from the Key Stage 2 and Key Stage 3 Programmes of Study for Computing.

2.6 select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information

3.6 understand how instructions are stored and executed within a computer system; understand how data of various types (including text, sounds and pictures) can be represented and manipulated digitally, in the form of binary digits

Data Representation (of images) is a key part of any GCSE/A-Level qualification for Computing. This activity easily fits the relevant exam board specification content and enables students to easily understand the Data Representation concepts being taught.