



F8.9 Compression

Data representation · GCSE · OCR J277 1.2.5, AQA 8525 3.3.8, Edexcel
1CP2 2.3.2 · about 20 min

Name _____

Class _____

Date _____

What this lesson is about

Lossy and lossless; run length encoding and Huffman coding.

- Lossy and lossless
- Run length encoding
- Huffman coding
- Which to use

Questions

5 marks in all

- Which kind of compression must be used for a program file? [1 mark]
☐ A Lossless, because every character must be kept exactly
☐ B Lossy, because it is smaller
☐ C Either
☐ D Neither
- What does lossy compression do? [1 mark]
☐ A Permanently removes detail people are unlikely to notice
☐ B Keeps every bit of the original
☐ C Makes a file larger
☐ D Encrypts the file
- Run length encode **WWWWBBW** in the form count then character. [1 mark]

- On which data does RLE work worst? [1 mark]
☐ A Data where the value changes every character
☐ B Data with long runs
☐ C Black and white images
☐ D Blank rows
- In Huffman coding, which characters get the shortest codes? [1 mark]
☐ A The most frequent ones
☐ B The least frequent ones
☐ C Capital letters
☐ D The first characters in the message

The task: compress a row

Write `rle_encode(text)` and `rle_decode(code)` yourself. Encode the row

`.....#####.....#####.....` and print it as `encoded: <code>`, then print `original: <n>` characters, `encoded: <m>` characters, and finally `decoded matches: True`, using your `decode` function.

```
# the two lines every program starts with: the commands, then the robot
from bugbot import *
connect()

row = ".....#####.....#####....."
```

Plan your program here, then type it in and press Run.



Do it on the robot

www.bugbotlab.com/learn/f8-9-compression/

The simulator checks it and tells you when it passes. Nothing to install, no account.

Challenges

1. Find a row of 20 characters where RLE makes the result longer. What is the worst case?
2. Decode a Huffman-coded message: turn `codes` round into a dictionary from code to character, and read bits until they match a code.
3. Why would lossy compression be a bad idea for the robot's program files?