

Solution

First, pupils need to realise that the code Stephen used was a basic code in which each letter has been replaced by its numerical position in the alphabet.

1 = A, 2 = B, 3 = C, 4 = D ... and so on.

This will help pupils to see how Matthew got the word **HELLO**.

To crack Matthew's code, they need to recognise that the numbers are not decimal, but binary.

They then work out the decimal for each of the binary numbers as follows:

- 11 = 3
- 10 010 = 18
- 1 = 1
- 11 = 3
- 1011 = 11

This gives the pupils 3, 18, 1, 3, 11.

They then use the basic code that Stephen originally used to substitute letters for the decimal numbers.

3 = **C**, 18 = **R**, 1 = **A**, 3 = **C**, 11 = **K**

They conclude that the coded message Matthew sent back to Stephen was for the word **CRACK**.

Pupils now need to take the letters of the word **MATHS** and substitute decimal numbers for the letters as follows:

M = 13, A = 1, T = 20, H = 8, S = 19

They convert each decimal into binary to get the following:

- 13 = 1101
- 1 = 1
- 20 = 10 100
- 8 = 1000
- 19 = 10 011

Finally, they put together the code that Stephen should send back to Matthew.

1101, 1, 10 100, 1000, 10 011



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