

# Science Olympiad — North Carolina Division A Sample - November 2021

Names of participants: (Please print neatly)

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

Check your team:  Varsity  JV1  JV2  JV3

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

**Note:** There are useful notes after this page.

Question	Value	Incorrect letters	Deduction	Score
1	56			
2	79			
3	98			
4	107			
5	98			
6	127			
7	57			
8	109			
9	131			
10	81			
11	143			
12	63			
<b>Final Score</b>				



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	25
1	9	21	15	3	19	7	23	11	5	17	25

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



3) [98 points] Solve this Caesar Cipher from Myra Yadav.

E	Q	Q	M	K	P	I

H	Q	Q	F

K	U

C

U	E	K	G	P	E	G

D	W	V

  

O	C	M	K	P	I

R	G	Q	R	N	G

J	W	P	I	T	A

K	U

C	P

  

C	T	V

4) [107 points] The following quote by Abraham Flexner needs to be decoded with the Vigenère Cipher with a keyword of **WORK**

O	Q	Z	O

J	Q	V	S

J	H	Y	O

R	S	I	I

W	Q	K	Y

B	G	F	V

  

R	W	E	Q

L	F	F	L

H	S	D	C

Y	F	V	K

P	S	J	W

K	F	V	Y

  

B	H	Y	O

I

5) [98 points] Solve this Caesar Cipher from Matt Groening.

L

N	Q	R	Z

D	O	O

W	K	R	V	H

Z	R	U	G	V

,

E	X	W

  
  

W	K	D	W

V	H	Q	W	H	Q	F	H

P	D	N	H	V

Q	R

V	H	Q	V	H

  
  

W	R

P	H

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6) [127 points] Solve this Aristocrat with a quote from Ralph Waldo Emerson about the future. The word **WHAT** appears three times.

**JLQE NRWF XWLRBV MF QBV JLQE**

**NRWF XWHPCW MF QCW ERBU YQEEWCF**

**TPYSQCWV EP JLQE NRWF JRELRB MF.**

	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		8	7		1		4		5	3	3		3	7	7	1	1	1	3	9	2	2	
Replacement																										

7) [57 points] Solve this Tapcode cipher which is a quote from Mustafa Kemal Atatürk.

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8) [109 points] The following advice from Steve Jobs needs to be decoded with the Vigenère Cipher with a keyword of **HOPE**.

H	B	S

X	O	S

D	R	S	M

L	E	F

H	D

H	V

U	G	I	H	H

L	S	Y	Y

X	W

A	C

A	S	C	S

L	L	H	H

N	S	B

R	D

. . . .  
. . . .

H	V	B

I

W	L	H	I	P	L

.  
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9) [131 points] Solve this Aristocrat cipher which is advice from Roy T. Bennett which ends with the word **TIME**.

VMJQ MG GWBKO. JBUPG BD TWXO

KQXVVH ZXOOQKG ZBGO. HBP WXFQ OB

UWXDSQ HBPYKMBKMOMQG BFQK OMZQ.

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

10) [81 points] Solve this Atbash cipher which is a quote from Robert A. Heinlein.

X	O	R	N	Z	G	V	R	H	D	S	Z	G	B	L	F	V	C	K	V	X	G	,
																						,

D	V	Z	G	S	V	I	R	H	D	S	Z	G	B	L	F	T	V	G	.
																			.

