Science Olympiad — ScioCamp 2022
Level I Codebusters Test

Timed Question **[200 points]** A quote from Gravity Falls character Stanford Pines has been encoded as an Aristocrat, what does it say? When you have solved it, raise your hand so that the time can be recorded and the solution checked.

JWPFP ZX XJFPAMJW ZA WDTZAM JWP WHLZGZJI JV OVFS
THERE IS STRENGTH IN HAVING THE HUMILITY TO WORK

OZJW DAR XDUFZYZUP YVF VJWPFX.
WITH AND SACRIFICE FOR OTHERS.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Frequency	4			3		6	1	1	1	8		1	2		2	6		1	1	1	2	4	7	4	2	8
Replacement	N	J	Z	A	P	R	L	U	Y	T	X	M	G	Q	W	E	B	D	K	V	C	O	H	S	F	I

1) **[180 points]** Decode this vigenere using the key word MABEL.

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

M	A	B	E	L	M
F	O	F	E	C	E
T	**O**	**E**	**A**	**R**	**S**

2) **[215 points]** Solve this Aristocrat of a quote about zombies. It has the word DUDES somewhere in it.

GRGTL, LADB VDFI. O'YT HTTX APDOXOXZ KWP ANOL IWYOT
DUDES, STAY CALM. I'VE BEEN TRAINING FOR THIS MOVIE

IB MNWFT FOKT. MOAN DFF WK ANT NWPPWP IWYOTL O'YT
MY WHOLE LIFE. WITH ALL OF THE HORROR MOVIES I'VE

LTTX, O EXWM FOATPDFFB TYTPBANOXZ ANTPT OL AW EXWM
SEEN, I KNOW LITERALLY EVERYTHING THERE IS TO KNOW

DHWRA NWM AW DYWOG JWIHOTL.
ABOUT HOW TO AVOID ZOMBIES.

	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**	**O**	**P**	**Q**	**R**	**S**	**T**	**U**	**V**	**W**	**X**	**Y**	**Z**
Frequency	11	4		7	2	8	3	3	5	1	3	7	5	8	15	8		2		18		1	15	7	6	2
Replacement	T	Y	J	A	K	L	D	B	M	Z	F	S	W	H	I	R	X	U	P	E	Q	C	O	N	V	G

3) **[135 points]** A quote by Bill Cipher has been encoded using the Morbit Cipher for you to decode. You are told that 1=●●, 3=●×, 4=×–, 5=●–, 7=–●, 9=––

```
9 3 5 3 5 6 1 8 1 4 4 5 8 6 5 3 5 6 7 3 5 1 6 1 2 1
––●×●–●×●–×●●●–×●●×–×–●––××●●–●×●–×●–●●×●–●●×●●●××●●
G   R   A  V    I  T Y    /F    A  L    L    S  / I

4 2 1 6 1 2 9 3 9 8 9 8 7 3 4 4 9 2 7 1 6 2 7 1 6 8
×–××●●×●●●××––●×–––×–––×–●●××–×–––××–●●●×●××–●●●×●–×
 T/ I  S  / G   O   O   D   /T O  / B    E/ B    A

7 7 4 5
–●–●×–●–
C    K
```

How to solve

Since we are told the mapping of 134579 ciphertext, we can build the following table:

1	2	3	4	5	6	7	8	9
●●	–× ×● ××	●×	×–	●–	–× ×● ××	–●	–× ×● ××	—

Based on that information we can map the cipher text as:

```
9 3 5 3 5 6 1 8 1 4 4 5 8 6 5 3 5 6 7 3 5 1 6 1 2 1
––●×●–●×●–  ●●  ●●×–×–●–    ●–●×●–  –●●×●–●●  ●●  ●●
G   R              T

4 2 1 6 1 2 9 3 9 8 9 8 7 3 4 4 9 2 7 1 6 2 7 1 6 8
×–  ●●  ●●  ––●×––  ––  –●●××–×–––  –●●●    –●●●
                              / T

7 7 4 5
–●–●×–●–
C    K
```

At this point in time, 3 ciphertext characters still need to be mapped.

1	2	3	4	5	6	7	8	9
●●	–× ×● ××	●×	×–	●–	–× ×● ××	–●	–× ×● ××	—

Based on that information we can map the cipher text as:

```
9 3 5 3 5 6 1 8 1 4 4 5 8 6 5 3 5 6 7 3 5 1 6 1 2 1
––●×●–●×●–  ●●  ●●×–×–●–    ●–●×●–  –●●×●–●●  ●●  ●●
G   R              T
```

```
4 2 1 6 1 2 9 3 9 8 9 8 7 3 4 4 9 2 7 1 6 2 7 1 6 8
x-  ●●  ●●  --●x--  --  -●●xx-x---  -●●●    -●●●
                                  / T

7 7 4 5
-●-●x-●-
C    K
```

At this point in time, 3 ciphertext characters still need to be mapped.

1	2	3	4	5	6	7	8	9
●●	–× ×● ××	●×	×–	●–	–× ×● ××	–●	–× ×● ××	—

Based on that information we can map the cipher text as:

```
9 3 5 3 5 6 1 8 1 4 4 5 8 6 5 3 5 6 7 3 5 1 6 1 2 1
--●x●-●x●-  ●●  ●●x-x-●-    ●-●x●-  -●●x●-●●  ●●  ●●
G   R              T

4 2 1 6 1 2 9 3 9 8 9 8 7 3 4 4 9 2 7 1 6 2 7 1 6 8
x-  ●●  ●●  --●x--  --  -●●xx-x---  -●●●    -●●●
                                  / T

7 7 4 5
-●-●x-●-
C    K
```

At this point in time, 3 ciphertext characters still need to be mapped.

