

Science Olympiad – 2024 Workshop

Test - Div A

Exam Preparation

You will need:

1. Folders for each of the teams to hold the tests
2. Sufficient copies of the test for all teams. They don't need to be stapled.

Before the event begins:

1. Adjust desks and chairs – teams may have up to 2 students for this event.

Running the Event

1. When the students enter the room, instruct them to sit down, DO NOT OPEN THE FOLDER, and put their names, school name and school number on the first page.
2. Encourage them to write their team number on all the other pages AFTER they begin the test. This way if their papers gets separated from each other we can make sure to give them credit.
3. **CRITICAL:** Check to see that students have ONLY brought
 - i. Something to write with (pencils, pens, erasers, highlighters)
 - ii. If the student has a smart watch (Apple watch, Samsung Gear, etc.) they will need to put it away.
4. Tell the teams that they do not have to fill in the frequency table. It is simply there as an aid to them solving the cryptogram. It will not be graded.
5. When time is up, have the students put writing instruments down and put their answer pages back into the folder in the correct order.

How to grade

1. Teams can have up to two incorrect letters total on their cryptogram and still be correct. The frequency of the incorrect letter is irrelevant. See the example below.

If the cryptogram was as shown:

KZBAOF KFXMFXYF
SAMPLE SENTENCE

and the students answered (underlined letters indicate mistakes)

SAMPLE SENTENCE

then it counts as four mistakes (even though the mistake was only in the letter E) and the answer DOES NOT count. However, if they put

SAMPUL SENTENCE

It is considered correct with two letter mistakes.

2. Teams do NOT have to fill in the frequency table. It is simply there as an aid to them solving the cryptogram. It is NOT to be graded. It is included in the answer key as an aid to the grader.
3. As you score each question, if correct, put the number of incorrect letters (0, 1, or 2) next to the question number on the scoring page. Also, put the value for the question into the score column. If they get more than 2 letters wrong, subtract 50 points from the score until it would be zero. If a question is worth 140 points and they get 4 letters wrong, you would start with 140 points (for up to 2 letters wrong) and then subtract 50 points for each of the next two letters wrong ending up with a final score of 40 points for that question. If they had gotten 5 or more letters wrong on a 140 point question, they would receive 0 points for that question. With a 350 point question, they could get 8 letters wrong and receive 50 points (2 free letters then $6 \times 50 = 300$ points off). Just put the incorrect cost deduction on the score sheet and subtract it from the value for the question. Under no circumstance should the score for any question be less than zero.
4. When scoring questions, if they actually did any work on the question and got some letters right, it is useful to write "LOTS" for the question on the score sheet. In this way it is really easy to break ties without having to go look at each question.
5. Add up all the scores and put the total on the bottom of score sheet.
6. You must break all ties. Indicate the tie breaker by adding .1 to the score of the team ahead. With multiple teams tied, you will add more. I.e. if five teams all scored 200 points, the final scores that you would enter on the score sheet would be 200.4, 200.3, 200.2, 200.1 and 200.
7. To determine how to break the tie, you need to look at the correctly answered questions in the order from the table below. If both teams answered the same (i.e. they answered the question with zero mistakes) then you go on to the next question. If one team had no mistakes and the other team had one mistake, then the team with no mistakes is ahead. For example, if one team answered question the highest value question and another team didn't, the first team will be ahead.

Tie Breaker Order	Question #
1	14
2	13
3	12
4	10
5	4

Tie Breaker Order	Question #
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6	3
7	9
8	7
9	2
10	6
11	1
12	11
13	5
14	8

8. If there is still a tie (typically when you have teams which answered either zero, one or two questions) then you will need to look at the tie breaker questions again and count the number of correctly answered letters. The team with the most correctly matched letters is to be ahead.

1) **[65 points]** Decode this quote which has been encoded using the Atbash Cipher.

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

L	M	Z	M	W	O	V	G	G	R	M	T	T	L	.
O	N	A	N	D	L	E	T	T	I	N	G	G	O	.

2) **[80 points]** Decode this quote which has been encoded using the Caesar Cipher. with a shift of 3

Q	E	B	Y	B	D	F	K	K	F	K	D	F	P	Q	E	B	J	L	P	Q
T	H	E	B	E	G	I	N	N	I	N	G	I	S	T	H	E	M	O	S	T

F	J	M	L	O	Q	X	K	Q	M	X	O	Q	L	C	Q	E	B	T	L	O	H
I	M	P	O	R	T	A	N	T	P	A	R	T	O	F	T	H	E	W	O	R	K

3) [106 points] Solve this Caesar with a shift between -5 and 5.

F	Q	P	'	V	F	G	E	K	F	G	V	J	C	V	A	Q	W	E	C	P	'	V
D	O	N	'	T	D	E	C	I	D	E	T	H	A	T	Y	O	U	C	A	N	'	T

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

E	C	P	.
C	A	N	.

4) [110 points] The following quote needs to be decoded with the Vigenère Cipher with a keyword of LOVE

L O V E L O V E L O V E L O V E L O V E L O V E

C	S	H	I	X	P	Z	V	H	V	V	X	T	G	B	M	G	S	I	J	C	C	H	X
R	E	M	E	M	B	E	R	W	H	A	T	I	S	G	I	V	E	N	F	R	O	M	T

L O V E L O V E L O V E L O V E L O V E L O

S	S	C	I	L	F	O	V	P	O	X	L	P	G	O	L	P	V	Z	E	C	H
H	E	H	E	A	R	T	R	E	A	C	H	E	S	T	H	E	H	E	A	R	T

5) **[58 points]** The following quote needs to be decoded with the Vigenère Cipher with a keyword of **DREAM**

D R E A M D R E A M D R E A M D R E A M D

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

6) **[65 points]** A quote has been encoded using the Pig Pen Cipher for you to decode.

