

The GCHQ recruitment puzzle begins on the page that announces the competition: <https://canyoufindit.co.uk>. The first step is to understand what it is that you are expected to do. If you examine the source code of this page

```
https://canyoufindit.co.uk/ - Original Source
File Edit Format
1 <!DOCTYPE html >
2 <!--[if lt IE 7]> <html class="no-js lt-ie9 lt-ie8 lt-ie7"> <![endif-->
3 <!--[if IE 7]> <html class="no-js lt-ie9 lt-ie8"> <![endif-->
4 <!--[if IE 8]> <html class="no-js ie8 lt-ie9"> <![endif-->
5 <!--[if IE 9]> <html class="no-js ie9"> <![endif-->
6 <!--[if gt IE 8]><!--> <html class="no-js"> <!--<![endif-->
7 <head>
8 <meta charset="utf-8">
9 <meta http-equiv="X-UA-Compatible" content="IE=edge,chrome=1">
10 <title>GCHQ :: Can you find it?</title>
11 <meta name="description" content="Our new challenge is to find and solve 5 codes we have hidden around the web. For anyone able
to rise to the challenge and find all the codes, you'll join an elite community of people with some of the specific skills we look for
at GCHQ.">
12 <meta name="viewport" content="width=1100">
13
14 <meta property="og:image" content="https://canyoufindit.co.uk/img/GCHQ.png"/>
15 <meta property="og:title" content="GCHQ :: Can you find it?"/>
16 <meta property="og:description" content="Our new challenge is to find and solve 5 codes we have hidden around the web. For
anyone able to rise to the challenge and find all the codes, you'll join an elite community of people with some of the specific skills
we look for at GCHQ."/>
17 <meta property="og:url" content="https://canyoufindit.co.uk/">
18 <meta property="og:site_name" content="GCHQ :: Can you find it?"/>
19
20 <link rel="stylesheet" href="css/normalize.css">
21 <link rel="stylesheet" href="css/main.css">
22 <script src="js/vendor/modernizr-2.6.2.min.js"></script>
23 </head>
24 <body>
25 <div id="header">
26 <div class="container">
27 <a rel="hub" id="gchq-logo" href="/">
28 GCHQ - explore another world...
29 </a>
30 <div class="module m-progress">
31 <p>Completed - <span id="number">0%</span></p>
32 <div class="bar-container">
33 <div class="bar-background">
34 </div>
35 <div id="bar-progress" class="" data-percent="20">
36 </div>
37 </div>
38 </div>
39 <div id="social-links" class="addthis_toolbox">
40 <ul>
41
42
43 <li><a rel="facebook" href="https://facebook.com/sharer.php?u=https%3A%2F%2Fcanyoufindit.co.uk%2F"
target="_blank" class="addthis_button_facebook facebook"></a></li>
44 <li><a rel="twitter" href="https://twitter.com/intent/tweet?url=https%3A%2F%2Fcanyoufindit.co.uk/&text=GCHQ%20%
3A%3A%20Can%20you%20find%20it%3F" target="_blank" class="addthis_button_twitter twitter"></a></li>
45 <li><a rel="email" href="mailto:?subject=Can%20you%20find%20the%20cyber%20secrets%3F&body=Last%20year%2C%20GCHQ%
20created%20a%20groundbreaking%20challenge%2C%20which%20asked%2027Can%20you%20crack%20it%27.%20Now%20in%202013%2C%20they%27r
e%20asking%
20Can%20you%20find%20it%3F%20The%20new%20challenge%20is%20to%20find%20and%20solve%205%20codes%20hidden%20around%20the%20web
.%20For%
20anyone%20able%20to%20rise%20to%20the%20challenge%20and%20find%20all%20the%20codes%2C%20they%27ll%20join%20an%20elite%20community%20of%
20people%20with%20some%20of%20the%20specific%20skills%20prized%20by%20GCHQ.%20%20GCHQ%20also%20have%20some%20great%20prizes.%20You%
20could%20win%201%20of%201.00%20Raspberry%20Pi%20or%201%20of%202.05%20Googl%20e%20Nexus%207%20tablets.%20Can%20you%20find%20it%3F%20https
3A/canyoufindit.co.uk/" class="addthis_button_email email-link addthis_button"></a></li>
46 </ul>
47 </div>
48 </div>
49 </div>
50
51 <div id="main">
52 <div class="container">
53 <h1>Can you find it?</h1>
54 <div class="main-content" role="main">
55 <pre>AWVLI QIQVT QOSQO ELGCV IIQWD LCUQE EOENN WWOAO
56 LTDNU QTGAW TSMDO QTLAO QSDCH PQQIQ DQQTQ OOTUD
57 BNIQH BHHTD UTEET FDU EA UMORE SQEQE MLTME TIREC
58 LICAI QATUN QRAL T ENEIN RKG</pre>
```

you will see that it includes the message:

"Our new challenge is to find and solve 5 codes we have hidden around the web. For anyone able to rise to the challenge and find all the codes, you'll join an elite community of people with some of the specific skills we look for at GCHQ."

So, we appear to be looking for a series of web pages each of which will contain a clue to the next page and an answer to the place in the boxes on the start page.