1	2	3	4	5	6	7	8	9
●●	–× ×● ××	●×	×–	●–	–× ×● ××	–●	–× ×● ××	—

Based on that information we can map the cipher text as:

```
9 3 5 3 5 6 1 8 1 4 4 5 8 6 5 3 5 6 7 3 5 1 6 1 2 1
--●x●-●x●-  ●●  ●●x-x-●-    ●-●x●-  -●●x●-●●  ●●  ●●
G   R              T

4 2 1 6 1 2 9 3 9 8 9 8 7 3 4 4 9 2 7 1 6 2 7 1 6 8
x-  ●●  ●●  --●x--  --  -●●xx-x---  -●●●    -●●●
                                  / T

7 7 4 5
-●-●x-●-
C    K
```

At this point in time, 3 ciphertext characters still need to be mapped.

1	2	3	4	5	6	7	8	9
●●	–× ×● ××	●×	×–	●–	–× ×● ××	–●	–× ×● ××	—

Based on that information we can map the cipher text as:

```
9 3 5 3 5 6 1 8 1 4 4 5 8 6 5 3 5 6 7 3 5 1 6 1 2 1
––●×●–●×●–  ●●  ●●×–×–●–    ●–●×●–  –●●×●–●●  ●●  ●●
G   R              T

4 2 1 6 1 2 9 3 9 8 9 8 7 3 4 4 9 2 7 1 6 2 7 1 6 8
×–  ●●  ●●  ––●×––  ––  –●●××–×–––  –●●●    –●●●
                              / T

7 7 4 5
–●–●×–●–
C   K
```

At this point in time, 3 ciphertext characters still need to be mapped.

1	2	3	4	5	6	7	8	9
●●	–× ×● ××	●×	×–	●–	–× ×● ××	–●	–× ×● ××	—

Based on that information we can map the cipher text as:

```
9 3 5 3 5 6 1 8 1 4 4 5 8 6 5 3 5 6 7 3 5 1 6 1 2 1
––●×●–●×●–  ●●  ●●×–×–●–    ●–●×●–  –●●×●–●●  ●●  ●●
G   R              T

4 2 1 6 1 2 9 3 9 8 9 8 7 3 4 4 9 2 7 1 6 2 7 1 6 8
×–  ●●  ●●  ––●×––  ––  –●●××–×–––  –●●●    –●●●
                              / T

7 7 4 5
–●–●×–●–
C   K
```

At this point in time, 3 ciphertext characters still need to be mapped.

1	2	3	4	5	6	7	8	9
●●	–× ×● ××	●×	×–	●–	–× ×● ××	–●	–× ×● ××	—

Based on that information we can map the cipher text as:

```
9 3 5 3 5 6 1 8 1 4 4 5 8 6 5 3 5 6 7 3 5 1 6 1 2 1
––●×●–●×●–  ●●  ●●×–×–●–    ●–●×●–  –●●×●–●●  ●●  ●●
```

```
G   R               T

4 2 1 6 1 2 9 3 9 8 9 8 7 3 4 4 9 2 7 1 6 2 7 1 6 8
x-  ●●  ●●  --●x--  --  -●●xx-x---  -●●●    -●●●
                                  / T

7 7 4 5
-●-●x-●-
C    K
```

At this point in time, 3 ciphertext characters still need to be mapped.

1	2	3	4	5	6	7	8	9
●●	–× ×● ××	●×	×–	●–	–× ×● ××	–●	–× ×● ××	—

Based on that information we can map the cipher text as:

```
9 3 5 3 5 6 1 8 1 4 4 5 8 6 5 3 5 6 7 3 5 1 6 1 2 1
--●x●-●x●-  ●●  ●●x-x-●-    ●-●x●-  -●●x●-●●  ●●  ●●
G   R               T

4 2 1 6 1 2 9 3 9 8 9 8 7 3 4 4 9 2 7 1 6 2 7 1 6 8
x-  ●●  ●●  --●x--  --  -●●xx-x---  -●●●    -●●●
                                  / T

7 7 4 5
-●-●x-●-
C    K
```

At this point in time, 3 ciphertext characters still need to be mapped.

1	2	3	4	5	6	7	8	9
●●	–× ×● ××	●×	×–	●–	–× ×● ××	–●	–× ×● ××	—

Based on that information we can map the cipher text as:

```
9 3 5 3 5 6 1 8 1 4 4 5 8 6 5 3 5 6 7 3 5 1 6 1 2 1
--●x●-●x●-  ●●  ●●x-x-●-    ●-●x●-  -●●x●-●●  ●●  ●●
G   R               T

4 2 1 6 1 2 9 3 9 8 9 8 7 3 4 4 9 2 7 1 6 2 7 1 6 8
x-  ●●  ●●  --●x--  --  -●●xx-x---  -●●●    -●●●
                                  / T

7 7 4 5
-●-●x-●-
C    K
```

At this point in time, 3 ciphertext characters still need to be mapped.

1	2	3	4	5	6	7	8	9
●●	–× ×● ××	●×	×–	●–	–× ×● ××	–●	–× ×● ××	—

Based on that information we can map the cipher text as:

```
9 3 5 3 5 6 1 8 1 4 4 5 8 6 5 3 5 6 7 3 5 1 6 1 2 1
––●×●–●×●–  ●●  ●●×–×–●–    ●–●×●–  –●●×●–●●  ●●  ●●
G   R               T

4 2 1 6 1 2 9 3 9 8 9 8 7 3 4 4 9 2 7 1 6 2 7 1 6 8
×–  ●●  ●●  ––●×––  ––  –●●××–×–––  –●●●    –●●●
                              / T

7 7 4 5
–●–●×–●–
C   K
```

At this point in time, 3 ciphertext characters still need to be mapped.

1	2	3	4	5	6	7	8	9
●●	–× ×● ××	●×	×–	●–	–× ×● ××	–●	–× ×● ××	—

Based on that information we can map the cipher text as:

```
9 3 5 3 5 6 1 8 1 4 4 5 8 6 5 3 5 6 7 3 5 1 6 1 2 1
––●×●–●×●–  ●●  ●●×–×–●–    ●–●×●–  –●●×●–●●  ●●  ●●
G   R               T

4 2 1 6 1 2 9 3 9 8 9 8 7 3 4 4 9 2 7 1 6 2 7 1 6 8
×–  ●●  ●●  ––●×––  ––  –●●××–×–––  –●●●    –●●●
                              / T

7 7 4 5
–●–●×–●–
C   K
```

At this point in time, 3 ciphertext characters still need to be mapped.

