

Welcome to Bletchley Park. I'm Alan Turing and you're going to be working on my codebreaking team. I'll guide you through your first day.

We have to break today's code as quickly as we can if we want to save people's lives. Let's start with yesterday's code. Use it in our preliminary equations.



a = 2	e = 8	i = 24	m = 15	q = 23	u = 9	y = 20
b = 3	f = 1	j = 4	n = 18	r = 26	v = 25	z = 19
c = 5	g = 10	k = 14	o = 17	s = 16	w = 11	
d = 6	h = 12	l = 21	p = 22	t = 7	x = 13	



## Stage One: Algebra

1 $5b$	2 $2p - 2m$	3 $\frac{j}{a}$	4 $d^2$	5 $5k - l$
6 $2z + g$	7 $cj$	8 $2(w + s)$	9 $5r$	10 $\sqrt{v}$
11 $6m - 2x$	12 $b(n - j)$	13 $3m - 10$	14 $y^2 - s^2$	
15 $2q + 4y$	16 $(k - d) + (p - a)$	17 $i - 2e$	18 $5h - z$	
19 $go$	20 $\sqrt{12h}$	21 $2d - f$	22 $3y$	23 $4(q - h)$
24 $a(l \div t)$	25 $\frac{4l}{2k}$	26 $\frac{2r}{x}$		

Continue to Stage Two...

Bletchley Park was home to the British codebreakers of WWII. Alan Turing is the most famous of these codebreakers today, but he had the support of thousands of other staff, 75% of whom were women.

Well done! Now let's use those answers to break today's code.  
The Nazis are using number patterns today.

Finish the patterns and match the answer to your answers from Stage One. When you find a match, enter the number of the question from Stage One as the match for that letter - I've completed 'A' for you as an example.



## Stage Two: Sequences and Pattern

A	9, 8, 7, 6 ... 5	5 is the answer to question 10, so A = 10
B	-60, -40, -20, 0 ...	B =
C	7, 9, 11, 13 ...	C =
D	0, 2, 4, 6 ...	D =
E	36, 42, 48, 54 ...	E =
F	42, 35, 28, 21 ...	F =
G	0, 11, 22, 33 ...	G =
H	19, 29, 30, 40 ...	H =
I	2, 1, 2, 1 ...	I =
J	2, 3, 5, 7 ...	J =
K	36, 25, 16, 9 ...	K =
L	16, 24, 32, 40 ...	L =
M	18, 30, 48, 78 ...	M =
N	96, 48, 24, 12 ...	N =
O	7, 14, 21, 28 ...	O =
P	4, 8, 16, 32 ...	P =
Q	0, 3, 6, 9, ...	Q =
R	21, 28, 35, 42 ...	R =
S	30, 36, 42, 48 ...	S =
T	210, 200, 190, 180 ...	T =
U	0, 1, 1, 2 ...	U =
V	64, 81, 100, 121 ...	V =
W	18, 20, 30, 32 ...	W =
X	4, 9, 16, 25 ...	X =
Y	48, 43, 38, 33 ...	Y =
Z	10, 40, 70, 100 ...	Z =

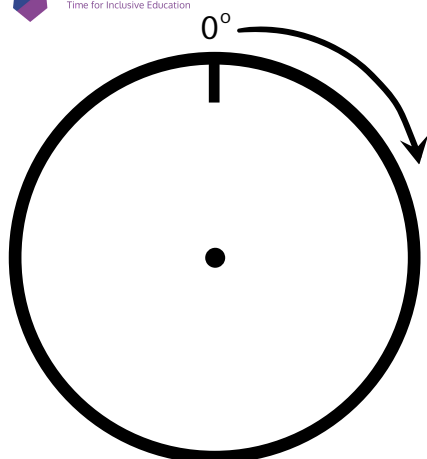
Continue to Stage Three...

Good work. Now we can start to crack the code. We can put what we know into the machine I created to crack codes: the Bombe. Let's get the final message before it's too late.

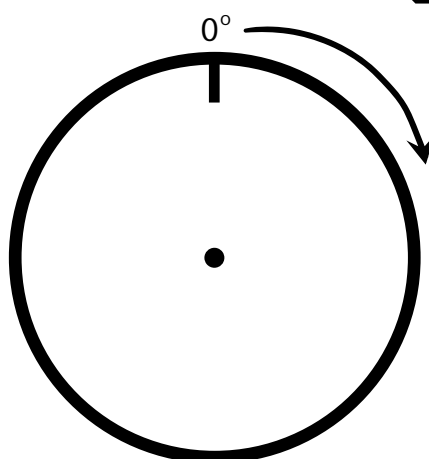
You'll need to set all the dials to exact positions to get the machine to work. Use a protractor to get them exactly right!