The first puzzle is on the page you see in your browser. It contains a series of characters:

AWVLI QIQVT QOSQO ELGCV IIQWD LCUQE EOENN WWOAO

LTDNU QTGAW TSMDO QTLAO QSDCH PQQIQ DQQTQ OOTUD

BNIQH BHHTD UTEET FDU EA UMORE SQEQE MLTME TIREC

LICAI QATUN QRALT ENEIN RKG

To a code breaker there are a few features that immediately strike you about this text:

1. It is displayed in groups of five characters. This is a historic trend used in part to stop any particular frequency or word matching to be made available by the format in which the message was transmitted. It is probably most famous from the many encrypted Enigma messages that one sees written about. In essence, you can ignore it as it is unlikely to provide you with anything useful for decrypting the message.
2. There are a large number of "Q's". This is unusual as Q is an infrequently used letter in the English language, and assuming the message is in English, the Q's probably serve some function. Such infrequently used characters are often used as spaces. So, it is likely that you can ignore the actual spaces used to create the five letter groups and assume that the Q's are the actual spaces.
3. For anyone who has dealt with ciphers the number of characters is of interest. Here we have 143 characters, which just happens to be the product of two prime numbers: 11 and 13. This is a big clue. What you are supposed to do is rearrange text as shown into a grid that is 11 by 13 characters:

A	W	V	L	I	Q	I	Q	V	T	Q	O	S
Q	O	E	L	G	C	V	I	I	Q	W	D	L
C	U	Q	E	E	O	E	N	N	W	W	O	A
O	L	T	D	N	U	Q	T	G	A	W	T	S
M	D	O	Q	T	L	A	O	Q	S	D	C	H
P	Q	Q	I	Q	D	Q	Q	T	Q	O	O	T
U	D	B	N	I	Q	H	B	H	H	T	D	U
T	E	E	T	F	D	U	E	A	U	M	O	R
E	S	Q	E	Q	E	M	L	T	M	E	T	I
R	E	C	L	I	C	A	I	Q	A	T	U	N
Q	R	A	L	T	E	N	E	I	N	R	K	G

Now if you read down the columns, using Q's as spaces you see the following message emerge:

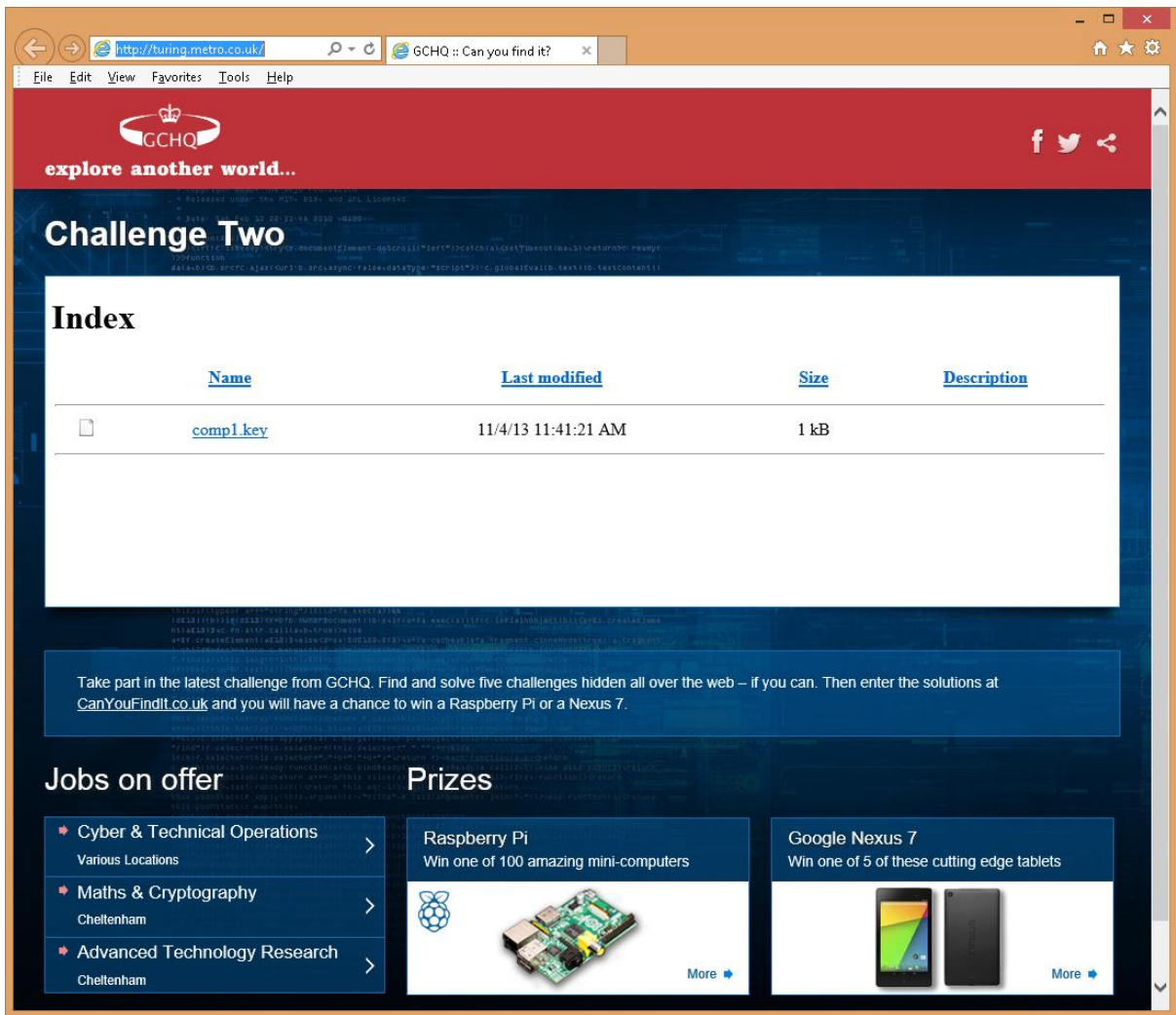
A COMPUTER WOULD DESERVE TO BE CALLED INTELLIGENT IF IT COULD DECEIVE A HUMAN INTO BELIEVING THAT IT WAS HUMAN WWW.DOT.METRO.DOT.CODOT.UK.SLASH.TURING

This form of encryption is a transposition cipher. It has many forms but the one used here is one of the simplest. It has a long history and before electronic encryption devices it, and its variants were the basis for many secret communications.

