Challenge 3 Solution

In challenge three the message was first encoded using a rotation cipher, then the letters of the enciphered message were converted to numbers according to the corresponding number on a telephone keypad. To decode one first needs to convert the letters back to numbers and then rotate the plaintext back into place.

On the keypad of a phone, numbers are associated with letters, although the association is not one to one. The number 2 is associated with the letters *abc*, the number 3 is associated with *def* and so on. The letters in the message can be decoded to their proper letter by looking at the number (which indicates a block of three letters) and the direction in which the number is slanted (which indicates which of the three letters). A number slanted to the left indicates the first letter in the block, no slant (vertical) indicates the middle letter and a slant to the right indicates the rightmost letter. In the case of numbers which correspond to four letters on a phone keypad, the "middle" should be determined by the context of the letter in the message. For example number 7 corresponds to four letters *pqrs* so a vertical 7 may correspond to a *q* or *r*. Since the *r* is more common, we replace the vertical 7 with an *r* but keep in mind that in the plaintext that *r* may actually correspond to a *q*. It is easy to decipher the message without using *q*'s and then fix it later if necessary. We first convert the number to their corresponding letter:

$6\,6372\,42$ $4\,5\,3\,4\,739$ $774\,523\,2$ $\lambda\,66\,8\,4\,6$ $\delta\,782\,543$

$76\,67363$ $62\,83687$ $54\,6\,466\,2$ $685\,2636$ $2968\,37\,3$

$2\,8363\,3\,8$ $7292\,6\,25$ $8\,2\,46376$ $343\,893\,4$ $3\,\lambda4\,8\,366$

Converted back to letters we get:

nmercha	ildisew	rrilbea	gontvin	truckhe
romrenf	oatfour	kpminoa	ntlando	aymuesd
atdoeet	sbycock	tainern	fiftyei	eghtdon

The letters were grouped in blocks of seven and were rotated by different amounts in each block. The first block was rotated right by one with the last letter in the block rotating back to the front of the block. The second block of seven was rotated by two, and so on. Below we underline the portion of each block that rotated around to the front when being encoded:

<u>n</u>mercha	<u>il</u>disew	<u>rr</u>ilbea	<u>g</u>ontvin	<u>tru</u>ckhe
<u>rom</u>renf	oatfour	kpminoa	<u>nt</u>lando	<u>ay</u>muesd
<u>atdo</u>eet	<u>sby</u>cock	<u>tain</u>ern	fiftyei	<u>eg</u>htdon

We take the underlined letters and put them back at the end of the block:

merchan disewil lbearri vingont hetruck fromren oatfour pminoak landont uesdaym eetatdo cksbyco ntainer fiftyei ghtdone.

Finally rewrite the text with correct spacing to reveal the message:

Merchandise will be arriving on the truck from Reno at four pm in Oakland on Tuesday. Meet at docks by container fifty eight. Done.