3.3.8 Data compression (Introduction and Run Length Encoding (RLE))

Teacher notes

The topic 3.3.8 is split into two separate lessons:

- **Lesson 1** – This is an introduction to data compression and Run Length Encoding (RLE).
- **Lesson 2** – This focuses on Huffman coding.

The following URL has some very good background information on Run Length Encoding (RLE) suitable for GCSE students:

bbc.co.uk/education/guides/z7vc7ty/revision/7

Extra discussion points

Why use data compression?

Although not strictly necessary for the level here, it may help to explain that traditionally, compression was used simply to save space when **storage** was far more expensive than it is now. In fact, data compression is far more important when **transmitting** data as bandwidth is finite – particularly for WLAN/mobile-phone technologies.

Encourage students to think that it is not just the (relatively small) HTML content of a web page that a mobile phone may be asked to download but related images or sound even. If such files were sent at their full size, then download speeds would be drastically compromised.

Commonly used techniques

There are a number of available techniques, the specification does not require coverage of whether they are 'lossy' or 'lossless' compression techniques. In fact, Run Length Encoding (RLE) is lossless as the data can restored to its original format – **Quiz 1** and **Quiz 2** effectively demonstrate this idea. Other techniques may rely on algorithms that 'lose' data in order to maximise the efficiency of the compression.

Can all data be compressed with the same level of efficiency?

Again, not a focus of the specification but it is certainly of background interest that compression comes at a price – some form of encoding must take place in order to save space and this encoding information itself needs to be stored in a compressed file.

Notes on the exemplar materials used in the PowerPoint

It is common for textbooks to ‘grow their own’ formats for Run Length Encoding (RLE). It is difficult to locate a definitive set of rules for Run Length Encoding (RLE) compression.

Two examples are used in the notes provided here:

- The one specified by AQA for black-and-white bitmapped images.
- One using colour RGB images with a limited colour palette.

Clearly, many more variations could be utilised – in each question, it is made clear how the image is to be compressed.