If you take the web address at the end of the message and write it in more familiar form:

www.metro.co.uk/turing

you have the next stop on your journey, plus you have the answer to the first clue which is "Turing".



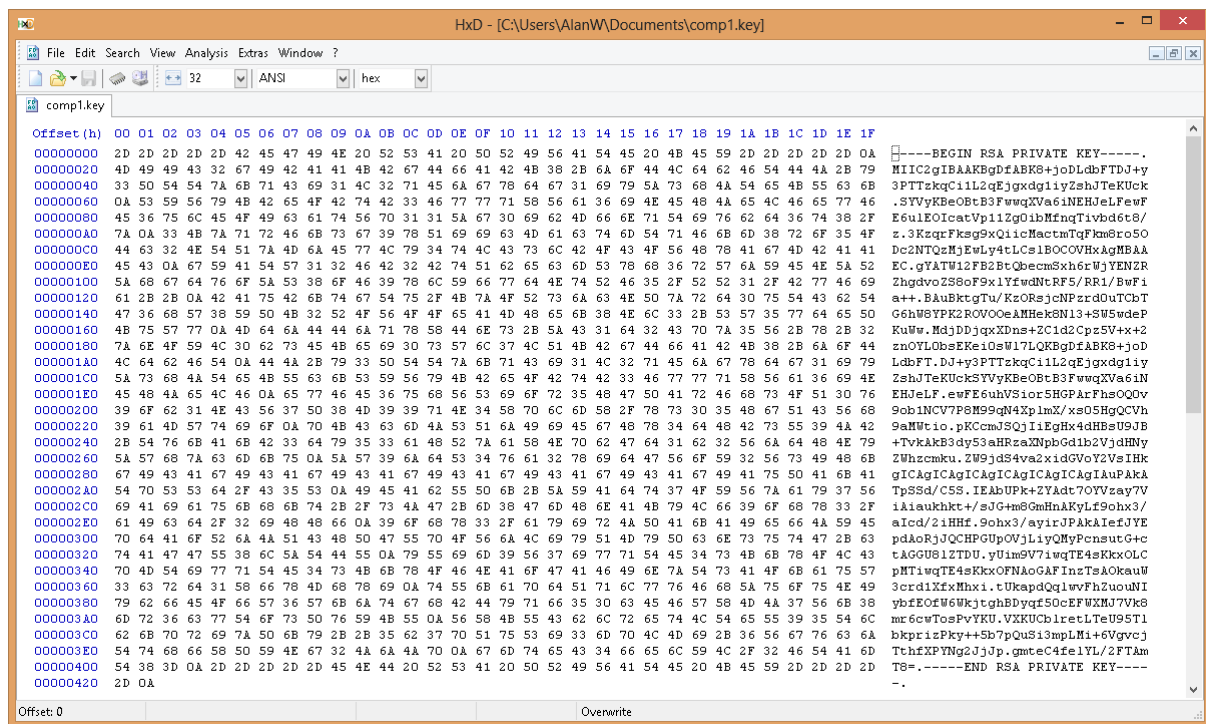
When you arrive at the new web page you see that there is a file available to download. It helpfully has the extension “key” so even before opening it one can assuming it is some form of encryption key. Download and open the file and you see the following:

-----BEGIN RSA PRIVATE KEY-----

```
MIIC2gIBAABgDfABK8+joDLdbFTDJ+y3PTTzkqCi1L2qEjgxdg1iyZshJTeKUck
SYVyKBeOBtB3FwwqXVa6iNEHJeLFewFE6ulEOlcatVp11Zg0ibMfnqTivbd6t8/z
3KzqrFksg9xQicMactmTqFkm8ro5ODc2NTQzMjEwLy4tLCsIBOCOVHxAgMBAAEC
gYATW12FB2BtQbecmSxh6rWjYENZRZhg dvoZS8oF9xIYfwdNtRF5/RR1/BwFia++
BAuBktgTu/KzORSjcNPzrd0uTCbTG6hW8YPK2ROVOOeAMHek8NI3+SW5wdePKuWw
MdJDDjqxXDns+ZC1d2Cpz5V+x+2znOYL0bsEKei0sWI7LQKBgDfABK8+joDLdbFT
DJ+y3PTTzkqCi1L2qEjgxdg1iyZshJTeKUckSYVyKBeOBtB3FwwqXVa6iNEHJeLF
ewFE6uhVSior5HGPArFhsOQ0v9ob1NCV7P8M99qN4XplmX/xs05HgQCVh9aMWtio
pKCcmJSQjliEgHx4dHBsU9JB+TvkaKB3dy53aHRzaXNpbGd1b2VjdHNyZWZcmku
ZW9jdS4va2xidGVoY2VsiHkgICAgICAgICAgICAgICAgIAuPAKATpSSd/C5S
```

