

# Science Olympiad – North Carolina Regional Test 1

## 2019

Names of participants: (Please print neatly)

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School Name: \_\_\_\_\_

V JV1 JV2 JV3

Warning: Do not open this packet until given permission to do so.

Note: There are useful notes after this page.

Scoring:

Time to solve first problem: \_\_\_\_\_ (use to calculate Bonus below)

Question	Value	Incorrect letters	Deduction	Score
Timed	200			
1	100			
2	500			
3	200			
4	120			
5	400			
6	100			
7	400			
8	120			
9	600			
10	250			
11	100			
12	240			
13	100			
14	100			
15	600			
16	220			
17	120			
18	520			
Bonus				
Final Score				



The following tables might be useful during the event.

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

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
0	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

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

1	3	5	7	9	11	15	17	19	21	23
1	9	21	15	3	19	7	23	11	5	17

AAAAA	A	AABBA	G	ABBAA	N	BAABA	T
AAAAB	B	AABBB	H	ABBAB	O	BAABB	U/V
AAABA	C	ABAAA	I/J	ABBBA	P	BABAA	W
AAABB	D	ABAAB	K	ABBBB	Q	BABAB	X
AABAA	E	ABABA	L	BAAAA	R	BABBA	Y
AABAB	F	ABABB	M	BAAAB	S	BABBB	Z

## Frequency Table of English letters:

E - 12.51%	S - 6.54%	C - 3.06%	G - 1.96%	K - 0.67%
T - 9.25%	R - 6.12%	U - 2.71%	W - 1.92%	X - 0.19%
A - 8.04%	H - 5.49%	M - 2.53%	Y - 1.73%	J - 0.16%
O - 7.60%	L - 4.14%	F - 2.30%	B - 1.54%	Q - 0.11%
I - 7.26%	D - 3.99%	P - 2.00%	V - 0.99%	Z - 0.09%
N - 7.09%				

## Frequency Table of Spanish letters:

E - 14.08%	I - 5.98%	M - 3.08%	Y - 1.09%	Z - 0.47%
A - 12.16%	L - 5.24%	P - 2.89%	V - 1.05%	Ñ - 0.17%
O - 9.20%	D - 4.67%	B - 1.49%	G - 1.00%	X - 0.14%
S - 7.20%	T - 4.60%	H - 1.18%	F - 0.69%	K - 0.11%
N - 6.83%	U - 4.69%	Q - 1.11%	J - 0.52%	W - 0.04%
R - 6.41%	C - 3.87%			

For the purposes of cryptograms it is customary to treat n and ñ as distinct letters, but a and á are the same letter. Likewise for e and é, and i and í. In other words, all the accent marks get amputated when working with cryptograms. Also, while some older Spanish dictionaries consider ch, ll, and rr, to be their own letters—this has fallen out of modern usage. Accordingly, “burro” is considered as five letters: “b-u-r-r-o” and not as four letters “b-u-rr-o.”

Timed Question [200 points] Solve this Aristocrat encoded quote by Marquis Pierre Simon de Laplace. When you have solved it, raise your hand so that the time can be recorded and the solution checked.

ODPU GU LTU AHWDLHDSW ISK PUCHMDLDUW HQ ICC LTU

AIVLDMCUW DS LTU XSDPUVWU, ISK D FDCC AVUKDML LTU

QXLXVU.

	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		6	11		1	1	4	4		3	9	3		1	3	2		5	4	13	4	5	3		
Replacement																										

1) [100 points] Decode this phrase by Dr. Roopleen which has been encoded using the Atbash Cipher.

W	L	M	G	O	V	G	N	V	M	G	Z	O	Y	O	L	X	P	H	X	L	M	G	I	L	O	B	L	F	.			

  

H	V	G	B	L	F	I	H	V	O	U	U	I	V	V	.	X	L	M	U	I	L	M	G	B	L	F	I	U	V	Z	I	

  

Z	M	W	G	F	I	M	G	S	V	N	V	M	G	Z	O	Y	O	L	X	P	H	R	M	G	L	

  

Y	F	R	O	W	R	M	T	Y	O	L	X	P	H	.

