# Homework 4 Representing images Answers

1. Photos have been taken for a school website on a 10 megapixel digital camera.
   1. State what is meant by ‘10 megapixel’. [2]

**1 mark** for each point:

* A pixel is the smallest component of an image *or*
* Colour or point described by binary code
* A megapixel is 1,000,000 pixels, 10 megapixels are 10million pixels
* The camera is capable of taking an image with 10million pixels in the same image
  1. Explain what the resolution of an image describes. [2]

**1 mark** for each point:

* The amount of pixels on one line of the image…
* …times the number of these lines…
* …which determines the overall number of pixels used to construct the image
  1. 30 images have been placed on the homepage of the website and it is now loading slowly. Describe three changes that could be made to the images to help alleviate this problem. [3]

**1 mark** for each point:

* Reduce the resolution….
* …the image will be smaller as fewer pixels are used to make up the image
* Reduce the colour depth…
* …less possible colours stored per pixel
* Remove the metadata…
* …so less extra information is stored about the images
* Any other valid solution with adequate description
* Compress (or further compress) the images using a JPEG format
* …to reduce the file sizes

1. A space invader image, pictured below, has been created as part of a computer game.

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* 1. State and explain the minimum number of bits that must be used to represent this image. [3]

**1 mark** for each point:

* 2 bits per pixel…
* …allows for four different combinations that…
* …can represent each of the four colours using different codes 00, 01, 10, 11.

The first line of the image can be encoded as 11111100 00111111. A black pixel is coded as 00.

* 1. Suggest a suitable 16-bit pattern that could be used to define the third row in the image. [2]

**1 mark** for each byte:

* 11000101 01100011 or 11001010 10010011
  1. Calculate the file size of the image in bytes. [3]

**1 mark** for each point:

* 8 x 8 pixels = 64
* 2 bits per pixel x 64 pixels = 128 bits
* 128 bits / 8 = 16 bytes
  1. Metadata is also stored with the image data. What is meant by metadata? [1]

**1 mark** for:

* Data stored about data
  1. Give two examples of metadata that might be included with this file. [2]

**1 mark** for each sensible answer including:

* Width in pixels
* Height in pixels
* Colour/bit depth
* Date last modified or Date created
  1. The colour red, represented in 24-bit colour, can be represented in hexadecimal as ff0000. Explain why. [2]

**1 mark** for each sensible answer including:

* Hex colour codes are broken into three segments
* Each segment represents either red, green or blue
* ‘ff’ means 255 out of a maximum 255 lots of red,
* with 0 green and 0 blue.

1. Give **one** advantage of vector graphics and **one** advantage of bitmap graphics.

Vector images are more likely to be smaller in file size. This means they use less storage space and less memory when in use.

Vector images can be resized without any degradation in quality (pixellation).

Bitmap images can be manipulated at pixel level to change their colour values.

[Total 22 marks]