

# Solutions

## Chapter 1: Understanding data compression

### Activity: Compression everywhere!, page 2

- 1 BFF** – best friends forever  
**IMHO** – in my humble opinion  
**B4N** – bye for now  
**OIC** – oh! I see!
- 2 :-D** – laughter  
**:’(** – crying  
**:\$** – embarrassed, blushing
- 3** Students’ responses may vary. Example response is: angry, sad, sly/sneaky, embarrassed, shocked and very amused.

### Knowledge probe: Opening files using a text editor, page 5

- 1** The JPEG is mostly visible but is cropped or corrupted.
- 2** The file is corrupted and artefacts appear in random positions.

### Skill builder: Lossy or lossless?, page 8

Table 1.2

File type	Full name	Data type(s)	Lossy or lossless compression?
<b>JPEG</b>	Joint Photographic Experts Group	Image	Lossy
<b>TIFF</b>	Tagged Image File Format	Image	Lossless
<b>MP3</b>	MPEG Audio Layer III	Audio	Lossy
<b>GIF</b>	Graphical Interchange Format	Image	Lossless
<b>TXT</b>	Text	Text	Lossless
<b>ZIP</b>	Zipper	File compression	Lossless
<b>PNG</b>	Portable Networks Graphic	Image	Lossless, normally
<b>BMP</b>	Bitmap	Image	Lossless but may act as a wrapper for a lossy format
<b>MPEG</b>	Moving Pictures Expert Group	Video	Lossy

## Review, pages 8–9

### Identify

- 1 With lossless compression the decompressed file is restored exactly with no loss of data. Lossy compression uses techniques that result in loss of data but which attempt to minimise the impact on the information conveyed when decompressed.
- 2 Lossy: JPEG, MP3. Lossless: GIF, PNG.
- 3 Compression reduces the amount of space required for storage of a file or for transmission over a network. At times the compressed file can be as much as 90% the size of the original. This can be critical in streaming movies for example, by delivering data fast enough to avoid delays.

### Analyse

- 4 The JPEG algorithm analyses and ranks pixel data on its importance to human visual perception and discards the less important information. The resolution of the image is reduced but we often do not notice it.
- 5 Run length encoding (RLE) compression happens at the level of the binary code itself by looking for recurring patterns in the sequences of 1s and 0s, and replacing these with shorter codes and recording the changes in a table.
- 6 General guidelines for usage of different format types:
  - If the image is to be used on a website or a mobile device, use JPEG or PNG.
  - If the image is a small line art or animation using flat colour on a website or a mobile device, use GIF.
  - If you wish to retain a transparent background, use PNG.
  - If the image is to appear in a quality hard copy print, use TIFF.
- 7 For audio files, simple compression can be achieved by:
  - reducing the sample rate (the number of sound samples taken per second)
  - making audio mono rather than stereo (this will halve the size)
  - reducing the sample size (the number of bits used to code the sound sample)
  - eliminating frequencies the human ear cannot detect as in MP3.

### Research

- 8 QuickTime, AVFoundation, Video for Windows, DirectShow and Media Foundation are development environments not codecs and they support many codecs. They can use standard extensions to distinguish their file types. .avi is always a Video for Windows file and .mov is always a QuickTime file. However, each format can support multiple codecs; for example, the H.264 codec.

When producing streaming files these must be prepared differently for the various applications.