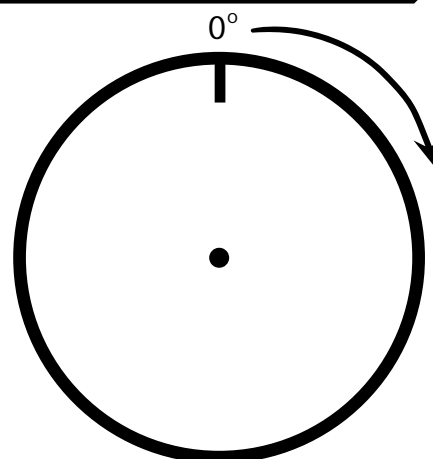
### Stage Three: Angles



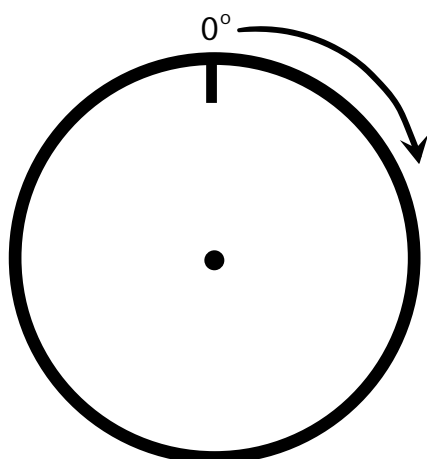
Set this dial to 120°



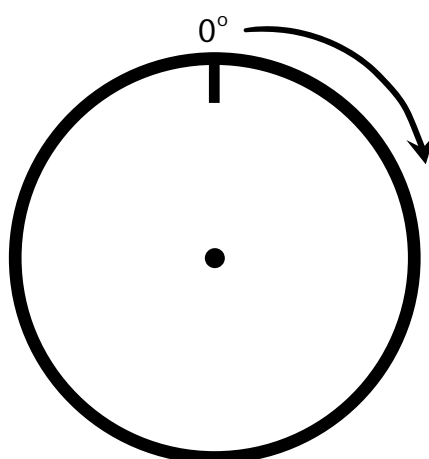
Set this dial to 315°



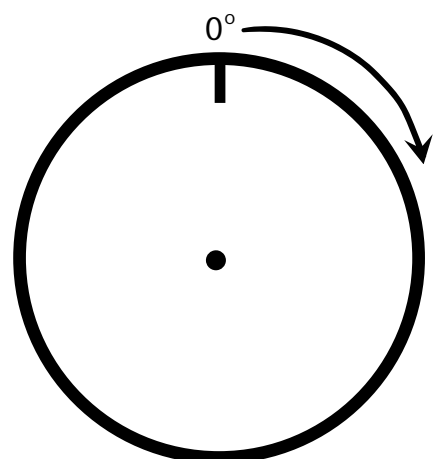
Set this dial to create a right angle



Set this dial to the complementary angle of 22°



Set this dial to the supplementary angle of 175°



Set this dial to create five equal angles

#### About Alan Turing:

Today, Alan Turing is considered a national hero for his war work. Working with his team at Bletchley Park, he significantly contributed to the breaking of Nazi codes and overall victory in WWII. He's even on the £50 note.

In his own time though, Alan was treated terribly. He was gay at a time when that was illegal and he was arrested after the war. He was sentenced to a brutal punishment which led him to die of suicide in 1954. He was 41.

Continue to Stage Four...

Now we have everything we need to crack this coded message. You'll need your answers from Stage Two - input them into the space below for easy reference.