1	2	3	4	5	6	7	8	9
●●	–× ×● ××	●×	×–	●–	–× ×● ××	–●	–× ×● ××	—

Based on that information we can map the cipher text as:

```
9 3 5 3 5 6 1 8 1 4 4 5 8 6 5 3 5 6 7 3 5 1 6 1 2 1
```

```
--●×●-●×●-  ●●  ●●×-×-●-    ●-●×●-  -●●×●-●●  ●●  ●●
G   R               T

4 2 1 6 1 2 9 3 9 8 9 8 7 3 4 4 9 2 7 1 6 2 7 1 6 8
×-  ●●  ●●  --●×--  --  -●●××-×---  -●●●    -●●●
                              / T

7 7 4 5
-●-●×-●-
C    K
```

At this point in time, 3 ciphertext characters still need to be mapped.

1	2	3	4	5	6	7	8	9
●●	–× ×● ××	●×	×–	●–	–× ×● ××	–●	–× ×● ××	—

Based on that information we can map the cipher text as:

```
9 3 5 3 5 6 1 8 1 4 4 5 8 6 5 3 5 6 7 3 5 1 6 1 2 1
--●×●-●×●-  ●●  ●●×-×-●-    ●-●×●-  -●●×●-●●  ●●  ●●
G   R               T

4 2 1 6 1 2 9 3 9 8 9 8 7 3 4 4 9 2 7 1 6 2 7 1 6 8
×-  ●●  ●●  --●×--  --  -●●××-×---  -●●●    -●●●
                              / T

7 7 4 5
-●-●×-●-
C    K
```

At this point in time, 3 ciphertext characters still need to be mapped.

1	2	3	4	5	6	7	8	9
●●	–× ×● ××	●×	×–	●–	–× ×● ××	–●	–× ×● ××	—

Based on that information we can map the cipher text as:

```
9 3 5 3 5 6 1 8 1 4 4 5 8 6 5 3 5 6 7 3 5 1 6 1 2 1
--●×●-●×●-  ●●  ●●×-×-●-    ●-●×●-  -●●×●-●●  ●●  ●●
G   R               T

4 2 1 6 1 2 9 3 9 8 9 8 7 3 4 4 9 2 7 1 6 2 7 1 6 8
×-  ●●  ●●  --●×--  --  -●●××-×---  -●●●    -●●●
                              / T

7 7 4 5
-●-●×-●-
C    K
```

At this point in time, 3 ciphertext characters still need to be mapped.

1	2	3	4	5	6	7	8	9
●●	–× ×● ××	●×	×–	●–	–× ×● ××	–●	–× ×● ××	—

Based on that information we can map the cipher text as:

```
9 3 5 3 5 6 1 8 1 4 4 5 8 6 5 3 5 6 7 3 5 1 6 1 2 1
––●×●–●×●–  ●●  ●●×–×–●–    ●–●×●–  –●●×●–●●  ●●  ●●
G   R               T

4 2 1 6 1 2 9 3 9 8 9 8 7 3 4 4 9 2 7 1 6 2 7 1 6 8
×–  ●●  ●●  ––●×––  ––  –●●××–×–––  –●●●    –●●●
                              / T

7 7 4 5
–●–●×–●–
C   K
```

At this point in time, 3 ciphertext characters still need to be mapped.

1	2	3	4	5	6	7	8	9
●●	–× ×● ××	●×	×–	●–	–× ×● ××	–●	–× ×● ××	—

Based on that information we can map the cipher text as:

```
9 3 5 3 5 6 1 8 1 4 4 5 8 6 5 3 5 6 7 3 5 1 6 1 2 1
––●×●–●×●–  ●●  ●●×–×–●–    ●–●×●–  –●●×●–●●  ●●  ●●
G   R               T

4 2 1 6 1 2 9 3 9 8 9 8 7 3 4 4 9 2 7 1 6 2 7 1 6 8
×–  ●●  ●●  ––●×––  ––  –●●××–×–––  –●●●    –●●●
                              / T

7 7 4 5
–●–●×–●–
C   K
```

At this point in time, 3 ciphertext characters still need to be mapped.

1	2	3	4	5	6	7	8	9
●●	–× ×● ××	●×	×–	●–	–× ×● ××	–●	–× ×● ××	—

Based on that information we can map the cipher text as:

```
9 3 5 3 5 6 1 8 1 4 4 5 8 6 5 3 5 6 7 3 5 1 6 1 2 1
```

```
--●×●-●×●-  ●●  ●●×-×-●-    ●-●×●-  -●●×●-●●  ●●  ●●
G   R               T

4 2 1 6 1 2 9 3 9 8 9 8 7 3 4 4 9 2 7 1 6 2 7 1 6 8
×-  ●●  ●●  --●×--  --  -●●××-×---  -●●●    -●●●
                              / T

7 7 4 5
-●-●×-●-
C    K
```

At this point in time, 3 ciphertext characters still need to be mapped.

1	2	3	4	5	6	7	8	9
●●	–× ×● ××	●×	×–	●–	–× ×● ××	–●	–× ×● ××	—

Based on that information we can map the cipher text as:

```
9 3 5 3 5 6 1 8 1 4 4 5 8 6 5 3 5 6 7 3 5 1 6 1 2 1
--●×●-●×●-  ●●  ●●×-×-●-    ●-●×●-  -●●×●-●●  ●●  ●●
G   R               T

4 2 1 6 1 2 9 3 9 8 9 8 7 3 4 4 9 2 7 1 6 2 7 1 6 8
×-  ●●  ●●  --●×--  --  -●●××-×---  -●●●    -●●●
                              / T

7 7 4 5
-●-●×-●-
C    K
```

At this point in time, 3 ciphertext characters still need to be mapped.