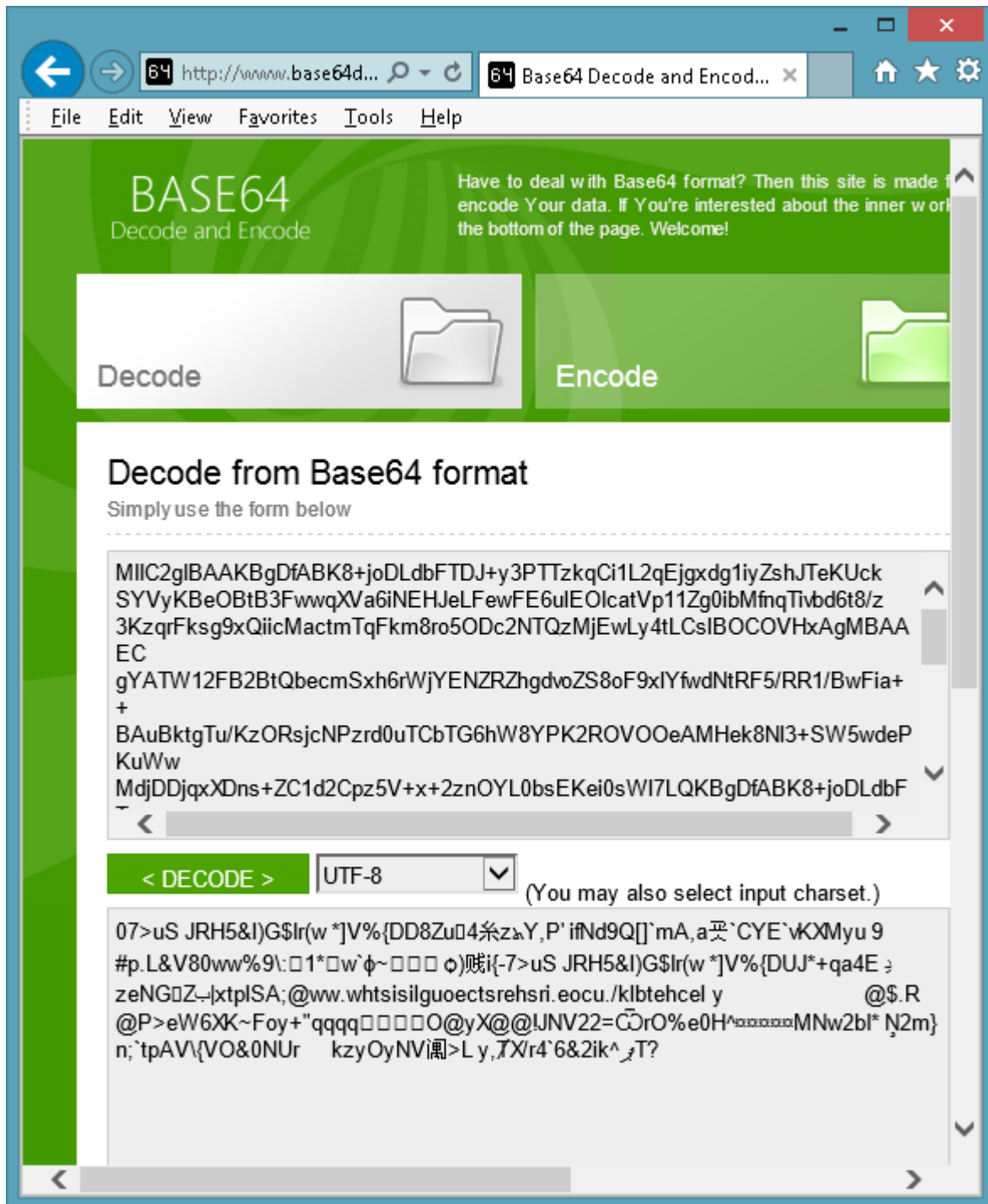
```
IEAbUPk+ZYAdt7OYVzay7ViAiaukhkt+/sJG+m8GmHnAKyLf9ohx3/aIcd/2iHHf
9ohx3/ayirJPAkAlefJYEpdAoRjJQCHPGUpOVjLiyQMYPcnsutG+ctAGGU8IZTDU
yUim9V7iwqTE4sKkxOLCpMTiwqTE4sKkxOFNAoGAFInzTsAOkauW3crd1XfxMhxi
tUkapdQqlwvFhZuouNlybfEOfW6WkjtgHBDyqf50cEFWXMJ7Vk8mr6cwTosPvYKU
VXKUCblretLTu95TlbpkprizPky++5b7pQuSi3mpLMi+6VgvcjTthfXPYNg2JjJp
gmteC4feYL/2FTAmT8=
-----END RSA PRIVATE KEY-----
```

If you take this on face value it is a RSA Private Key from an RSA Public/Private key pair. What is a lot less clear is what it is supposed to be used to decrypt. The page contains no other text or files that would seem to be usable with this key. You have to assume the key itself has something more to tell you. So, the starting point of most forensics is to open the file in a hex editor and see what it might reveal:



Even when you remove the header and footer (-----BEGIN RSA PRIVATE KEY----- and -----END RSA PRIVATE KEY-----) it doesn't tell you much.

As is common practice for transmitting keys, the file is encoded using Base64. There are lots of online Base64 decoders into which you can place this key for decoding (remembering to remove the header and footer first). I used <http://www.base64decode.org/> which gave me:



As you scan through the decoded string of characters you see a string embedded in it which starts to look familiar: www.whthisgloucestershiresri.ecu./klbtehcel y

And if you do a simple swap of alternate characters you find you have another web address:

www.thisisgloucestershiresri.co.uk/bletchley

Sure enough this is the next stop on the journey, and “Bletchley” is the next answer for the main page:

The page contains a new stream if characters:

```
2910404C21CF8BF4CC93B7D4A518BABF34B42A8AB0047627998D633E653AF63A873C\
8FABBE8D095ED125D4539706932425E78C261E2AB9273D177578F20E38AFFE124E06\
8D230BA64AEB8FF80256EA015AA3BFF102FE652A4CBD33B4036F519E5899316A6250\
840D141B8535AB560BDCBDE8A67A09B7C97CB2FA308DFFBAD9F9
```

It looks very much like a modern cipher stream so one has to assume there is a key for decrypting it which of course we were just given on the previous page. So, let's revisit the key we were given.

Files that begin and end with these words have a very definite format. It is known as PKCS#1 and comprises the following elements:

1. ASN.1 Header
2. Algorithm Version
3. Modulus
4. Public Exponent
5. Private Exponent
6. prime1

7. prime2
8. exponent 1
9. exponent 2
10. coefficient

Each of these can be extracted manually by partitioning up the hex format of the key. If you do that you see that the web address www.thisisgloucestershire.co.uk/Bletchley is in the component known as Prime 2.

