Images

Teacher's Notes

Lesson Plan

Length	60 mins	Specification Link	214/k	
Learning objective		Candidates should be able to: (k) explain the representation of an image as a series of pixels represented in binary		

Time (min)	Activity	Further Notes
10	Using a projector display the **Starter Activity**. Explain that images are made up of pixels – picture elements – and that the greater the number of pixels present in a given area, then the greater the resolution of the image. Show students the link to the specification. Explain the purpose and objectives of the lesson.	
15	Watch the **Videos**.	
5	Ask some questions about the video to assess learning. E.g. • What are pixels? • How is the resolution of an image measured? • What resolution is suitable for a monitor display? • How many bits are used to store the information in each pixel?	Answers: Picture elements. The small packets of image data that make up the image. Pixels or dots per inch. 72 dpi 24. Eight for each of the colours; red, green and blue.
15	Students to complete **Worksheet 1** either on paper or on a computer. Ask individual students for their answers and discuss with the class so that all students will have the correct answers entered on their worksheets.	Answers provided.
10	Students to complete the **Interactive Activity**.	
	Extension Challenge/Homework • The students should complete and submit **Worksheet 2**.	
5	**Plenary** **Revision:** Revisit the questions asked after the video to assess learning.	

WORKSHEET 1 ANSWERS

1 **Pixels are the smallest individual element in an image.**
Pixel is a combination of which two words?

Picture and element.

2 **The number of bits used to store information in each pixel will determine how many colours can be represented.**
How many colours could be represented by the following bits per pixel (bbp).

(a) 1	2	1 bit can be either 0 or 1 and therefore 2 colours.
(b) 4	16	With 4 bits there are 16 combinations from 0000 to 1111.
(c) 8	256	With 8 bits there are 256 combinations from 00000000 to 11111111.

3 **(a) Pixels hold information on the levels of which three colours?**

Red, green and blue.

(b) If 8 bits are used for each of these colour levels, how many bits are used to hold information for each pixel?

24

(c) Using your answer for (b), calculate how many different colours can be represented?

256*256*256 = 16,777,216

4 **(a) What is the difference between the terms 'dimensions' and 'resolution' when applied to digital images?**

'Dimensions' refers to the total number of pixels along an image's width and height e.g. 640 x 480.

'Resolution' refers to the density of pixels in an image – the greater the density, the greater the image sharpness and clarity.

It is measured in pixels per inch (ppi) or dots per inch (dpi).

(b) What is a suitable resolution for:

(i) viewing an image on screen?	72 ppi
(ii) printing an image?	300 ppi

WORKSHEET 2 ANSWERS

1 (a) An image file stores information about each pixel in the image.
How many colours could be represented by the following number of bits?

(i) 1 bit

2 **(1)**

(ii) 2 bits

4 **(1)**

(iii) 8 bits

256 **(1)**

(b) In most images data is stored about the levels of **three** colours.
State what these colours are.

Red, green and blue. **(1 mark for all three, no marks for one or two)**