1	2	3	4	5	6	7	8	9
●●	–× ×● ××	●×	×–	●–	–× ×● ××	–●	–× ×● ××	—

Based on that information we can map the cipher text as:

```
9 3 5 3 5 6 1 8 1 4 4 5 8 6 5 3 5 6 7 3 5 1 6 1 2 1
--●×●-●×●-  ●●  ●●×-×-●-    ●-●×●-  -●●×●-●●  ●●  ●●
G   R               T

4 2 1 6 1 2 9 3 9 8 9 8 7 3 4 4 9 2 7 1 6 2 7 1 6 8
×-  ●●  ●●  --●×--  --  -●●××-×---  -●●●    -●●●
                              / T

7 7 4 5
-●-●×-●-
C    K
```

At this point in time, 3 ciphertext characters still need to be mapped.

1	2	3	4	5	6	7	8	9
●●	–× ×● ××	●×	×–	●–	–× ×● ××	–●	–× ×● ××	—

Based on that information we can map the cipher text as:

```
9 3 5 3 5 6 1 8 1 4 4 5 8 6 5 3 5 6 7 3 5 1 6 1 2 1
––●×●–●×●–  ●●  ●●×–×–●–    ●–●×●–  –●●×●–●●  ●●  ●●
G   R               T

4 2 1 6 1 2 9 3 9 8 9 8 7 3 4 4 9 2 7 1 6 2 7 1 6 8
×–  ●●  ●●  ––●×––  ––  –●●××–×–––  –●●●    –●●●
                              / T

7 7 4 5
–●–●×–●–
C    K
```

At this point in time, 3 ciphertext characters still need to be mapped.

1	2	3	4	5	6	7	8	9
●●	–× ×● ××	●×	×–	●–	–× ×● ××	–●	–× ×● ××	—

Based on that information we can map the cipher text as:

```
9 3 5 3 5 6 1 8 1 4 4 5 8 6 5 3 5 6 7 3 5 1 6 1 2 1
––●×●–●×●–  ●●  ●●×–×–●–    ●–●×●–  –●●×●–●●  ●●  ●●
G   R               T

4 2 1 6 1 2 9 3 9 8 9 8 7 3 4 4 9 2 7 1 6 2 7 1 6 8
×–  ●●  ●●  ––●×––  ––  –●●××–×–––  –●●●    –●●●
                              / T

7 7 4 5
–●–●×–●–
C    K
```

At this point in time, 3 ciphertext characters still need to be mapped.

4) **[500 points]** This quote from Bill Cipher has been encoded as a patristocrat and begins with the word "REMEMBER"

MXDXD ZXMMX GFQYE QLGAQ FFRLQ BAYWX RAQUX MLXQL
REMEM BERRE ALITY ISANI LLUSI ONTHE UNIVE RSEIS

GWBFB JMGDZ REJBF NZEX
AHOLO GRAMB UYGOL DBYE

Remember! Reality is an illusion, the universe is a hologram, buy gold, bye!

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Frequency	3	4		3	3	5	4			2		4	5	1			6	3			1		2	8	2	3
Replacement	N	O	F	M	Y	L	A	P	K	G	W	S	R	D	C	Z	I	U	J	X	V	Q	H	E	T	B

5) **[105 points]** This phrase by Dipper Pines has been encoded using a Caesar cipher with a shift of 6. What does it say?

U	A	X		A	T	I	R	K		N	G	J		Z	X	G	T	Y	L	U	X	S	K	J		N	O	Y		N	U	A	Y	K
O	**U**	**R**		**U**	**N**	**C**	**L**	**E**		**H**	**A**	**D**		**T**	**R**	**A**	**N**	**S**	**F**	**O**	**R**	**M**	**E**	**D**		**H**	**I**	**S**		**H**	**O**	**U**	**S**	**E**

O	T	Z	U		G		Z	U	A	X	O	Y	Z		Z	X	G	V		N	K		I	G	R	R	K	J		'	Z	N	K
I	**N**	**T**	**O**		**A**		**T**	**O**	**U**	**R**	**I**	**S**	**T**		**T**	**R**	**A**	**P**		**H**	**E**		**C**	**A**	**L**	**L**	**E**	**D**		'	**T**	**H**	**E**

S	E	Y	Z	K	X	E		Y	N	G	I	Q	.	'		Z	N	K		X	K	G	R		S	E	Y	Z	K	X	E		C	G	Y
M	**Y**	**S**	**T**	**E**	**R**	**Y**		**S**	**H**	**A**	**C**	**K**	.	'		**T**	**H**	**E**		**R**	**E**	**A**	**L**		**M**	**Y**	**S**	**T**	**E**	**R**	**Y**		**W**	**A**	**S**

C	N	E		G	T	E	U	T	K		I	G	S	K	.
W	**H**	**Y**		**A**	**N**	**Y**	**O**	**N**	**E**		**C**	**A**	**M**	**E**	.

How to solve

We start out by looking for short words to decode and then see if that encoding makes sense. Since we have a single letter word, we try out G=A and G=I.

With G=A we look in the decoding table for a G in the A column and see that it is the G row

Using the G row to decode the first long word 'ZXGTYLUXSKJ', it comes out as 'TRANSFORMED'

With G=I we look in the decoding table for a G in the I column and see that it is the Y row

Using the Y row to decode the first long word 'ZXGTYLUXSKJ', it comes out as 'BZIVANWZUML'

Based on this, we believe that the key row is G which we can use to decode the remaining letters

---

6) **[207 points]** A quote by Dipper Pines has been encoded as an Aristocrat.

FLN TN MHI'N, UHFYZ. NRHN'G KHQN CD PQCJTIP LK.
BUT IT CAN'T, MABEL. THAT'S PART OF GROWING UP.

NRTIPG MRHIPY. GLUUYQ YIEG.
THINGS CHANGE. SUMMER ENDS.

	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**	**O**	**P**	**Q**	**R**	**S**	**T**	**U**	**V**	**W**	**X**	**Y**	**Z**
Frequency			2	1	1	2	4	5	5	1	2	3	2	7		4	3	3		3	3				4	1
Replacement	Q	V	O	F	D	B	S	A	N	W	P	U	C	T	Y	G	R	H	Z	I	M	X	J	K	E	L

7) **[446 points]** These strange headlines are a Baconian cipher of a quote from Gravity Falls. It starts out as OLD PE.