Now we've unlocked the code, let's look at an actual message. Based on where the message came from, we think these are co-ordinates for a German attack coming tonight. Be quick!



a = 10	e =	i =	m =	q =	u =	y =
b =	f =	j =	n =	r =	v =	z =
c =	g =	k =	o =	s =	w =	
d =	h =	l =	p =	t =	x =	



## Stage Four: Ratio

Where the ratio is 3 : 4

h : n or 18 : 24

w : \_\_\_\_ or \_\_\_\_ : \_\_\_\_

l : \_\_\_\_ or \_\_\_\_ : \_\_\_\_

Where the ratio is 2:5

a : \_\_\_\_ or \_\_\_\_ : \_\_\_\_

s : \_\_\_\_ or \_\_\_\_ : \_\_\_\_

Where the ratio is 7:5

v : \_\_\_\_ or \_\_\_\_ : \_\_\_\_

j : \_\_\_\_ or \_\_\_\_ : \_\_\_\_

Simplify these ratios:

k : y =

o : s or 13 : 8

j : h =

\_\_\_\_ : \_\_\_\_ or \_\_\_\_ : \_\_\_\_

Simplify these ratios:

p : c =

\_\_\_\_ : \_\_\_\_ or \_\_\_\_ : \_\_\_\_

k : n =

\_\_\_\_ : \_\_\_\_ or \_\_\_\_ : \_\_\_\_

Simplify these ratios:

170 : 60 =

\_\_\_\_ : \_\_\_\_ or \_\_\_\_ : \_\_\_\_

115 : 65 =

\_\_\_\_ : \_\_\_\_ or \_\_\_\_ : \_\_\_\_

Now write your answers in numbers and in the form of co-ordinates for Stage Five.

(18, 24) ( , ) ( , )

( , ) ( , ) ( , )

( , ) ( , ) ( , )

( , ) ( , ) ( , )

( , ) ( , ) ( , )

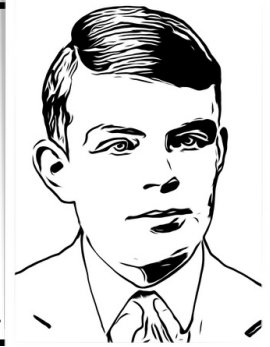
Continue to Stage Five...

Alan Turing's 'Bombe' codebreaking machine was one of the forerunners of modern computers. It advanced the work of Polish mathematicians.

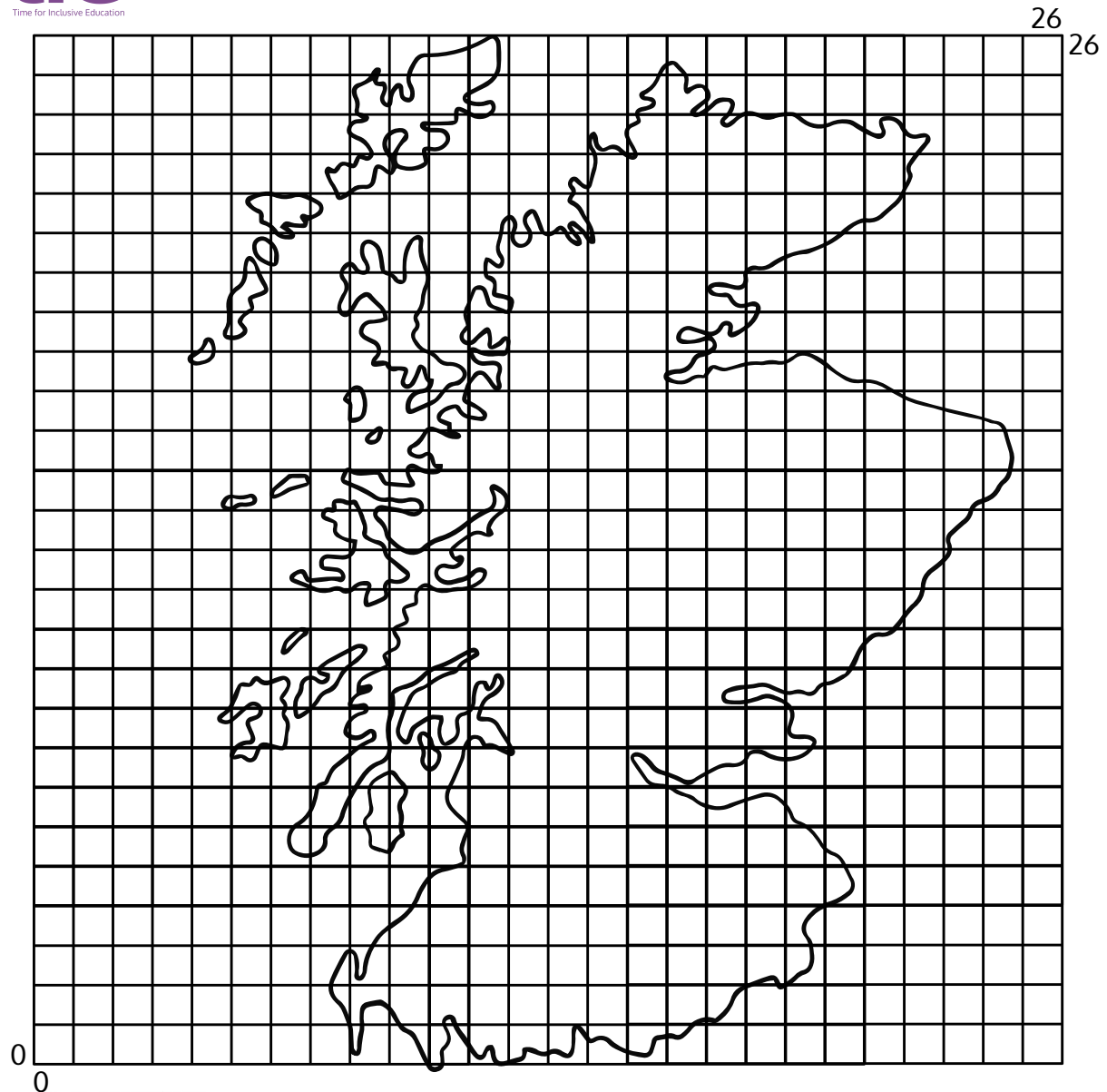
The Bombe inspired other machines at Bletchley, including Tommy Flowers's 'Colossus', the world's first programmable electronic digital computer.

