

# 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**.



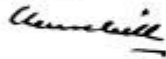
# The Prime Minister writes...

To the women 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.

Codebreaking takes place in Hut 8; translating messages into English takes place in Hut 4.

80% of Bletchley's 9,000 staff are women.

Mathematicians are very much in demand!



# Keep Calm and Carry On...

Right, I'm now going to hand you over to First Officer King of the WRNS. She'll brief you on how to actually crack those pesky Nazi codes.

Good luck; the UK is counting on you all!



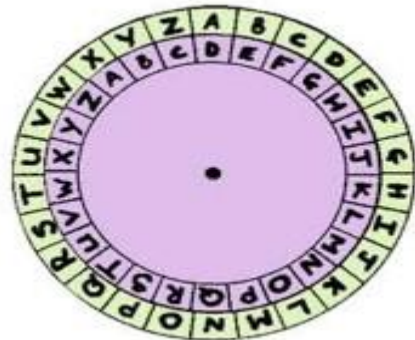
## *The Caesar Shift Code*

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.

You will be given a template of this to help you crack your codes.



On the page after the wheel template you will find your challenge – can you use the Caesar Shift Wheel to crack the code and protect our ships?

GOOD LUCK!!!!

When you have solved it, try challenging the grown-ups. Write a sentence then put it into the code and give it them. Are they as good as you?