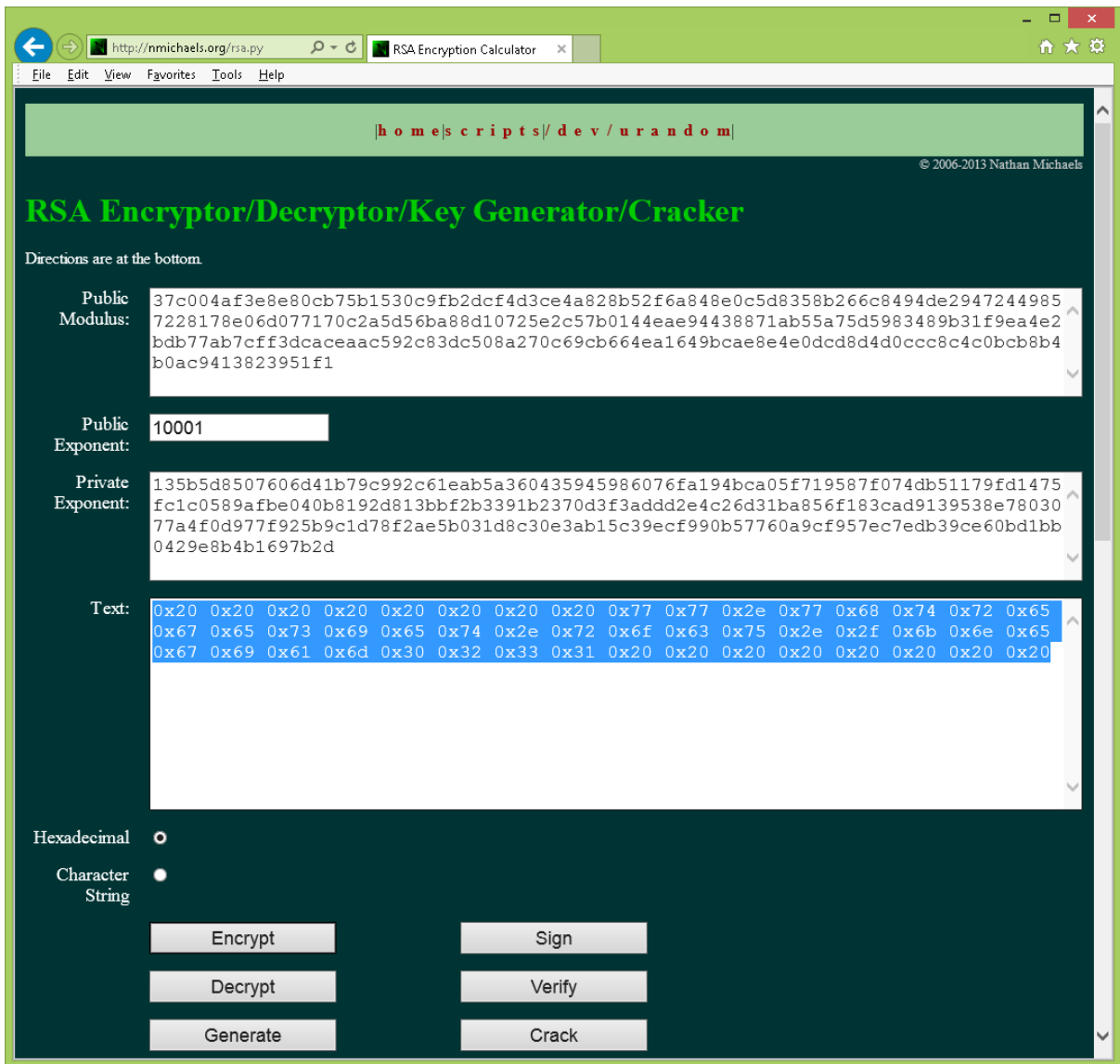
There are online descriptions if you wanted to go this route eg http://etherhack.co.uk/asymmetric/docs/rsa_key_breakdown.html However, the simpler way is to use a tool such as OpenSSL which is available here <http://www.openssl.org/> This will give you all of the components of the Private Key by analysing the key file with the simple command:

```
openssl.exe RSA -in compl.key -text
```

