UNIT 1 *Substitution Ciphers*  

**Key Stage:** 3  
**Target:** *Mainstream Year 7 or high-achieving Year 5/6*  

**Teaching Notes**

Starting with fairly simple Caesar ciphers, this section extends to general substitution. Students are encouraged to think about how many Caesar/substitution ciphers are possible. They are also given a (gentle!) introduction to frequency analysis.

In *Exercise 6*, the concept of the number of permutations is introduced, starting with some straightforward examples students can work out 'by hand'.

For *Exercise 7*, students will hopefully be guided to the correct answer, which is 5 times the previous answer. This introduces the concept of factorial numbers.

In the *Activity*, students work through the processes step by step until they have enough information to finish.

**Solutions and Notes**

*Exercise 1*  
GONE TO WATCH HARLEQUINS. BACK AT SEVEN.

*Exercise 2*  
26 different ways

*Exercise 3*  
THIS HAS BEEN SHIFTED BY EIGHT

*Exercise 4*  
T might represent letter E; shift of 15; GIVE ME CHEESE PLEASE

*Exercise 5*  
JANUARY BRINGS THE SNOW

*Exercise 6*  
6 different substitution ciphers

*Exercise 7*  
(a) 24 different substitution ciphers  
(b) 120 different substitution ciphers

*Activity*  
Substitution table:

| Plain | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |
| Cipher| U | P | T | B | Z | O | K | F | V | A | G | M | J | Y | C | H | N | W | I | D |

Deciphered message:

LAST NIGHT I DREAMT I WENT TO MANDERLEY AGAIN. IT SEEMED TO ME I STOOD BY THE IRON GATE LEADING TO THE DRIVE AND FOR A WHILE I COULD NOT ENTER FOR THE WAY WAS BARRED TO ME.

Some letters are missing from the table.  
Words including letters missing from the table are needed for the table to be completed.

**Detailed Lesson Plans** are provided to help teachers in their delivery of interactive whole-class teaching.