

Codename: ULTRA



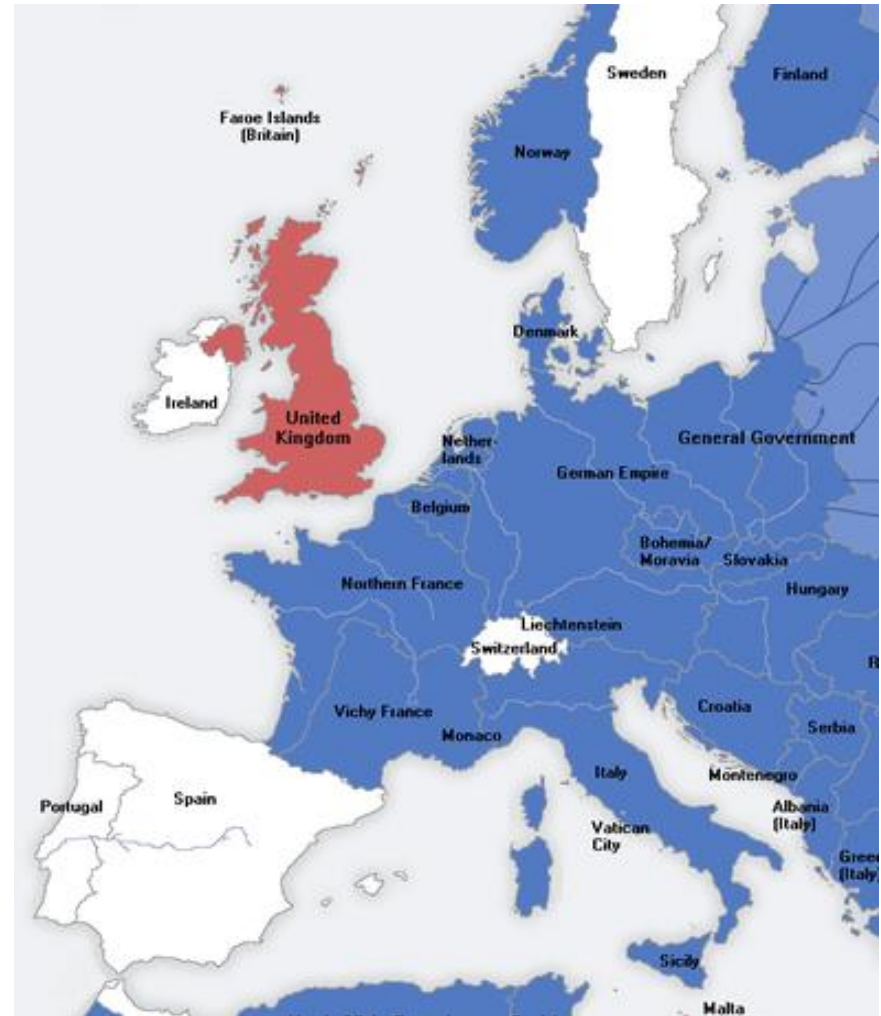
Can your mathematical skills save the United Kingdom from defeat and invasion?

June, 1940

Only the United Kingdom remains free to fight the menace of Nazi Germany.

In order to keep fighting, the UK must import 5 millions tons of food, fuel and military equipment every month.

If the UK cannot get these supplies, it will be forced to surrender to Nazi Germany. The consequences of this for the UK and the rest of the world are unthinkable...