2) [500 points] Solve this Patristocrat which is a quote by Stanley Victor Paskavich encoded using a K1 alphabet.

OPCVK JKQOP POPQC VKZMK CRSPT ZVOYM RMZVK BRCSD

QVCCV KFMBY TCMRK KCVKP SUCKB CVSCS PHUMB NMUKT

DLSCO MPFSR PMYMP QKBUB KK

K1	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	12	2		2		1		1	14	1	10	1	5	10	4	5	7	3	4	8				3	3
Replacement																											

3) [200 points] Solve this Aristocrat which is a quote by Albert Einstein which ends with the word LIVES.

DCO FBGYBRD QP DGBDC VMH ZOVBDS RY V YFCOGO QP

VLDRXRDS RM UCRLC UO VGO FOGARDDOH DQ GOAVRM

LCRJHGOM VJJ QBG JRXYOY.

	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	5	6	10		3	8	3		4		3	4		11	2	4	10	2		2	7		2	4	1
Replacement																										

4) [120 points] Encode this phrase by Marcus Aurelius using the Atbash Cipher.

T	H	E	O	B	J	E	C	T	O	F	L	I	F	E	I	S	N	O	T	T	O	B	E	O	N	T	H	E
S	I	D	E	O	F	T	H	E	M	A	J	O	R	I	T	Y	,	B	U	T	T	O	E	S	C	A	P	E
F	I	N	D	I	N	G	O	N	E	S	E	L	F	I	N	T	H	E	R	A	N	K	S	O	F	T	H	E
I	N	S	A	N	E	.																						
						.																						

5) [400 points] Figure out what these strange headlines encoded using a Baconian alphabet mean. It was said by Mark Twain and starts out with THEM. What does it say?

FIND A SUPER SCRUB GLOVE ON ITS MEDIC.

PILOT SAVED UP FOR AN OLD MEDAL MULTI RAZOR.

GERMS BELOW LAMPS JUST A MULTI ATOMS.

CAGED HAWKS SPEAK UP FOR AN OLD SIOUX ARROW.

HE DID AVOID FATAL SHELF AS HIS PHONE SPLIT BELOW.

BASIC AMBER LASER IS NOT SEEN A RISKY HOBBY.

TIRES TURNS, TREAD WATER, MARSH FISHY LANDS.

SHEER NORTH GROVE CABIN MEETS PORCH STEEP TREAD.

CANDY BACON CREAM GREAT TREND, FOOLS FANCY BARON.

I MUST BUILD ROADS, TOWER, OMEGA SWORD

6) [100 points] Encode this phrase from Yogi Berra using the Affine cipher with  $a=15$  and  $b=7$ .

W	E	M	A	D	E	T	O	O	M	A	N	Y	W	R	O	N	G	M	I	S	T	A	K	E	S	.
																										.



7) [400 points] Solve this Aristocrat which is a quote by Nora Okja Keller, very badly mangled by Alexa and then encoded with a K1 alphabet.

ESEQ FVBQI MTJ WSQD T DTV MBF ZFKWP UQLQI DQVZB VBQ

VTWQ FR BTGGSUQJJ YQZTKJQ JBQ UQLQI JVFGGQP ZBTJSAU

SV.

K1	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	1	7		3	2	5	4		3	7	2	2	2			2	15	1	5	7	4	7	3		1	4
Replacement																										

8) [120 points] Encode this phrase by Patricia Cornwell using a Caesar cipher with a shift of 8. I.e. A is encoded as I.

I	D	I	D	N	,	T	I	N	V	E	N	T	F	O	R	E	N	S	I	C	S	C	I	E	N	C	E	A	N	D
M	E	D	I	C	I	N	E	.	I	J	U	S	T	W	A	S	O	N	E	O	F	T	H	E	F	I	R	S	T	
P	E	O	P	L	E	T	O	R	E	C	O	G	N	I	Z	E	H	O	W	I	N	T	E	R	E	S	T	I	N	G
I	S	.																												