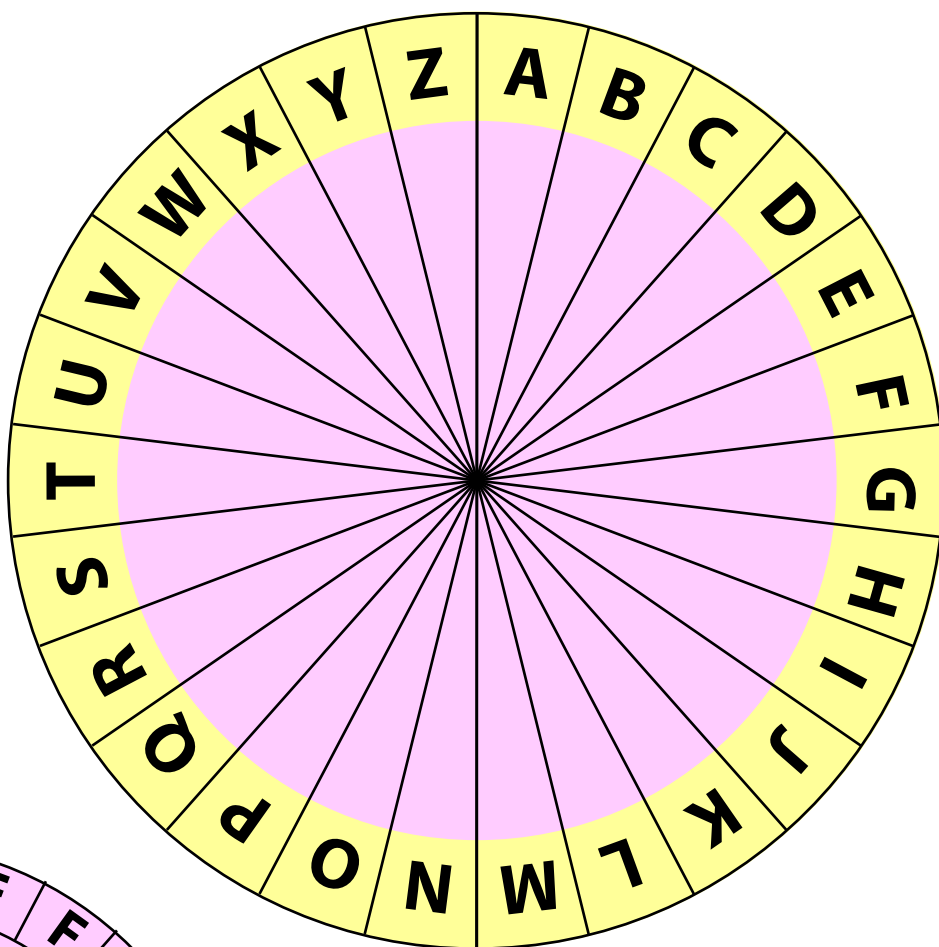


## Make a Caesar Shift Wheel:

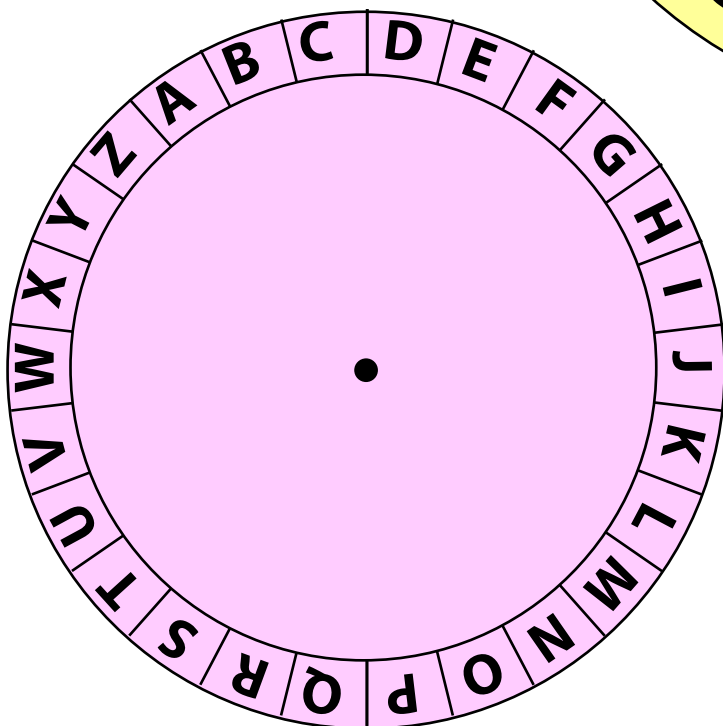
- 1) Carefully cut out the two circles. Ask a grown up to help you if you need to.
- 2) Place the Inner Wheel on top of the Outer Wheel so that the middles meet.
- 3) Poke a small hole through the centre of both circles using a sharp pencil with some blu-tak beneath.
- 4) Push a split pin or other small object through the hole to secure the two circles together, so the smaller circle can spin freely. Alternately, you can turn the wheel without doing this.

You can then use this wheel to solve Pam's puzzles!

Outer  
Wheel



Inner  
Wheel



**1) Message from 1940 – Caesar Shift PLUS FOUR (+4)**

XLI YO LEW MRZEH IH MGIPERH WS XLI VEJ GER YWI MX  
EW E FEWI XS TVSXIGX WLMTW MR XLI GIRXVEP  
EXPERXMG

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**2) Message from 1941 – Caesar Shift PLUS SEVEN (+7)**

QVSSF NVVK ZOVD! OTZ IBSSKVN OHZ JHWABYLK  
H B-IVHA, PUJSBKPUN HU LUPNTH JVKL THJOPUL!

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### 3) Message from 1945 – Caesar Shift MINUS EIGHT (-8)

LZW OSJ AK GNWJ. 3,500 MC EWJUZSFL KZAHK OWJW  
KMFC, SFV 25% GX LZWAJ UJWOK OWJW CADDWV

----- . 3,500 -----  
----- , ----- 25% -----  
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### Answers:

- 1) *The UK has invaded Iceland so the RAF can use it as a base to protect ships in the central Atlantic.*
- 2) *Jolly good show! HMS Bulldog has captured a U-Boat, including an Enigma Code Machine!*
- 3) *The war is over. 3,500 UK merchant ships were sunk, and 25% of their crews were killed.*