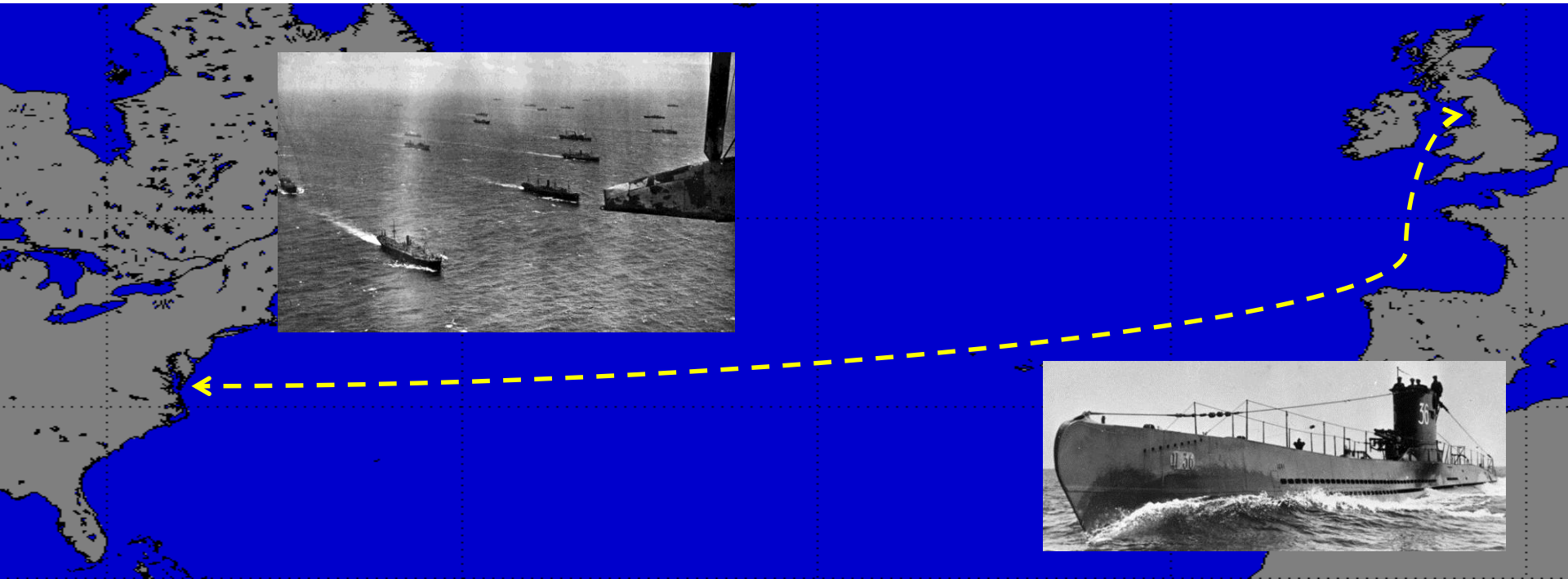


The Threat

The UK's vital supplies are delivered by merchant ships which travel from the USA and across the Atlantic Ocean in order to reach us.

Unfortunately, despite the Royal Navy and RAF's best efforts, these merchant ships have very little protection whilst crossing the Atlantic.

They face attack from Nazi aircraft, sea-mines, warships and most worrying of all, submarines, better known as **U-boats**.



The Prime Minister writes...

To the people of Hut 8, Station X:

The U-Boats frighten me. If they sink at least 150 of our merchant ships per month for a whole year, Britain will be forced to surrender.

I know you will use your mathematical talents with all your might.

Your mission: To crack the Nazi codes, decode their messages and use what you have learned to protect our merchant ships, bringing vital supplies!



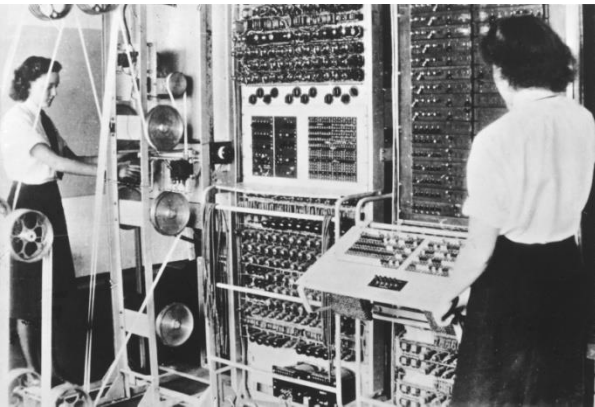
W. S. Churchill



Station X?

The codename for Bletchley Park, Buckinghamshire, home to the UK's wartime codebreakers.

Mathematicians are very much in demand!



Keep Calm and Carry On...

Right, I'm now going to hand you over to First Officers Owen and Leavold. They'll brief you on how the tasks ahead.

Good luck; the UK is counting on you all!