9) [600 points] Solve this Xenocrypt in Spanish which is a quote by Tim O'Reilly that has been encoded with a K1 alphabet using an English keyword.

EPM TL XMR NARMR CEL ÑMNL XM KLNPAQAOM LR NDLMD

PELFMR ABADKEPOTMTLR BMDM KDMSMVAR TLRLMTAR.

K1	A	B	C	D	E	F	G	H	I	J	K	L	M	N	Ñ	O	P	Q	R	S	T	U	V	W	X	Y	Z
Frequency	7	2	1	5	4	1					3	10	14	4	1	2	4	1	9	1	5		1		3		
Replacement																											

10) [250 points] Solve this Aristocrat which is a quote by Roy T. Bennett.

ZVJQ VO PDWER PNNQTRVXB RFQ NFPZZQXBQO PZWXB RFQ CPS,

NEWWOVXB RW IQQT HWKVXB JWLCPLU, PXU OPKWLVB RFQ

YWELXQS.

	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	2	1	2	5		1	1	2	2	4		4	4	8	10	6	2	2	2	6	9	8	1	4
Replacement																										



13) [100 points] Decode this phrase by Ibrahim Mustapha which has been encoded using a Caesar Cipher.

Z	W	P	F	L	K	Y	Z	E	B	F	W	S	L	Z	C	U	Z	E	X	P	F	L	I	C	Z	W	V	K	Y	V
N	R	P	P	F	L	S	L	Z	C	U	R	Y	F	L	J	V	,	Z	K	T	R	E	Y	V	C	G	P	F	L	
J	V	V	Y	F	N	Z	D	G	F	I	K	R	E	K	Y	R	M	Z	E	X	R	J	K	I	F	E	X			
W	F	L	E	U	R	K	Z	F	E	Z	J																			

14) [100 points] Decode this phrase by Benjamin Franklin which was encoded with with the Vigenere cipher using the keyword LINKS.

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

15) [600 points] Solve this Patristocrat which is a quote by Tamyara Brown that has been encoded with a K2 alphabet and starts with MYNOV.

ZHDEG QYRKA QBAVI IQDBV IUIUQ CNACE RQESI KXVDT

KYYES ZHOUK AKOIQ ARZQR RKDPI NADVD TVIVD IEKMQ

KNIVS NYZKR IQACV QOQ

Replacement																																															
K2	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	7	2	3	7	5		1	2	11		9		1	4	3	1	11	6	3	2	3	8		1	4	4																					

16) [220 points] Solve this Aristocrat which is a quote by Zig Ziglar containing the word DOES.

XTLXST LRUTA WZC UFZU NLUJDZUJLA YLTWA'U SZWU. KTSS,

ATJUFTM YLTW HZUFJAQ - UFZU'W KFC KT MTILNNTAY JU

YZJSC.

	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	1		5		1	1	6	3	7	2	3			1	1	5	11	12		5	2	4	7																												
Replacement																																																						

17) [120 points] Encode this phrase by Virginia Woolf using Vigenère cipher with a keyword of NIGHT.

G	R	O	W	I	N	G	U	P	I	S	L	O	S	I	N	G	S	O	M	E	I	L	L	U	S	I	O	N	S	I	N

  

O	R	D	E	R	T	O	A	C	Q	U	I	R	E	O	T	H	E	R	S

18) [520 points] Solve this Aristocrat encoded quote by Criss Jami which was misheard and then typed in with mistakes before being encoded with a K2 alphabet.

XAT ULOW QJTXQN ID AQW QUIAXIDT CWQD CID TQXHQ RXQS

JT JD QFMQN XUQDA NJAWQN AWJD J TANLVVRQ SILN

MIMLRJNXAG .

Replacement																																						
K2	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	8		2	7		1	1	1	6	7		4	3	7	1		13	3	2	6	3	2	5	7														