You've done it and just in time! Now we have the positions for tonight's air raid on the Scottish mainland. We need to let the air force know so they can protect our people from the incoming planes.

Drawing a map will get the information across most quickly. Here's a grid map - draw on all the coordinates from Stage Four.



### Stage Five: Coordinates



I'm very impressed at your efforts, codebreaker. I'm glad you were sent to my team!

I've sent the positions straight to the RAF. With any luck, we've saved some lives today.

I hope you're ready to do this all again tomorrow!

Thank you, teachers! Your guidance of our young codebreakers is greatly appreciated.

Here are all the answers to make life easier for you and your young people.

Visit [www.lgbteducation.scot](http://www.lgbteducation.scot) or [www.tie.scot](http://www.tie.scot) for more information, training and resources on LGBT Inclusive Education.



## Teacher Answer Sheet

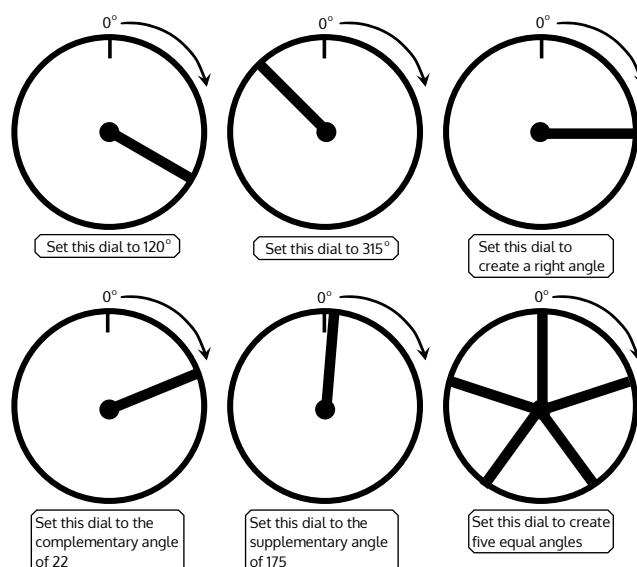
### Stage One

1. = 15	15. = 126
2. = 14	16. = 28
3. = 2	17. = 8
4. = 36	18. = 41
5. = 49	19. = 170
6. = 48	20. = 12
7. = 20	21. = 11
8. = 54	22. = 60
9. = 130	23. = 44
10. = 5	24. = 6
11. = 64	25. = 3
12. = 42	26. = 4
13. = 35	
14. = 144	