which outputs the following:


```
Command Prompt
Private-Key: (1022 bit)
modulus:
 37:c0:04:af:3e:8e:80:cb:75:b1:53:0c:9f:b2:dc:
 f4:d3:ce:4a:82:8b:52:f6:a8:48:e0:c5:d8:35:8b:
 26:6c:84:94:de:29:47:24:49:85:72:28:17:8e:06:
 d0:77:17:0c:2a:5d:56:ba:88:d1:07:25:e2:c5:7b:
 01:44:ea:e9:44:38:87:1a:b5:5a:75:d5:98:34:89:
 b3:1f:9e:a4:e2:bd:b7:7a:b7:cf:f3:dc:ac:ea:ac:
 59:2c:83:dc:50:8a:27:0c:69:cb:66:4e:a1:64:9b:
 ca:e8:e4:e0:dc:d8:d4:d0:cc:c8:c4:c0:bc:b8:b4:
 b0:ac:94:13:82:39:51:f1
publicExponent: 65537 (0x10001)
privateExponent:
 13:5b:5d:85:07:60:6d:41:b7:9c:99:2c:61:ea:b5:
 a3:60:43:59:45:98:60:76:fa:19:4b:ca:05:f7:19:
 58:7f:07:4d:b5:11:79:fd:14:75:fc:1c:05:89:af:
 be:04:0b:81:92:d8:13:bb:f2:b3:39:1b:23:70:d3:
 f3:ad:dd:2e:4c:26:d3:1b:a8:56:f1:83:ca:d9:13:
 95:38:e7:80:30:77:a4:f0:d9:77:f9:25:b9:c1:d7:
 8f:2a:e5:b0:31:d8:c3:0e:3a:b1:5c:39:ec:f9:90:
 b5:77:60:a9:cf:95:7e:c7:ed:b3:9c:e6:0b:d1:bb:
 04:29:e8:b4:b1:69:7b:2d
prime1:
 37:c0:04:af:3e:8e:80:cb:75:b1:53:0c:9f:b2:dc:
 f4:d3:ce:4a:82:8b:52:f6:a8:48:e0:c5:d8:35:8b:
 26:6c:84:94:de:29:47:24:49:85:72:28:17:8e:06:
 d0:77:17:0c:2a:5d:56:ba:88:d1:07:25:e2:c5:7b:
 01:44:ea:e8:55:4a:2a:2b:e4:71:8f:02:b1:61:b0:
 e4:34:bf:da:1b:d4:d0:95:ec:ff:0c:f7:da:8d:e1:
 7a:65:99:7f:f1:b3:4e:47:81:00:95:87:d6:8c:5a:
 d8:a8:a4:a0:9c:98:94:90:8c:88:84:80:7c:78:74:
 70:6c:53:d2:41:f9:3b:e4
prime2:
 77:77:2e:77:68:74:73:69:73:69:6c:67:75:6f:65:
 63:74:73:72:65:68:73:72:69:2e:65:6f:63:75:2e:
 2f:6b:6c:62:74:65:68:63:65:6c:20:79:20:20:20:
 20:20:20:20:20:20:20:20:20:20:20:20:20:20:20:
 20:20:0b:8f
exponent1:
 13:a5:24:9d:fc:2e:52:20:40:1b:50:f9:3e:65:80:
 1d:b7:b3:98:57:36:b2:ed:58:80:89:ab:a4:86:4b:
 7e:fe:c2:46:fa:6f:06:98:79:c0:2b:22:df:f6:88:
 71:df:f6:88:71:df:f6:88:71:df:f6:88:71:df:f6:
 b2:8a:b2:4f
exponent2:
 08:79:f2:58:12:97:40:a1:18:c9:40:21:cf:19:4a:
 4e:56:32:e2:c9:03:32:3d:c9:ec:ba:d1:be:72:d0:
 06:19:4f:25:65:30:d4:c9:48:a6:f5:5e:e2:c2:a4:
 c4:e2:c2:a4:c4:e2:c2:a4:c4:e2:c2:a4:c4:e2:c2:
 a4:c4:e1:4d
coefficient:
 14:89:f3:4e:c0:0e:91:ab:96:dd:ca:dd:d5:77:f1:
 32:1c:62:b5:49:1a:a5:d4:2a:97:0b:c5:85:9b:a8:
 b8:d2:32:6d:f1:0e:7d:6e:96:92:3b:60:84:10:f2:
 a9:fe:74:70:41:56:5c:c2:7b:56:4f:26:af:a7:30:
 4e:8b:0f:bd:82:94:55:72:94:09:b9:6b:7a:d2:d3:
 79:4f:79:4e:56:e4:a6:b8:b3:3e:4c:be:fb:96:fb:
 a5:0b:92:8b:79:a9:2c:c8:be:e9:58:2f:72:34:ed:
 85:f5:cf:60:d8:36:26:32:69:82:6b:5e:0b:87:de:
 95:82:ff:d8:54:c0:99:3f
```

Now find yourself a RSA decryptor. I used one written by Nathan Michaels at <http://nmichaels.org/rsa.py>



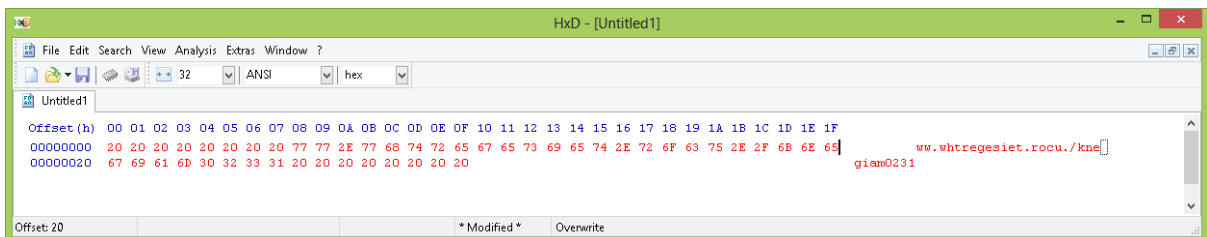
Hence the decoded hex string is:

20 20 20 20 20 20 20 20 20 77 77 2e 77 68 74 72 65 67 65 73 69 65

74 2e 72 6f 63 75 2e 2f 6b 6e 65 67 69 61 6d 30 32 33 31 20 20

20 20 20 20 20 20

If you put this back into your favourite Hex editor you again see a web address that has had each character swapped:



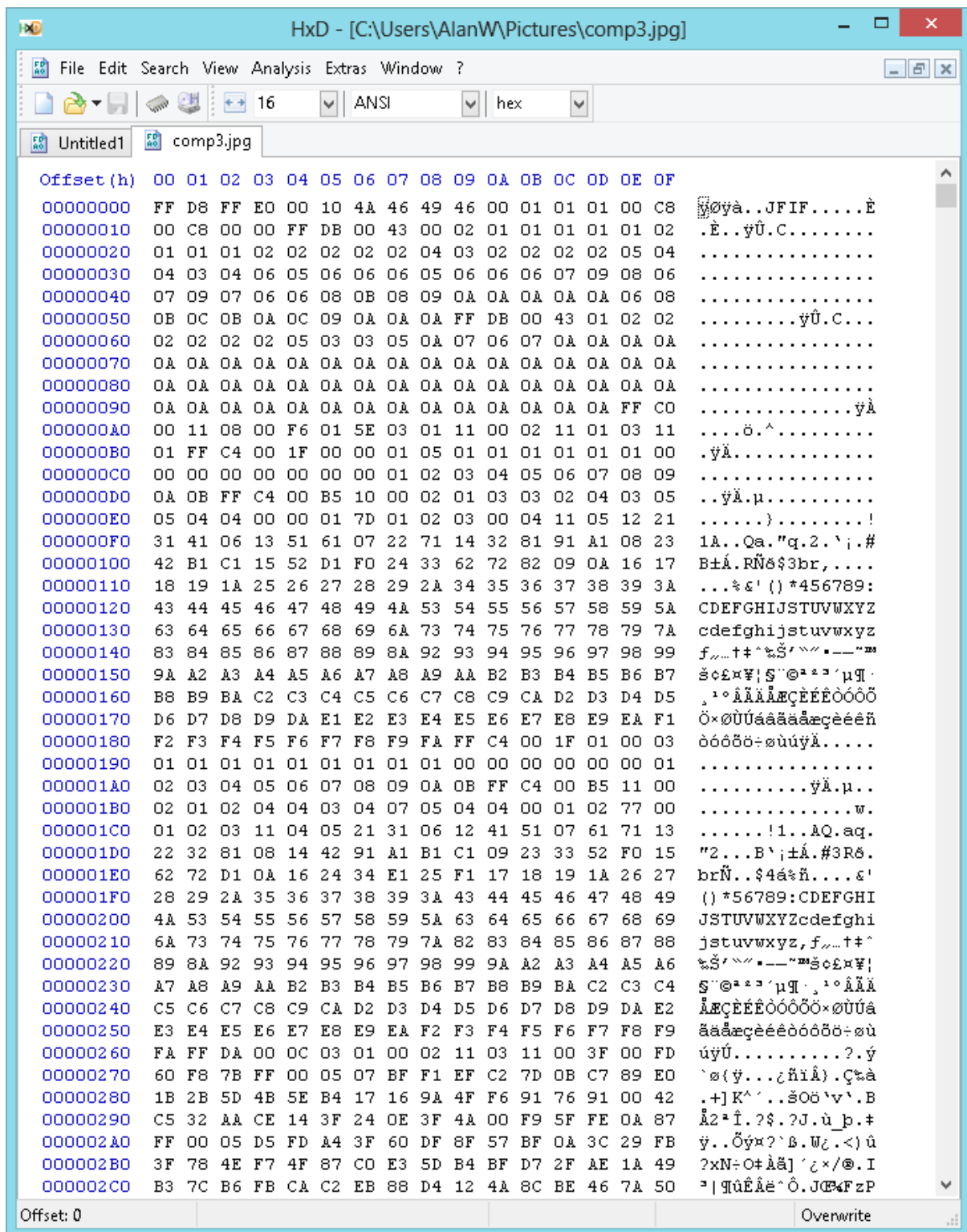
So, swapping back the characters in the string `ww.whrtregesiet.rocu./knegiam0231` gives you the URL: www.theregister.co.uk/enigma2013 Hence, you have the next stop on the journey and, following the pattern where the last part of the URL is the answer for the home page, your next answer is Enigma2013.

This next page presents something new:

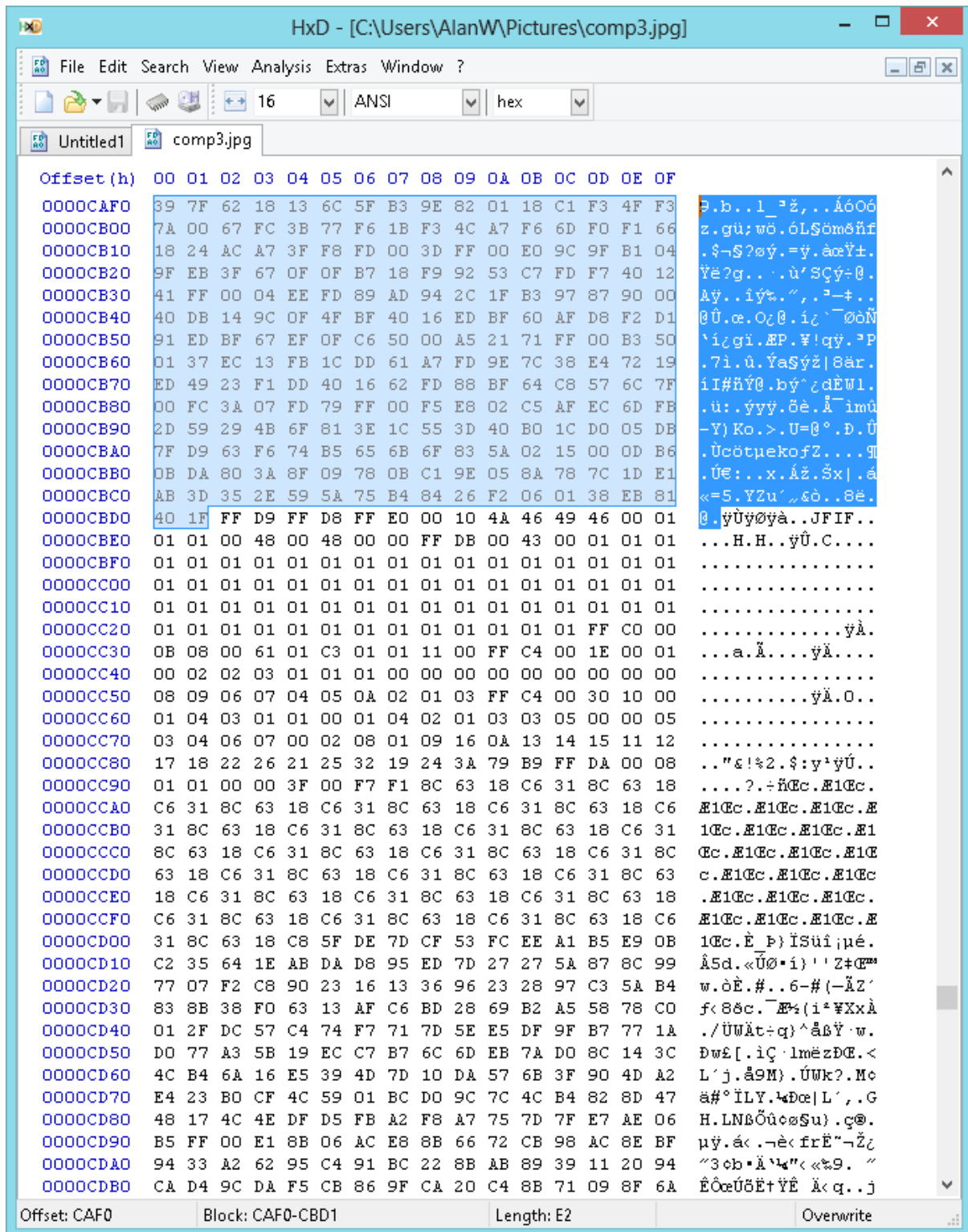
The screenshot shows a web browser window displaying the GCHQ Challenge Four page. The browser's address bar shows the URL `http://www.theregister.co.uk/enigma2013`. The page has a red header with the GCHQ logo and the tagline "explore another world...". Below the header, the main content area is dark blue with the title "Challenge Four" in white. A central image shows a large, complex machine, identified as Colossus. Below the image, a text box invites users to participate in the challenge, promising a chance to win a Raspberry Pi or a Nexus 7. At the bottom, there are sections for "Jobs on offer" and "Prizes". The "Jobs on offer" section lists three categories: Cyber & Technical Operations, Maths & Cryptography, and Advanced Technology Research. The "Prizes" section highlights the Raspberry Pi and Google Nexus 7.