< ◻ <] ◻ ∨] < ∨ ∩] ∨ ∨ ◻] ◻ ◻ < ◻ ◻ ◻ ◻

Y	O	U	A	L	W	A	Y	S	P	A	S	S	F	A	I	L	U	R	E	O	N
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

> ◻ ◻ ∨] < > ◻ ∨ < L L ◻ ∨ ∨ .

T	H	E	W	A	Y	T	O	S	U	C	C	E	S	S	.
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

7) [80 points] A quote has been encoded using the Pig Pen Cipher for you to decode.

I AM NOT AFRAID OF STORMS,
 FOR I AM LEARNING HOW TO
 SAIL MY SHIP.

8) [55 points] The following symbols represent a quote which has been encoded using the Tap Code Cipher for you to decode.

A L I T T L E
 M A G I C C A N
 T A K E Y O U
 A L O N G W A Y
 .

9) [81 points] The following symbols represent a quote which has been encoded using the Tap Code Cipher for you to decode.

• •
A

•• ••••• ••• •••• •••• ••••• •••• •• ••• ••• • •••••
••••• ••••
J O U R N E Y

••• •••• •• • • •
O F A

•••• •••• •• ••• ••• ••••• ••••• ••••• •••• • • •••
••• • ••••
T H O U S A N
D

••• •• •• •••• ••• • • • ••••• •••• •••
M I L E S

• •• • ••••• •• •• •• ••••• ••• ••• ••••• •••
B E G I N S

••••• •• •• •••• •••• •••• •• ••• • • •
W I T H A

•••• ••• •• •••• ••• ••• •• •• ••• • • •••••
S I N G L E

•••• ••• •••• •••• • ••••• ••• ••••• •
S T E P .

10) [129 points] A quote has been encoded using the Dancing Men Cipher for you to decode.



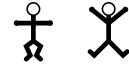
K	I	N	D
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W	O	R	D	S
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C	A	N
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B	E
---	---



S	H	O	R	T
---	---	---	---	---



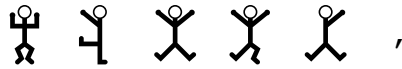
A	N	D
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E	A	S	Y
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T	O
---	---



S	P	E	A	K
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B	U	T
---	---	---



T	H	E	I	R
---	---	---	---	---



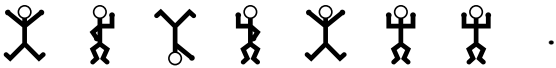
E	C	H	O	E	S
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A	R	E
---	---	---



T	R	U	L	Y
---	---	---	---	---



E	N	D	L	E	S	S
---	---	---	---	---	---	---

11) [64 points] A quote by Walt Disney has been encoded using the Dancing Men Cipher for you to decode.

The image shows a grid of stick figures representing the Dancing Men Cipher. Each figure is a stick figure with arms and legs in various positions, corresponding to letters of the alphabet. The grid is arranged as follows:

I	T	'	S	K	I	N	D	O	F	F	U	N	T	O	
D	O	T	H	E	I	M	P	O	S	S	I	B	L	E	.

12) [188 points] A quote has been encoded using the Aristocrat Cipher for you to decode. You are told that it begins with WHEN

**IWOM AWO UBNDG GXGV QXTFWOY UHN
WHEN THE FIRST BABY LAUGHED FOR**

**AWO UBNDG ABCO, BA'D QXTFW GNHRO
THE FIRST TIME, IT'S LAUGH BROKE**

**BMAH X AWHTDXMY JBOSOD, XMY AWOV
INTO A THOUSAND PIECES, AND THEY**

**XQQ IOMA DRBJJBMF XGHTA, XMY
ALL WENT SKIPPING ABOUT, AND**

**AWXA IXD AWO GOFBMMBMF HU AWO
THAT WAS THE BEGINNING OF THE**

**UXBNBOD.
FAIRIES.**

	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	15	12	1	8		5	5	6	3	3			10	5	14		4	2	1	4	5	2	10	12	4	
Replacement	T	I	M	S	Z	G	B	O	W	P	J	V	N	R	E	Q	L	K	C	U	F	Y	H	A	D	X

13) [270 points] A quote has been encoded using the Aristocrat Cipher for you to decode. You are told the word IS shows up twice.

KHBWKLBFKQL KC HQSP KHYQSFBLE
IMAGINATION IS MORE IMPORTANT

FDBL MLQZGPXWP. MLQZGPXWP KC
THAN KNOWLEDGE. KNOWLEDGE IS

GKHKFPX. KHBWKLBFKQL PLEKSEGPC
LIMITED. IMAGINATION ENCIRCLES

FDP ZQSGX.
THE 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		6	3	2	2	7	5	5			12	9	2			9	7		4				4	4	1	3
Replacement	F	A	S	H	C	T	L	M	X	Z	I	N	K	Y	V	E	O	J	R	B	Q	U	G	D	P	W

14) [322 points] A quote has been encoded using the Aristocrat Cipher for you to decode.

QVF KOMFGQMKQ MK GZQ R SFIKZG
THE SCIENTIST IS NOT A PERSON

EVZ AMHFK QVF IMAVQ RGKEFIK, VF'
WHO GIVES THE RIGHT ANSWERS, HE'

K ZGF EVZ RKYK QVF IMAVQ
S ONE WHO ASKS THE RIGHT

TLFKQMZGK.
QUESTIONS.

	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				3	10	6	1	4		12	1	7		1		9	3	1	1		8			1	6
Replacement	G	D	F	M	W	E	N	V	R	X	S	U	I	Z	C	L	T	A	P	Q	B	H	Y	J	K	O