**KEEP
CALM
AND
CARRY
ON**



**FREEDOM IS
IN PERIL
DEFEND IT
WITH ALL
YOUR MIGHT**



**YOUR COURAGE
YOUR CHEERFULNESS
YOUR RESOLUTION
WILL BRING
US VICTORY**

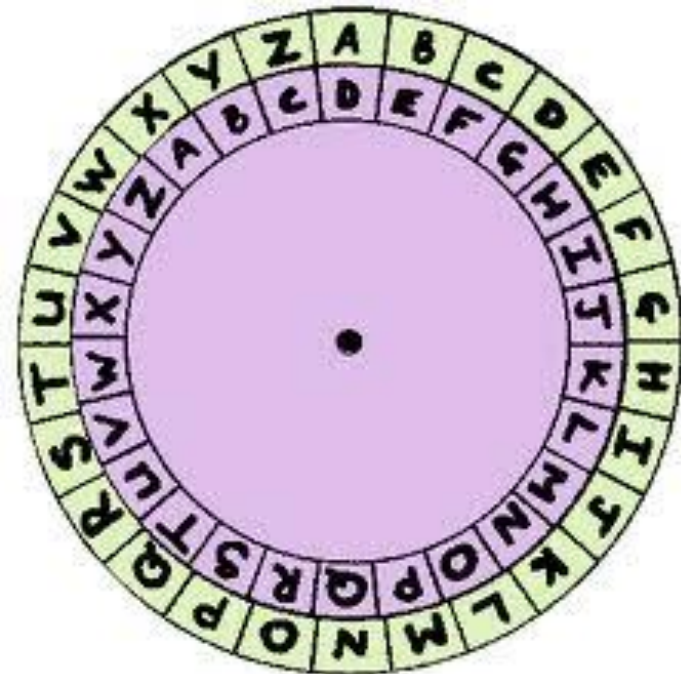


The Caesar Shift Code

This code is named after the famous Roman Emperor Julius Caesar. He used it to communicate with officers in his army across the Roman Empire.

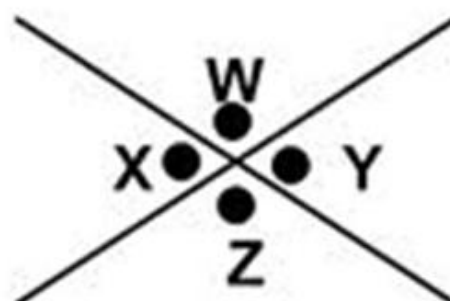
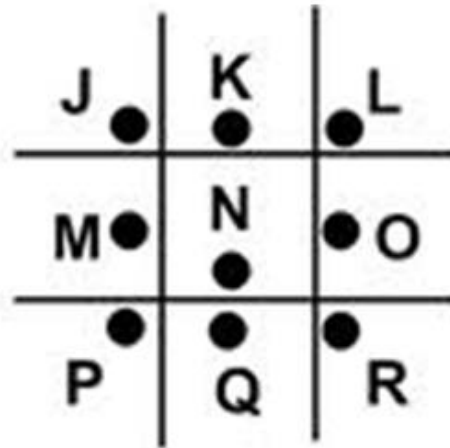
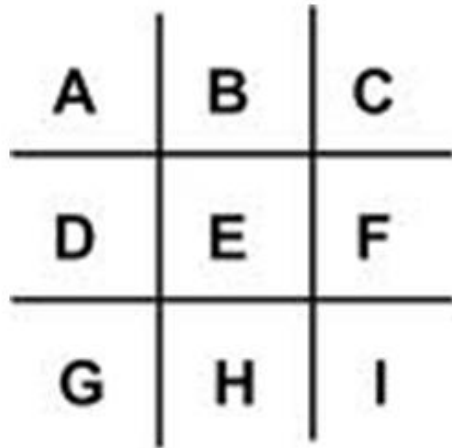
The code works by shifting all the letters in the alphabet across by a certain number of places. For example, a shift of PLUS 3, would move all the letters along 3 places. So A would become D, B would be E etc.

A useful device to help use this type of code is the Caesar shift wheel, shown here.



The Pigpen Cipher

The Pigpen Cipher uses symbols rather than letters. The name came about because it was thought that the letters were like 'pigs' traipped in the straight lines that looked like 'pens'.



Transposition Cipher

This cipher is based on **factors** and **multiples**. You remove the spaces from a normal message and count the number of letters. If necessary, add extra letters at the end to get up to a number with lots of factors. You then re-write the message in a grid like this.

n	o	w	r	u	n	a	l	o	n	g	a
n	d	d	o	n	t	g	e	t	i	n	t
o	m	i	s	c	h	i	e	f	i	a	m
g	o	i	n	g	o	u	t	x	x	x	x

The coded message will look like this:

Nnogodmowdiroshuncgnthoagiuleetotfxniixgnaxatmx.

To crack it you need to count the number of letters and try different sized grids.