The new element is a picture. For anyone who has visited Blechely Park they will recognise the machine shown as Colossus, the first computer which was used to crack the Enigma code in the Second World War.

As before let's take this image file and open it in our hex editor:



At first it appears to be a standard jpeg file with the usual header that you would expect. However, as you scan down the file you notice there is another jpeg file header.



Someone has added a second image to the end of the main image. Using your hex editor it's a simple matter to delete everything before the second jpeg header, save the edited file and try to open this newly shortened file. What you see is this:

www.eveningstandard.co.uk/colossus

As before, you have your next answer (Colossus) and your next port of call.

ES London Evening Standard | ... X

File Edit View Favorites Tools Help

GCHQ
explore another world...

Challenge Five

CanYouFindIt.co.uk/secured

Take part in the latest challenge from GCHQ. Find and solve five challenges hidden all over the web – if you can. Then enter the solutions at CanYouFindIt.co.uk and you will have a chance to win a Raspberry Pi or a Nexus 7.

Jobs on offer Prizes

- Cyber & Technical Operations
Various Locations
- Maths & Cryptography
Cheltenham
- Advanced Technology Research
Cheltenham

Raspberry Pi
Win one of 100 amazing mini-computers

Google Nexus 7
Win one of 5 of these cutting edge tablets

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This page presents you with a URL directly, and in solving puzzles sometimes the obvious answer is the right answer. If you use this web address it takes you back to the start page, and if the pattern is maintained your final answer should be “Secured”.

Returning to the start page and typing in your answers:

Completed - 0%

explore another world...

Can you find it?

AWVLI QIQVT QOSQO ELGCV IIQWD LCUQE EOENN WWOAO
 LTDNU QTGAW TSMDO QTLAO QSDCH PQQIQ DQQTQ OOTUD
 BNIQH BHHTD UTEET FDUEA UMORE SQEQE MLTME TIREC
 LICAI QATUN QRALT ENEIN RKG

Your answers


Answer 1
 Answer 2
 Answer 3
 Answer 4
 Answer 5

Jobs on offer

- Cyber & Technical Operations
Various Locations
- Maths & Cryptography
Cheltenham
- Advanced Technology Research
Cheltenham


Prizes

Raspberry Pi
Win one of 100 amazing mini-computers



[More](#)

Google Nexus 7
Win one of 5 of these cutting edge tablets



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then reveals that you've followed the trail correctly and you can provide GCHQ with your contact details if you wish to be considered for a job.

Browser: <https://canyoufindit.co.uk/> | GCHQ :: Can you find it? | Completed - 100%

explore another world...

Can you find it?

AWVLI QIQVT QOSQO ELGCV IIQWD LCUQE EOENN WWOAO
 LTDNU QTGAW TSMDO QTLAO QSDCH PQQIQ DQQTQ OOTUD
 BNIQH BHHTD UTEET FDUEA UMORE SQEQE MLTME TIREC
 LICAI QATUN QRALT ENEIN RKG

Congratulations

You've found and solved every one of the challenges hidden around the web.

Enter your details for a chance to win in our free prize draw.

Name:
 Surname:
 Email:

Opt-in to receive future employment related opportunities
 Accept [terms and conditions](#)


Jobs on offer

- Cyber & Technical Operations
Various Locations
- Maths & Cryptography
Cheltenham
- Advanced Technology Research
Cheltenham

Prizes

Raspberry Pi


Win one of 100 amazing mini-computers



[More](#)

Google Nexus 7

Win one of 5 of these cutting edge tablets



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If followed the trail correctly then congratulations. If not, even following through with answer sheets like this one can help you understand the mind-set you need to work on the more complex area of communications security. I'm sure there will be more opportunities to put what you have learned to use.