CABLE CADET CHOIR CAIRO CHALK CABLE CAIRO.
ABBAB ABABA AAABB ABBBA AABAA ABBAB ABBBA.

O L D P E O P

CADET CHALK CALEB CABLE A HOME CALLS CHALK A TOWN.
ABABA AABAA ABABB ABBAB BAABB ABAAA AABAA BAAAB .

L E M O U/V I/J E S

CHAMP SWISS MODEL A GOOD CHALK CHOPS CHOIR.
AABBA AABAA BAABA BAAAA AABAA AAAAA AAABB.

G E T R E A D

A DEAL CHASE HANDY, A GOOD A GOOD STICK CHASE.
BABBA AABAB ABBAB, BAAAA BAAAA AABAA AABAB.

Y F O R R E F

CHALK A GOOD CHALK CAMPS, CLOAK STUCK A TOWN A CALL.
AABAA BAAAA AABAA ABBAA, AAABA AABAA BAAAB BABAA .

E R E N C E S W

CHALK A CALL CABLE.
AABAA BABAA ABBAB.

E W O

CAMPS A LORD A HOME GUEST PHONE.
ABBAA BAABA BAABB ABBAA AAABB.

N T U/V N D

CHALK A GOOD A TOWN A LORD CHOPS CAMPS CHOIR CHOPS
AABAA BAAAA BAAAB BAABA AAAAA ABBAA AAABB AAAAA

E R S T A N D A

CAMPS CHOIR A CALL CABLE A GOOD CHOIR A TOWN A CALL
ABBAA AAABB BABAA ABBAB BAAAA AAABB BAAAB BABAA

N D W O R D S W

CHALK CLOAK CHOPS CAMPS A LORD A GOOD CHALK CAIRO
AABAA AAABA AAAAA ABBAA BAABA BAAAA AABAA ABBBA

E C A N T R E P

CHALK CHOPS A LORD
AABAA AAAAA BAABA

E A T

Old people movies! Get ready for references we won't understand and words we can't repeat.

The letters are mapped as:

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

---

8) **[101 points]** Decode this quote about heroes that has been encoded using the Atbash cipher.

Y	V	R	M	T		Z		S	V	I	L		N	V	Z	M	H		U	R	T	S	G	R	M	T		Y	Z	X	P		V	E	V	M
B	**E**	**I**	**N**	**G**		**A**		**H**	**E**	**R**	**O**		**M**	**E**	**A**	**N**	**S**		**F**	**I**	**G**	**H**	**T**	**I**	**N**	**G**		**B**	**A**	**C**	**K**		**E**	**V**	**E**	**N**

D	S	V	M		R	G		H	V	V	N	H		R	N	K	L	H	H	R	Y	O	V	.
W	**H**	**E**	**N**		**I**	**T**		**S**	**E**	**E**	**M**	**S**		**I**	**M**	**P**	**O**	**S**	**S**	**I**	**B**	**L**	**E**	.

9) **[165 points]** A quote by Grunkle Stan has been encoded with the Vigenère cipher using a keyword of FALLS. What was it?

F	A	L	L	S	F	A	L	L	S	F	A	L	L	S	F	A	L	L	S	F	A	L	L	S	F	A	L	L	S
N	T	L	W	D	G	E	R	T	F	X	W	T	E	Z	Y	H	T	D	D	N	T	E	W	W	K	E	W	W	S
I	**T**	**A**	**L**	**L**	**B**	**E**	**G**	**I**	**N**	**S**	**W**	**I**	**T**	**H**	**T**	**H**	**I**	**S**	**L**	**I**	**T**	**T**	**L**	**E**	**F**	**E**	**L**	**L**	**A**

F	A	L	L	S	F	A	L	L	S	F	A	L	L	S	F	A
Y	H	P	A	A	Y	U	T	E	S	W	Y	R	W	S	S	D
T	**H**	**E**	**P**	**I**	**T**	**U**	**I**	**T**	**A**	**R**	**Y**	**G**	**L**	**A**	**N**	**D**

10) **[126 points]** This quote has been encoded using the Rail Fence Cipher for you to decode. You are told that 4 rails were used to encode it and there is no offset.

REAAEOUUEBRRVFLHRNOOCRSMMIGIYLTESNYATTENTSIEN

```
R     E     A     A     E     O     U     U
 E   B R   R V   F L   H R   N O   O C   R S
  M M   I G   I Y   L T   E S   N Y   A T   T
   E     N     T     S     I     E     N
```

Answer: _REMEMBER, IN GRAVITY FALLS, THERE IS NO ONE YOU CAN TRUST._

How to solve

This is how you solve it for 4 rails and no rail offset.

There are 4 rails in this problem. Therefore, each zig-zag will have `(2 * #rails) - 2 = (2 * 4) - 2 =` 6 characters (A single zig-zag starts with the character from the top row, goes down each row and back up ending one character before the top row.). The encrypted text is 45 characters long, so there are 7 complete zig-zags in the solution, with 3 characters left over in an incomplete zig-zag.

All spaces and punctuation have been removed from the message. To decode it, fill in each rail as described below. The message can be read along the zig-zags. Spaces between words can be added based on context.

Rail 1

Copy the first 8 characters from the cipher text along the first rail, with 5 spaces between each character.

Rail 2

Copy the next 15 characters of the cipher string along rail 2, starting at position 2. Alternate between 3 and 1 spaces between characters, starting with 3 spaces.

Rail 3

Copy the next 15 characters of the cipher string along rail 3, starting at position 3. Alternate between 1 and 3 spaces between characters, starting with 1 space.

Rail 4

Copy the last 7 characters from the cipher text along the last rail, starting at position 4 with 5 spaces between each character.

Read the decrypted message along the diagonals!