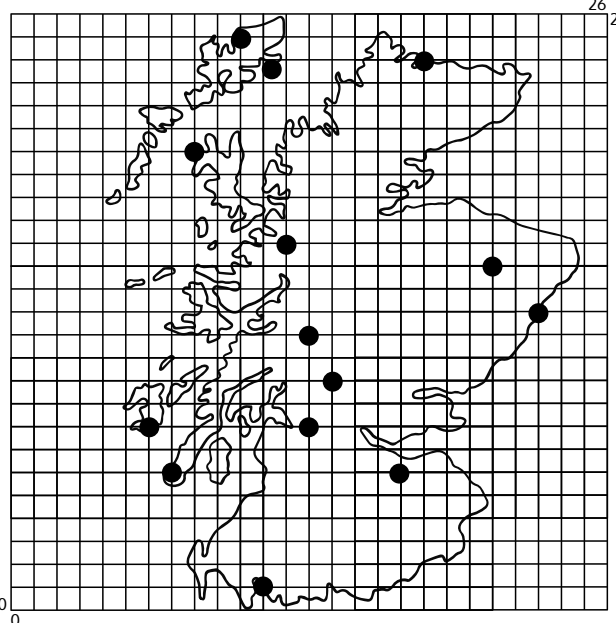
### Stage Two

A = 10	O = 13
B = 7	P = 11
C = 1	Q = 20
D = 17	R = 5
E = 22	S = 8
F = 2	T = 19
G = 23	U = 25
H = 18	V = 14
I = 3	W = 12
J = 21	X = 4
K = 26	Y = 16
L = 6	Z = 9
M = 15	
N = 24	

### Stage Three



### Stage Five



### Stage Four

Final co-ordinate answers.

( 18 , 24 )	( 14 , 10 )	( 13 , 12 )
( 12 , 16 )	( 21 , 15 )	( 17 , 6 )
( 6 , 8 )	( 13 , 8 )	( 23 , 13 )
( 10 , 25 )	( 7 , 6 )	
( 8 , 20 )	( 11 , 1 )	

Welcome to Bletchley Park. I'm Alan Turing and you're going to be working on my codebreaking team. I'll guide you through your first day.

We have to break today's code as quickly as we can if we want to save people's lives. Let's start with yesterday's code. Use it in our preliminary equations.



a =	e =	i =	m =	q =	u =	y =
b =	f =	j =	n =	r =	v =	z =
c =	g =	k =	o =	s =	w =	
d =	h =	l =	p =	t =	x =	



## Stage One: Algebra

1	2	3	4	5
6	7	8	9	10
11	12		13	14
15	16		17	18
19	20	21	22	23
24	25	26		

Continue to Stage Two...

Bletchley Park was home to the British codebreakers of WWII. Alan Turing is the most famous of these codebreakers today, but he had the support of thousands of other staff, 75% of whom were women.

Well done! Now let's use those answers to break today's code.  
The Nazis are using number patterns today.

Finish the patterns and match the answer to your answers  
from Stage One. When you find a match, enter the number of  
the question from Stage One as the match for that letter - I've  
completed 'A' for you as an example.



## Stage Two: Sequences and Pattern

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

Continue to Stage Three...

