RUN LENGTH ENCODING ALGORITHM

Consider this icon of a space ship that could be used in a typical computer game to represent a player's life. A white pixel is represented with a 1. A black pixel is represented with a 0. The data is stored as a continual stream of binary digits (0 or 1) in a file.

1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1
1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
1	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1
1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1
1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1
1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1
1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1
1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1
1	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1
1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
1	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

1. Show how the file size has been calculated as 32 bytes.

2. Explain **how** run length encoding could compress this file:

3. Illustrate the data that would need to be stored using this table:

Bit run length	Bit value (0 or 1)
	1
	0
	1
	0
	1
	0
	1
	0
	1
	0
	1
	0
	1
	0
	1
	0
	1
	0
	1
	0
	1
	0
	1
	0
	1
	0
	1

Binary stored in compressed file

4. Calculate the size of the compressed file in bytes.

5. Create a 1 bit black & white 16x16 icon of a star.

6. Calculate the raw file size in bytes.		7. Calculate the run-length encoded file size in bytes.		8. By what percentage was the file size reduced by?	