Rail	Counts			Zigzag
	zz	l/o	Tot	1 2 3 4 5 6 7 8
1	7	1	8	R.....E.....A.....A.....E.....O.....U.....U..
2	14	1	15	.E...B.R...R.V...F.L...H.R...N.O...O.C...R.S.
3	14	1	15	..M.M...I.G...I.Y...L.T...E.S...N.Y...A.T...T

Rail	Counts		
	zz	l/o	Tot
4	7	0	7

Zigzag

1	2	3	4	5	6	7	8
. . . E	. . . . . N	. . . . . T	. . . . . S	 I	. . . . . E	. . . . . N	. . . .

11) **[119 points]** Wendy Corduroy provided her insight on lifeguarding which has been encoded using a Caesar cipher with an offset of 8. What did she say?

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

X	Z	Q	D	Q	T	M	O	M	A	.	X	T	C	A		Q		O	M	B	B	P	M	J	M	A	B	A	M	I	B		Q	V
P	**R**	**I**	**V**	**I**	**L**	**E**	**G**	**E**	**S**	.	**P**	**L**	**U**	**S**		**I**		**G**	**E**	**T**	**T**	**H**	**E**	**B**	**E**	**S**	**T**	**S**	**E**	**A**	**T**		**I**	**N**

B	P	M		P	W	C	A	M	.
T	**H**	**E**		**H**	**O**	**U**	**S**	**E**	.

How to solve

We start out by looking for short words to decode and then see if that encoding makes sense. Since we have a single letter word, we try out Q=A and Q=I.

With Q=A we look in the decoding table for a Q in the A column and see that it is the Q row

Using the Q row to decode the first long word 'TQNMOCIZLA', it comes out as 'DAXWYMSJVK'

With Q=I we look in the decoding table for a Q in the I column and see that it is the I row

Using the I row to decode the first long word 'TQNMOCIZLA', it comes out as 'LIFEGUARDS'

Based on this, we believe that the key row is I which we can use to decode the remaining letters

---

12) **[468 points]** Siri transcribed some thoughts by Bill Cipher encrypted as an Aristocrat, unfortunately they misheard a bunch of the words. What does it decrypt to say?

BJPQ JV HQWH, WSH PQWSJSX GWV SC PQWBJSX. QIJVBQSDQ
TIME IS DEAD, AND MEANING HAS NO MEATING. EXISTENCE

JV NMVJHQ TACRS WSH J AWJS VNMAQPQ. RQYDCPQ, RCS WSH
IS UPSIDE FROWN AND I RAIN SUPREME. WELCOME, WON AND

WYY, BC RQJAHPWXQHHCS!
ALL, TO WEIRDMAGEDDON!

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Frequency	4	4	6	2			1	9	1	10			2	2		6	14	4	12	1		6	10	3	3	
Replacement	R	T	O	C	K	Q	H	D	X	I	Z	V	P	U	B	M	E	W	N	F	Y	S	A	G	L	J

13) **[248 points]** A quote that has the word “YOU” in it 4 times has been encoded as an Aristocrat.

ARS! ARS GHQ’X WNWQ MCHZMQW TEHX ARS KSOX GROX CW!
YOU! YOU CAN’T EVEN IMAGINE WHAT YOU JUST COST ME!

VR ARS EHNW HQA MVWH TEHX M’C YMIW TEWQ M’C CHV?
DO YOU HAVE ANY IDEA WHAT I’M LIKE WHEN I’M MAD?

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Frequency	5		5		4		2	8	1		1		6	2	2		5	6	5	3		3	8	5	1	1
Replacement	Y	F	M	Q	H	Z	C	A	K	R	J	X	I	V	S	B	N	O	U	W	P	D	E	T	L	G

14) **[138 points]** A quote by Dipper Pines has been encoded using the Pollux Cipher for you to decode. You are told that 1=●, 2=–, 3=×, 4=●, 5=–, 6=×

```
80583285640866842497865099539402432586027951846169100
–●––×–––×●●–××–●–●×●–×–●××–××●●–●×–––×●–●×–●–●×●××●●●
Y    O   U    C    A  N   T  F    O   R   C    E  S

92859256735586816099292823305779585374723439518535886018
×–––×––×●×–––×–●×●××–×–––××●–●●×–––×●●●–×●××–●––×–––×●●–
 O   M  E O   N  E  T O    L    O   V    E  Y    O   U
```

How to solve

Since we are told the mapping of 123456 ciphertext, we can build the following table:

0	1	2	3	4	5	6	7	8	9
●–×	●	–	×	●	–	×	●–×	●–×	●–×

Based on that information we can map the cipher text as:

```
80583285640866842497865099539402432586027951846169100
  – ×– –×●  ×× ●–●   ×–   –× ● –●×–– × –  –● ●×●× ●
            /                              E

92859256735586816099292823305779585374723439518535886018
 – – ––× ×–– × ●×   – – –×× –   – –× ● –×●× –● –×–  × ●
                      /          E
```

At this point in time, 4 ciphertext characters still need to be mapped. The first morse code character can never be an ×,

0	1	2	3	4	5	6	7	8	9
●–×	●	–	×	●	–	×	●–×	●–	●–×

Based on that information we can map the cipher text as:

```
80583285640866842497865099539402432586027951846169100
? –?×–?–×● ?××?●–●  ?×–   –× ● –●×––?× –  –●?●×●× ●
            /                              E

92859256735586816099292823305779585374723439518535886018
 –?– ––× ×––?×?●×   – –?–×× –   –?–× ● –×●× –●?–×–??× ●?
                      /          E
```

At this point in time, 4 ciphertext characters still need to be mapped. Looking at the ciphertext, we see the sequence 330 which would result in three ×s in a row if 0 were an ×.