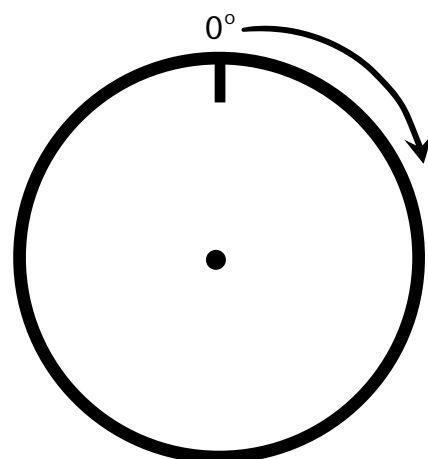
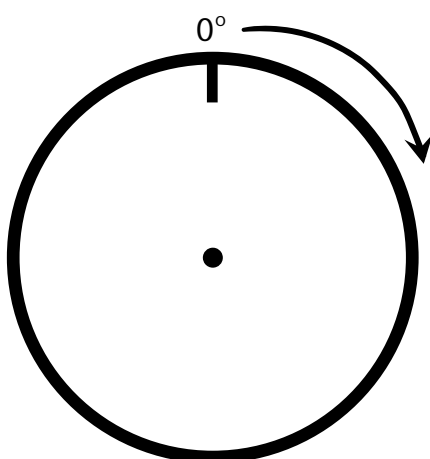
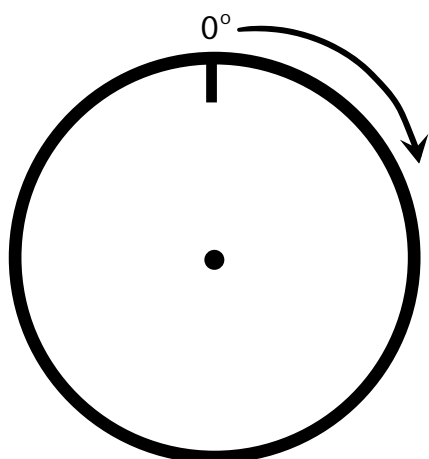
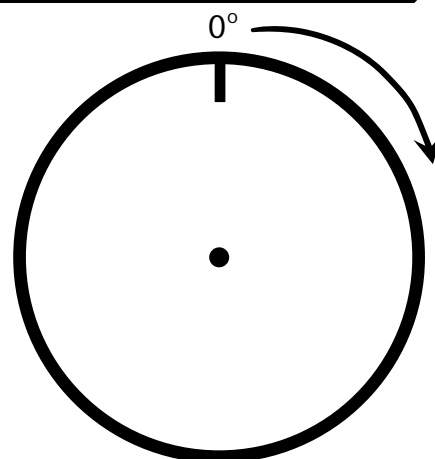
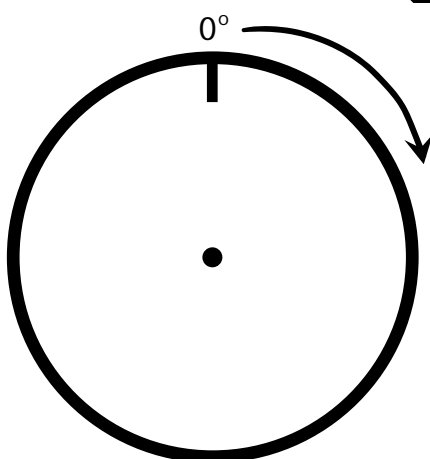
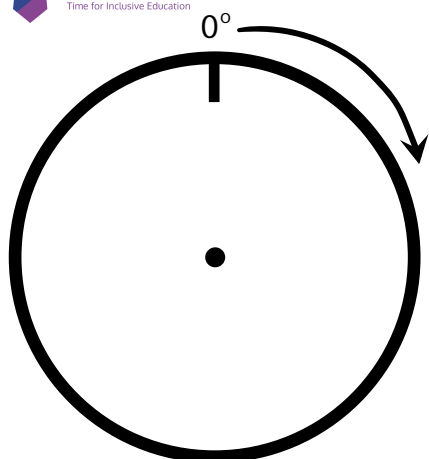


Good work. Now we can start to crack the code. We can put what we know into the machine I created to crack codes: the Bombe. Let's get the final message before it's too late.

You'll need to set all the dials to exact positions to get the machine to work. Use a protractor to get them exactly right!



### Stage Three: Angles



#### About Alan Turing:

Today, Alan Turing is considered a national hero for his war work. Working with his team at Bletchley Park, he significantly contributed to the breaking of Nazi codes and overall victory in WWII. He's even on the £50 note.

In his own time though, Alan was treated terribly. He was gay at a time when that was illegal and he was arrested after the war. He was sentenced to a brutal punishment which led him to die of suicide in 1954. He was 41.

Continue to  
Stage Four...

Now we have everything we need to crack this coded message. You'll need your answers from Stage Two - input them into the space below for easy reference.

Now we've unlocked the code, let's look at an actual message. Based on where the message came from, we think these are co-ordinates for a German attack coming tonight. Be quick!



a =	e =	i =	m =	q =	u =	y =
b =	f =	j =	n =	r =	v =	z =
c =	g =	k =	o =	s =	w =	
d =	h =	l =	p =	t =	x =	



### Stage Four: Ratio


Now write your answers in numbers and in the form of co-ordinates for Stage Five.

( , )	( , )	( , )
( , )	( , )	( , )
( , )	( , )	( , )
( , )	( , )	
( , )	( , )	

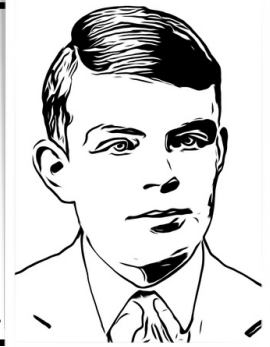
Continue to Stage Five...

