

Science Olympiad — Div A Practice Test #2

1) **[130 points]** Solve this Caesar quote from Mother Teresa.

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

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 C=A and C=I.

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

Using the C row to decode the first long word 'UGCUQP', it comes out as 'SEASON'

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

Using the U row to decode the first long word 'UGCUQP', it comes out as 'AMIAWV'

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

2) **[100 points]** Solve this Atbash quote from George Eliot.

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

3) [100 points] Solve this Aristocrat cypher from Malala Yousafzai with four words that are ONE.

**XMJ QXXE, XMJ UJM, XMJ BAODY,
ONE BOOK, ONE PEN, ONE CHILD,**

**VMJ XMJ HJVBAJW BVM BAVMLJ HAJ
AND ONE TEACHER CAN CHANGE THE**

**KXWDY.
WORLD.**

	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		2	1			2		9	1	1	8		1		1				1	4	2	7	3	
Replacement	H	C	F	L	K	M	S	T	Q	E	W	G	N	X	I	J	B	U	Z	V	P	A	R	O	D	Y

4) [200 points] Solve this Aristocrat from Abraham Lincoln.

**IQB MBZI IQFDE WMAPI IQB LPIPHB
THE BEST THING ABOUT THE FUTURE**

**FZ IQWI FI OAUBZ ADB NWR WI W
IS THAT IT COMES ONE DAY AT A**

**IFUB.
TIME.**

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

5) [175 points] The following quote needs to be decoded with the Vigenère Cipher with a keyword of **STAR**.

S T A R S T A R S T A R S T A R S T A R S T A R

K	A	O	F	L	Y	O	I	L	A	E	D	G	H	N	R	F	W	I	W	Q	H	U	D
S	H	O	O	T	F	O	R	T	H	E	M	O	O	N	A	N	D	I	F	Y	O	U	M

S T A R S T A R S T A R S T A R S T A R S T A R

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

S T A R S T

W	L	T	R	J	L
E	S	T	A	R	S

6) [90 points] Solve this PigPen cypher quote from Maya Angelou.

> Ɔ < > Ɔ U □ J Ɔ J Ɔ □ U Ɔ V Ɔ □

F	R	Y
---	---	---

T	O
---	---

B	E
---	---

A

R	A	I	N	B	O	W
---	---	---	---	---	---	---

I	N
---	---

∨ Ɔ □ Ɔ □ Ɔ □ ' ∨ L L Ɔ < □ .

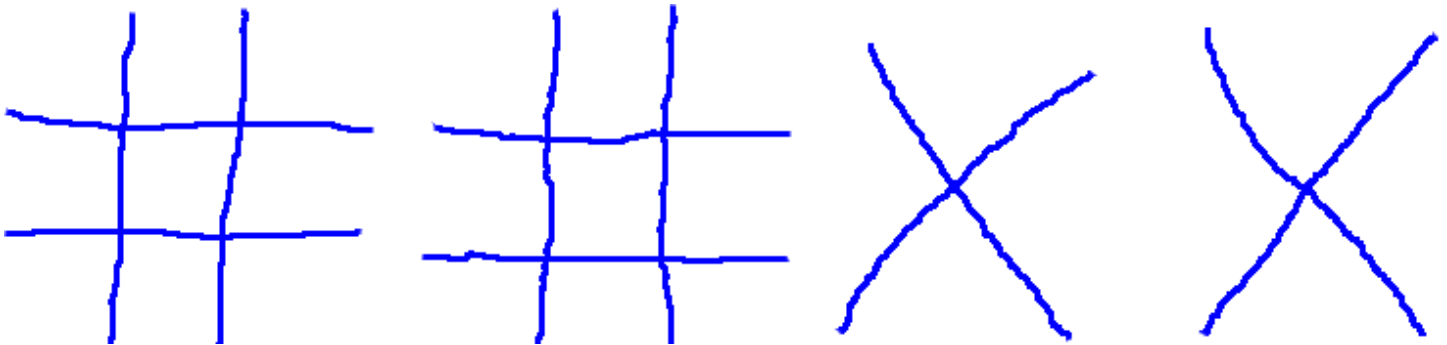
S	O	M	E	O	N	E
---	---	---	---	---	---	---

S

C	L	O	U	D
---	---	---	---	---

How to Solve

First you want to create the lookup table by drawing two tic-tac-toe boards followed by two big Xs.



Then write the alphabet in the tic-tac-toe boards across and then down putting dots on the letters in the second board.

Then fill up the two big Xs starting at the top then left, right and finally bottom, putting dots on the letters in the second X. like:

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	

With that decode table, it should be quick decode the characters by looking at the shapes and whether the shape has a dot in it or not.

7) [125 points] Solve this Tap Code, which is a great question from Robert H. Schuller.

●●●●● ●● ●● ●●● ● ● ●●●● ●●●●
 W H A T

●● ●● ●●●● ●● ● ●●●●● ● ● ●●●● ●●●●
 G R E A T

●●●●● ●●●●● ●● ●●●● ●● ●●●●● ●●●● ●●●● ●● ●●
 T H I N G

●●●●●● ●● ●●●● ●●●●● ●●●●● ●●●●●● ●●●● ●● ●● ●●●●●
 W O U L D

●●●●●● ●●●●● ●●●● ●●●●● ●●●●● ●●●●●●
 Y O U

● ● ●●●●● ●●●●● ●●●●● ●●●●● ● ●●●●●● ●●●● ●● ●●●● ●●●●●● ●●●●●
 ●●●●●
 A T T E M P T

●● ●●●●● ●● ●● ●●●●●● ●●●●● ●●●● ●●●●● ●●●●● ●●●●●●●
 I F Y O U

● ●●●● ●●●● ●●●● ●●●●●●● ●●●●●●● ●● ●●●●●●● ●●●●● ●●●●● ●●●●●●●
 ●●●●● ●●●●●●●
 K N E W Y O U

● ●●●● ●●●● ●●●●● ●●●●●●● ●●●●●●● ●●●● ●● ●●●●●●●
 C O U L D

●●●● ●●●● ●●●● ●●●●●●● ●●●●●●● ●●●●● ●● ●● ●● ●●●● ●●●●● ●●●● ●● ●●
 N O T F A I L ?

How to Solve

First you want to create the lookup table by drawing a grid with 5 horizontal and 5 vertical lines. Then fill in the top with the numbers 1 through 5 and the same on the left side of the grid. Finally fill in the letters from left to right and then down, remembering to skip the letter K. Once you have filled in all 25 cells, go back and add K to the cell with C in it giving you a table like:

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

Then go through the cipher text and put a mark between each two groups of dots. To decode, count the number of dots in the first group to pick the row in the table and the number of dots in the second group to pick the column and read the letter. Only when you have a single dot followed by three dots (which corresponds to the letter C) do you have to decide whether the letter should be a C or K