0	1	2	3	4	5	6	7	8	9
●–	●	–	×	●	–	×	●–×	●–	●–×

Based on that information we can map the cipher text as:

```
8058328564086684249786509953940243258602795184616910 0
??–?×–?–×●??××?●–●  ?×–?  –× ●?–●×––?×?–  –●?●×●× ●??
           /                                  E

928592567355868160992928233057795853747234395185358860 18
 –?– ––× ×––?×?●×?  – –?–××?–   –?–× ● –×●× –●?–×–??×?●?
                      /             E
```

At this point in time, 4 ciphertext characters still need to be mapped. Since 7 can still map to ●–× we simply try them and look at the first word or two to see if it makes sense. Trying ● for 7 gives us a chunk: VE. Trying – for 7 gives us a chunk: YE. Trying × for 7 gives us a chunk: ETE. Which means we know that 7 must map to ●

0	1	2	3	4	5	6	7	8	9
●–	●	–	×	●	–	×	●	●–	●–×

Based on that information we can map the cipher text as:

```
8058328564086684249786509953940243258602795184616910 0
??–?×–?–×●??××?●–● ●?×–?  –× ●?–●×––?×?–● –●?●×●× ●??
           /                                  E

928592567355868160992928233057795853747234395185358860 18
 –?– ––×●×––?×?●×?  – –?–××?–●● –?–×●●●–×●× –●?–×–??×?●?
       E                /          V    E
```

At this point in time, 3 ciphertext characters still need to be mapped. Since 8 can still map to ●– we simply try them and look at the first word or two to see if it makes sense. Trying ● for 8 gives us a chunk: EGI. Trying – for 8 gives us a chunk: EON. Which means we know that 8 must map to –

0	1	2	3	4	5	6	7	8	9
●–	●	–	×	●	–	×	●	–	●–×

Based on that information we can map the cipher text as:

```
8058328564086684249786509953940243258602795184616910 0
–?––×–––×●?–××–●–● ●–×–?  –× ●?–●×–––×?–● –●–●×●× ●??
     O      /                  O          E

928592567355868160992928233057795853747234395185358860 18
 ––– ––×●×–––×–●×?  – –––××?–●● –––×●●●–×●× –●––×–––×?●–
       E O   N          /          V    E       O
```

At this point in time, 2 ciphertext characters still need to be mapped. Based on the sequence 8058 with 0 possibly being one of '●–, only ● results in a legal morse code character, so we can mark 0 as being ●.

0	1	2	3	4	5	6	7	8	9
●	●	–	×	●	–	×	●	–	●–×

Based on that information we can map the cipher text as:

```
8058328564086684249786509953940243258602795184616910 0
–●––×–––×●●–××–●–● ●–×–●  –× ●●–●×–––×●–● –●–●×●× ●●●
```

```
Y    O   U  /                    O           E

928592567355868160992928233057795853747234395185358860 18
 --- --×●×---×-●×●  - ---××●-●● ---×●●●-×●× -●--×---×●●-
       E O   N          /          V   E       O   U
```

At this point in time, 1 ciphertext characters still need to be mapped. Based on the sequence 8424978 with 9 possibly being one of '●–×, only × results in a legal morse code character, so we can mark 9 as being ×.

0	1	2	3	4	5	6	7	8	9
●	●	–	×	●	–	×	●	–	×

Based on that information we can map the cipher text as:

```
805832856408668424978650995394024325860279518461691 00
-●--×---×●●-××-●-●×●-×-●××-××●●-●×---×●-●×-●-●×●××●●●
Y    O   U  / C   A  N / T/ F   O   R   C   E/ S

928592567355868160992928233057795853747234395185358860 18
×---×--×●×---×-●×●××-×---××●-●●×---×●●●-×●××-●--×---×●●-
 O   M  E O   N  E/ T O  / L   O   V   E/ Y   O   U
```

Now that we have mapped all the ciphertext characters, the decoded morse code is the answer:

YOU CAN T FORCE SOMEONE TO LOVE YOU

15) **[165 points]** Decrypt this statement from a Gravity Falls character using the Affine cipher where a=5, and b=9

X	A	'	V		I	F	W	W	Z		S	B	P		Y	F	R	O		Z	B	F		J	Q	D	!
I	**T**	'	**S**		**F**	**U**	**N**	**N**	**Y**		**H**	**O**	**W**		**D**	**U**	**M**	**B**		**Y**	**O**	**U**		**A**	**R**	**E**	!

How to solve

Using the given value of $\mathrm{a} = 5$ and $\mathrm{b} = 9$ we can calcuate using the formula $a * x + b \mod 26$

X	**A**	**V**	**I**	**F**	**W**	**W**	**Z**	**S**	**B**	**P**	**Y**	**F**	**R**	**O**	**Z**	**B**	**F**	**J**	**Q**	**D**

The first step is to encode the common letters **ETAOIN** to see what they would map to.

$$
\begin{array}{lllllll}
E(4) & \rightarrow & 4 * 5 + 9 & \rightarrow & 29 \mod 26 & \rightarrow & D(3) \\
T(19) & \rightarrow & 19 * 5 + 9 & \rightarrow & 104 \mod 26 & \rightarrow & A(0) \\
A(0) & \rightarrow & 0 * 5 + 9 & \rightarrow & 9 \mod 26 & \rightarrow & J(9) \\
O(14) & \rightarrow & 14 * 5 + 9 & \rightarrow & 79 \mod 26 & \rightarrow & B(1) \\
I(8) & \rightarrow & 8 * 5 + 9 & \rightarrow & 49 \mod 26 & \rightarrow & X(23) \\
N(13) & \rightarrow & 13 * 5 + 9 & \rightarrow & 74 \mod 26 & \rightarrow & W(22)
\end{array}
$$

Filling in the letter we found (DAJBXW), we get a bit more of the answer.

X	**A**	**V**	**I**	**F**	**W**	**W**	**Z**	**S**	**B**	**P**	**Y**	**F**	**R**	**O**	**Z**	**B**	**F**	**J**	**Q**	**D**
I	**T**				**N**	**N**			**O**							**O**		**A**		**E**

Next, encode the next 5 common letters **SRHLD**.

$$
\begin{array}{lllllll}
S(18) & \rightarrow & 18 * 5 + 9 & \rightarrow & 99 \mod 26 & \rightarrow & V(21) \\
R(17) & \rightarrow & 17 * 5 + 9 & \rightarrow & 94 \mod 26 & \rightarrow & Q(16) \\
H(7) & \rightarrow & 7 * 5 + 9 & \rightarrow & 44 \mod 26 & \rightarrow & S(18) \\
L(11) & \rightarrow & 11 * 5 + 9 & \rightarrow & 64 \mod 26 & \rightarrow & M(12) \\
D(3) & \rightarrow & 3 * 5 + 9 & \rightarrow & 24 \mod 26 & \rightarrow & Y(24)
\end{array}
$$

We know the reverse mapping of 5 more letters (VQSMY), which we can fill in.