Alan Turing's 'Bombe' codebreaking machine was one of the forerunners of modern computers. It advanced the work of Polish mathematicians.

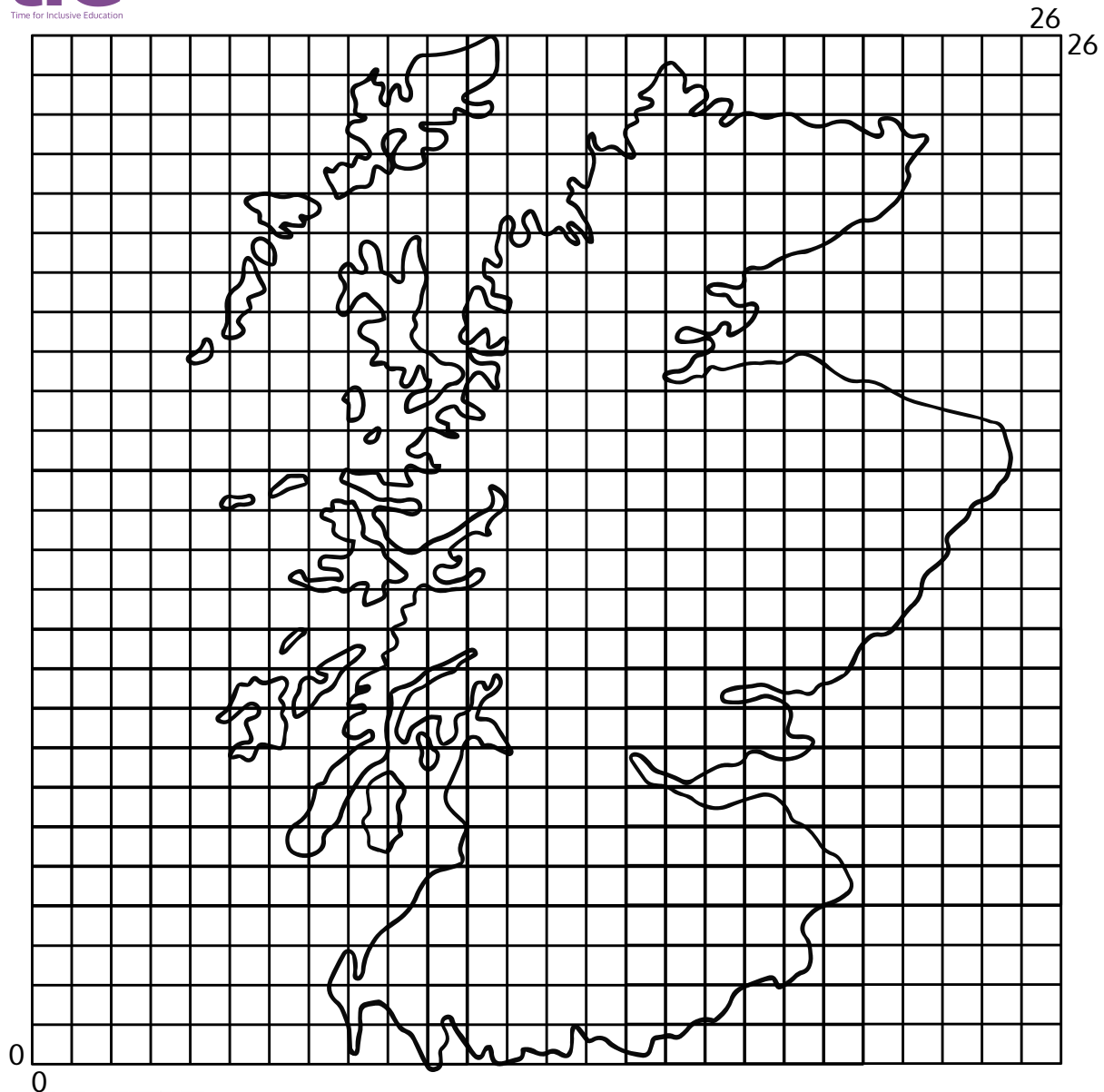
The Bombe inspired other machines at Bletchley, including Tommy Flowers's 'Colossus', the world's first programmable electronic digital computer.

