3. Calculating file size

LO: Understand how pixel depth impacts on the file size.

Variation in quality

Changing the colour depth of an image will affect the number of colours it can display, as shown below:

| 2 Colours | 4 Colours | 8 Colours | 16 Colours | 256 Colours | 16.7m Colours |

- Each pixel is given a binary value

- Each value represents a different colour

- Using one bit per pixel allows only 2 values, 0 and 1
  - 1 = Black, 0 = White

- Mentally calculate the file size of this image:
  - 10 x 10 = 100 pixels
  - 100 pixels x 1 bit = 100 bits
  - 100 bits / 8 = *12.5 Bytes*

0	0	0	0	1	0	0	0	0	0
0	0	0	1	1	0	0	0	0	0
0	0	1	1	1	0	1	0	0	0
0	1	1	1	1	0	1	1	0	0
1	1	1	1	1	0	1	1	1	0
0	0	0	0	1	0	1	0	0	0
1	1	1	1	1	1	1	1	1	1
0	1	1	1	1	1	1	1	1	0
0	0	1	1	1	1	1	1	1	0
0	0	0	0	0	0	0	0	0	0

More bits per pixel = more colour combinations

- 1 bit = 2 Colours
- 2 bits = 4 Colours
- 3 bits = 8 Colours
- 4 bits = 16 Colours

- How many bits per pixel required for 256 colours
  - 8 Bits

01 = (red)   10 = (brown)
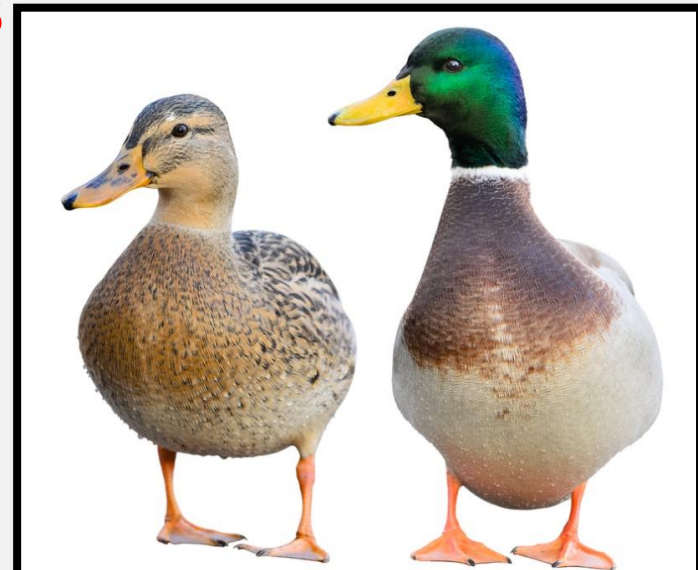00 = (blue)   11 = (white)

Using the Ducks.BMP image (1000height and 750width), calculate the file size with **24bit** colour:

- 1000(height) x 750(Width) pixels =   750,000 pixels in the image

- 24 bits per pixel x 750,000 =   18,000,000 bits in the image

- 18,000,000 / 8 =   2,250,000 bytes

- 2,250,000/1024 =   2,197 KB

- 2,197/1024 =   2.14 MB

Step 1: Use the Height and Width of the image

1000(height) x 750(Width) pixels =   750,000 pixels in the image

Step 2: Work out how many bits are used in the image (hint – in the question)

24 bits per pixel x 750,000 pixels in the image =   18,000,000 bits in the image

Step 3: Convert bits into Bytes (8 bits in a byte)

18,000,000 / 8 =   2,250,000 bytes

Step 4: Convert bytes into Kilo Bytes

2,250,000/1024 =   2,197 KB

Step 5: Convert kilo bytes into Mega Bytes

2,197/1024 =   2.14 MB

- **Note:** you will express the answer in Mega Bytes (2.14MB) **not in Bits** (18,000,000 bit).