X	**A**	**V**	**I**	**F**	**W**	**W**	**Z**	**S**	**B**	**P**	**Y**	**F**	**R**	**O**	**Z**	**B**	**F**	**J**	**Q**	**D**
I	**T**	**S**			**N**	**N**		**H**	**O**		**D**					**O**		**A**	**R**	**E**

We will convert the next 5 most frequent letters **CUMFP**.

$$
\begin{array}{lllllll}
C(2) & \rightarrow & 2 * 5 + 9 & \rightarrow & 19 \mod 26 & \rightarrow & T(19) \\
U(20) & \rightarrow & 20 * 5 + 9 & \rightarrow & 109 \mod 26 & \rightarrow & F(5) \\
M(12) & \rightarrow & 12 * 5 + 9 & \rightarrow & 69 \mod 26 & \rightarrow & R(17) \\
F(5) & \rightarrow & 5 * 5 + 9 & \rightarrow & 34 \mod 26 & \rightarrow & I(8) \\
P(15) & \rightarrow & 15 * 5 + 9 & \rightarrow & 84 \mod 26 & \rightarrow & G(6)
\end{array}
$$

The next 5 letters we know are (TFRIG), so we will fill those in.

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

Next, encode the next 5 common letters **GWYBV**.

$$
\begin{array}{lcrcrcl}
G(6) & \rightarrow & 6*5+9 & \rightarrow & 39 & \mod 26 & \rightarrow & N(13) \\
W(22) & \rightarrow & 22*5+9 & \rightarrow & 119 & \mod 26 & \rightarrow & P(15) \\
Y(24) & \rightarrow & 24*5+9 & \rightarrow & 129 & \mod 26 & \rightarrow & Z(25) \\
B(1) & \rightarrow & 1*5+9 & \rightarrow & 14 & \mod 26 & \rightarrow & O(14) \\
V(21) & \rightarrow & 21*5+9 & \rightarrow & 114 & \mod 26 & \rightarrow & K(10)
\end{array}
$$

We know the reverse mapping of 5 more letters (NPZOK), which we can fill in.

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

The solution is now complete!

---

16) **[215 points]** A statement by Mabel Pines has been encoded using a Baconian cipher.

ceɔeceɔeɔəceɔecəceceeceɔəcecəcecəɔeceeceɔeɔeɔəcəcecəceeceɔ
AABAAABABBAABAABAAAAABBAAABAAABBAAAAABABABBABAAABAAAAA

E M E R G E N C Y S A

eɔeɔeceeceeceɔeɔəcəcecəcecəcəɔeɔeɔəcəɔeceɔeɔeɔəɔeɔəcəceee
ABABAAAAAAABABBABAAABAAABABBABABBABBAAABABABBBABBABAAAA

L A M I S O O S M Y R

ceɔecəcecəcəɔəcecəceeceəcəceɔeceɔeɔeɔəcəɔeceeceəcəɔecəɔeɔ
AABAABAAABABBBAAABAAAAABABAABAAABABABBABBAAAABABBAABBAB

E S P E C T F O R Y O

əceɔəceɔəɔeceeceɔeceɔecəɔeɔeceeceɔəcəɔeɔeceɔəce
BAABBAABBBAAAAABAAABAABBABAAAAABBABBABAAABBAA

U H A S G R O W N

Emergency salami? Soos, my respect for you has grown!

The A letters are represented by ' ce ' and the B letters by ' ɔə '

17) **[102 points]** Grunkle Stan offers some advice that has been encoded using the Caesar cipher with an offset of 11. What does it decode to?

D	Z	X	P	E	T	X	P	D		L		X	L	Y		S	L	D		E	Z		D	E	P	L	W		L	Y
S	**O**	**M**	**E**	**T**	**I**	**M**	**E**	**S**		**A**		**M**	**A**	**N**		**H**	**A**	**S**		**T**	**O**		**S**	**T**	**E**	**A**	**L**		**A**	**N**

L	Y	T	X	L	E	C	Z	Y	T	N		M	L	O	R	P	C		E	Z		D	E	L	J		T	Y		E	S	T	D
A	**N**	**I**	**M**	**A**	**T**	**R**	**O**	**N**	**I**	**C**		**B**	**A**	**D**	**G**	**E**	**R**		**T**	**O**		**S**	**T**	**A**	**Y**		**I**	**N**		**T**	**H**	**I**	**S**

N	C	L	K	J		R	L	X	P		N	L	W	W	P	O		W	T	Q	P	.
C	**R**	**A**	**Z**	**Y**		**G**	**A**	**M**	**E**		**C**	**A**	**L**	**L**	**E**	**D**		**L**	**I**	**F**	**E**	.

How to solve

We start out by looking for short words to decode and then see if that encoding makes sense. Since we have a single letter word, we try out L=A and L=I.

With L=A we look in the decoding table for a L in the A column and see that it is the L row

Using the L row to decode the first long word 'DZXPETXPD', it comes out as 'SOMETIMES'

With L=I we look in the decoding table for a L in the I column and see that it is the D row

Using the D row to decode the first long word 'DZXPETXPD', it comes out as 'AWUMBQUMA'

Based on this, we believe that the key row is L which we can use to decode the remaining letters

18) **[0 points]** Decrypt this Porta cipher encoded with the key of “HUNTS”

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

H	U	N	T	S		H	U	N	T	S		H	U	N	T	S		H	U	N	T
Y	J	N	V	F		C	J	S	F	E		C	J	X	I	Q		E	D	A	J
I	**T**	**H**	**M**	**O**		**S**	**T**	**M**	**O**	**N**		**S**	**T**	**E**	**R**	**H**		**U**	**N**	**T**	**S**