You've done it and just in time! Now we have the positions for tonight's air raid on the Scottish mainland. We need to let the air force know so they can protect our people from the incoming planes.

Drawing a map will get the information across most quickly. Here's a grid map - draw on all the coordinates from Stage Four.



## Stage Five: Coordinates



I'm very impressed at your efforts, codebreaker. I'm glad you were sent to my team!

I've sent the positions straight to the RAF. With any luck, we've saved some lives today.

I hope you're ready to do this all again tomorrow!

Thank you, teachers! Your guidance of our young codebreakers is greatly appreciated.

Here are all the answers to make life easier for you and your young people.

Visit [www.lgbteducation.scot](http://www.lgbteducation.scot) or [www.tie.scot](http://www.tie.scot) for more information, training and resources on LGBT Inclusive Education.



## Teacher Answer Sheet

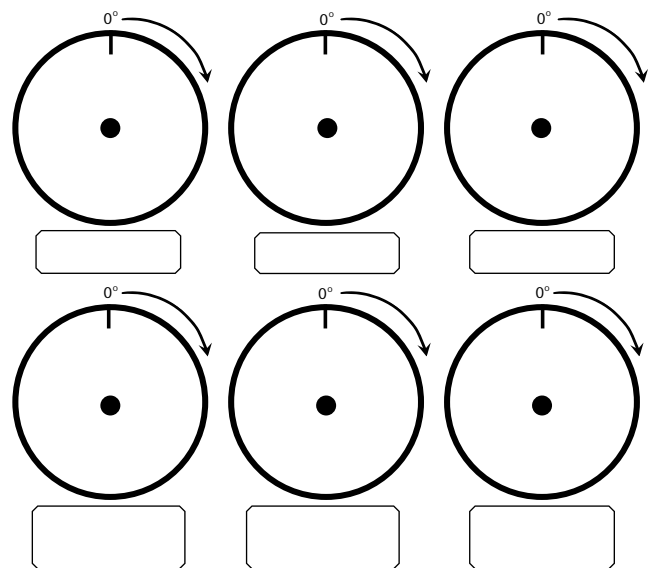
### Stage One

- |       |       |
|-------|-------|
| 1. =  | 15. = |
| 2. =  | 16. = |
| 3. =  | 17. = |
| 4. =  | 18. = |
| 5. =  | 19. = |
| 6. =  | 20. = |
| 7. =  | 21. = |
| 8. =  | 22. = |
| 9. =  | 23. = |
| 10. = | 24. = |
| 11. = | 25. = |
| 12. = | 26. = |
| 13. = |       |
| 14. = |       |

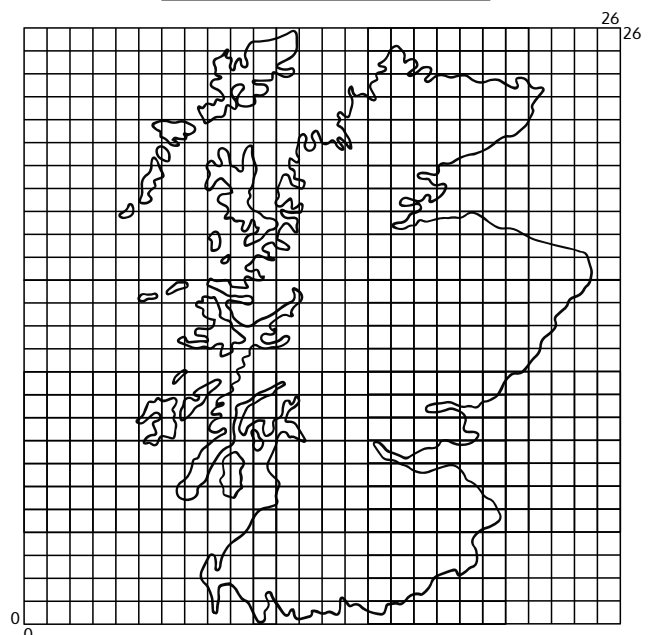
### Stage Two

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

### Stage Three



### Stage Five



### Stage Four

Final co-ordinate answers.

- |       |       |       |
|-------|-------|-------|
| ( , ) | ( , ) | ( , ) |
| ( , ) | ( , ) | ( , ) |
| ( , ) | ( , ) | ( , ) |
| ( , ) | ( , ) |       |
| ( , ) | ( , ) |       |