More Image file calculations

Images are stored as **bitmaps** - grids of individual pixels

A **pixel** is a single point in a graphical image - a picture element

Each pixel is encoded with data about the colour to create a **number**

The number of bits used for each colour is the **colour depth**

More image file calculations

Key formulae:

image size = width x height

size in bits = width x height x colour depth

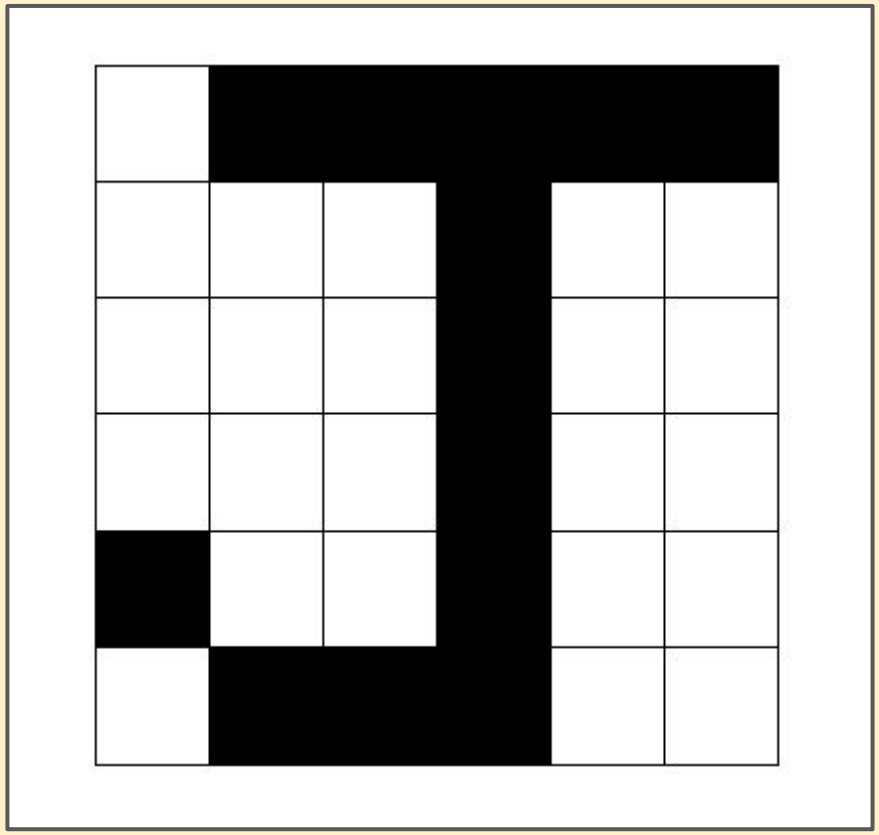
size in Bytes = (width x height x colour depth) /8

More image file calculations

The exam board loves questions like this:

Q. The image shows a black and white bitmap

What is the size of the image file on the computer?

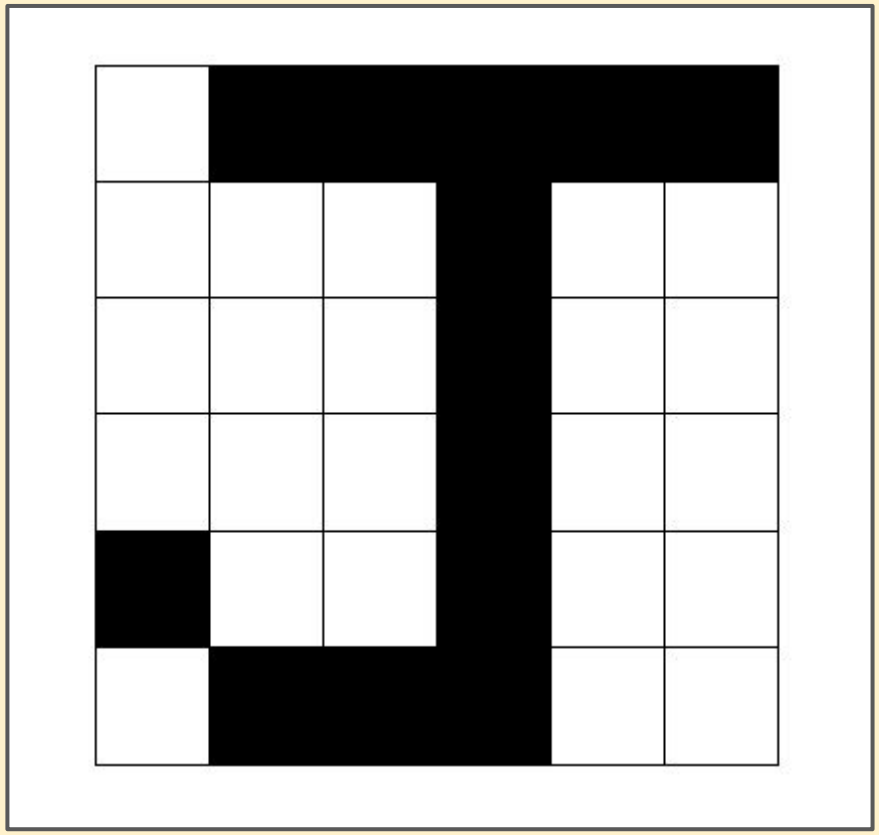


More image file calculations

A variation:

Q. The image shows a black and white bitmap

Explain why 36 bits are needed to represent the image

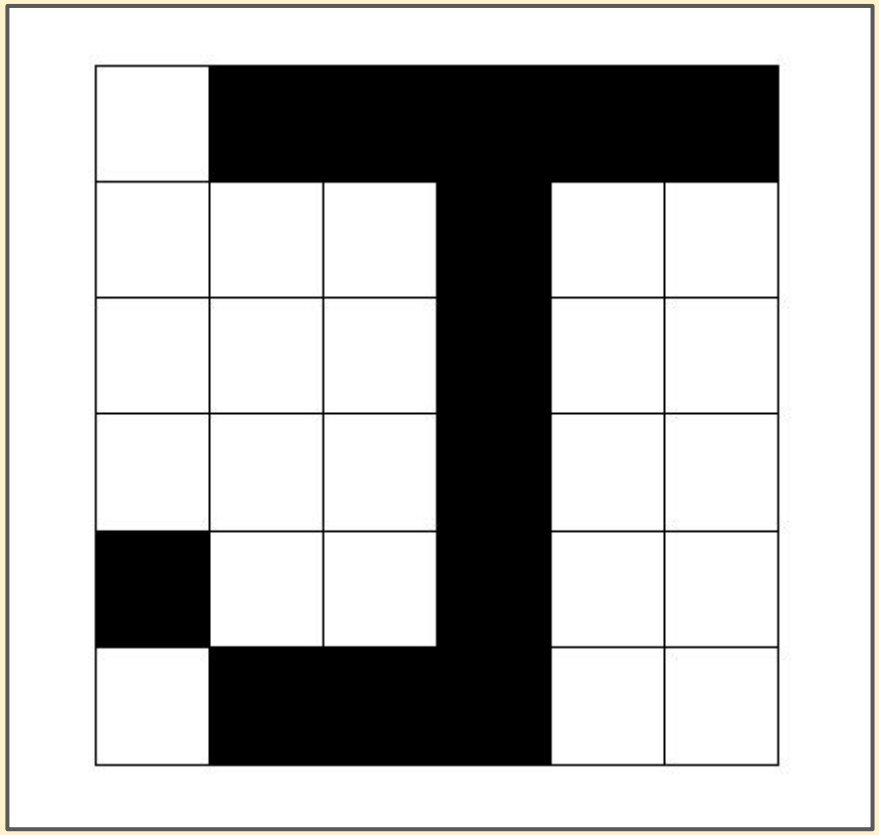


More image file calculations

Then they do this:

Q. The image shows a black and white bitmap

How many bits would be needed to represent the image if it used 5 colours rather than 2?



More image file calculations

The problem:

The answer **isn't** 6 x 6 x 5

Think: how many **bits** do you need to represent each colour if there are 5 different colours?

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5 colours = the numbers from 0 to 4

What binary numbers will we need for this?

More image file calculations

5 colours = the numbers from 0 to 4

What binary numbers will we need for this?

000, 001, 010, 011 and 100 will all be needed

So, we need **3 bits** - the colour depth is 3 bits to represent 5 colours

I know… This is **tricky**

More image file calculations

How many bits would be needed to represent the image if it used 5 colours rather than 2?

file size = width x height x colour depth

= 6 x 6 x 3

= 36 x 3

= 108 bits

More image file calculations

Try some more:

How many bits would be needed to represent the image if it used 3 colours?

How many bits would be needed to represent the image if it used 8 colours?

How many bits would be needed to represent the image if it used 12 colours?

More image file calculations

Try some more:

How many bits would be needed to represent the image if it used 3 colours? (6 x 6 x 2 = 72)

How many bits would be needed to represent the image if it used 8 colours? (6 x 6 x 3 = 108)

How many bits would be needed to represent the image if it used 12 colours? (6 x 6 x 4 = 144)

More image file calculations

How about this:

How many Bytes would be needed to represent the image if it used 256 colours?

More image file calculations

How about this:

How many Bytes would be needed to represent the image if it used 256 colours?

256 colours is 8 bit colour depth (0 to 255)

= 6 x 6 x 8 bits = 288 bits

= 288/8 Bytes

= 36 Bytes