

12.2 Image File Size Reduction

Syllabus 2026 - 2028

WHAT YOU NEED TO KNOW

- Recognise that reducing the file size can be achieved by reducing the image resolution or colour depth

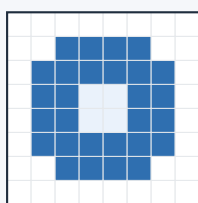
Why reduce the size of an image file

Large images take up a lot of storage and are slow to upload, download and display. A smaller image file saves storage space, is quicker to send and makes web pages load faster. Two main ways to reduce the size are to reduce the **resolution** and to reduce the **colour depth**.

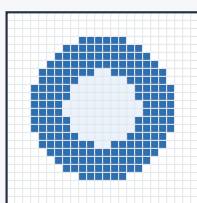
Image resolution

An image is made of tiny squares called **pixels**. The **resolution** is the number of pixels, usually given as width x height. More pixels give more detail, but a bigger file.

Figure 58: Image resolution



Low resolution: 8 x 8
few pixels, small file, blocky



High resolution: 24 x 24
many pixels, large file, smooth

Resolution = number of pixels

width x height, for example 1920 x 1080

Reducing it makes the file smaller
but the image loses detail and
looks pixelated if enlarged

- Reduce resolution:** use fewer pixels, so the file is smaller
- Effect: less detail, and the image looks blocky if it is enlarged
- Suitable for images shown on small screens or web pages

Colour depth

Colour depth is the number of bits used to store the colour of each pixel. More bits mean more possible colours.

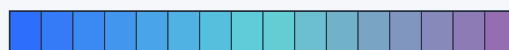
Figure 59: Colour depth

1 bit 2 colours



small file

4 bits 16 colours



8 bits 256 colours



24 bits 16.7 million colours



large file

More bits per pixel means more colours, better quality and a bigger file.

Colour depth	Number of colours	Typical use
1 bit	2 (black and white)	Simple line art, scanned text
8 bits	256	Icons and simple graphics
24 bits	More than 16 million	Photographs ('true colour')

- **Reduce colour depth:** fewer bits per pixel, so the file is smaller
- Effect: fewer colours, and smooth colour changes become bands, which is less accurate
- File size is roughly **pixels x bits per pixel**, so changing either one changes the size

Method	How it reduces size	Effect on the image
Lower resolution	Fewer pixels to store	Less sharp; blocky when enlarged
Lower colour depth	Fewer bits for each pixel	Fewer colours; banding
Crop the image	Removes pixels not needed	Smaller picture area
Compress the image	Stores the data more efficiently (for example JPEG)	Slight loss of quality with lossy compression

EXAM TIP

Always give a **link** between the change and the file size, for example 'reducing the resolution means fewer pixels, so there is less data to store and the file is smaller', and mention the **effect on quality**.

Key terms

Term	Meaning
Pixel	The smallest dot of colour in a digital image.
Resolution	The number of pixels in an image.
Colour depth	The number of bits used for each pixel's colour.
Bit	A single binary digit, 0 or 1.
File size	The amount of storage a file takes.
Pixelated	Blocky because the pixels are visible.
Compression	Reducing file size by encoding data more efficiently.
True colour	24-bit colour with more than 16 million colours.

Practice questions

Answer each question in full sentences. Command words used: State (give a short answer), Describe (say what it is like), Explain (give reasons), Analyse (break it down and examine it), Suggest (apply your knowledge to a situation), Compare and contrast (similarities and differences), Evaluate (weigh up and reach a judgement).

No.	Question	Marks
1	State two ways to reduce the file size of an image.	[2]
2	Describe what is meant by image resolution.	[2]
3	Explain why an image with a lower colour depth has a smaller file size.	[3]
4	Analyse the effect on a photograph of reducing its resolution.	[3]
5	Suggest how a web designer could reduce the file sizes of images so a page loads more quickly.	[3]
6	Compare and contrast reducing the resolution of an image with reducing its colour depth.	[4]
7	Evaluate the use of 1-bit colour depth for a photograph on a school website.	[5]
8	Describe the effect on the file size of doubling both the width and height of an image in pixels.	[2]

Total: 24 marks