

Science Olympiad — CrazyScaryMangoEater's 2021 Codebusters Mini-Competition

Names of participants: (Please print neatly)

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.

Scoring:

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

Question	Value	Incorrect letters	Deduction	Score
Timed	200			
1	250			
2	300			
3	200			
4	275			
5	175			
6	250			
7	325			
8	215			
9	300			
10	200			
11	500			
12	350			
13	275			
14	400			
15	450			
16	700			
17	100			
18	50			
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	25
1	9	21	15	3	19	7	23	11	5	17	25

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%				

Morse Code:

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	-----•

•	E
••	I
•••	S
••••	H
-•••	B
-----	0
•••••	5

-	T
•-	A
••-	U
•••-	V
-••-	X
•-----	1
-••••	6

-•	N
•-•	R
••-•	F
-•-•	C
••----	2
--•••	7

--	M
•--	W
•-••	L
-•--	Y
•••--	3
----••	8

-••	D
•--•	P
--••	Z
••••-	4
-----•	9

-•-	K
•---	J
--•-	Q

--•	G
-----	---

---	O
-----	---

Timed Question **[200 points]** Solve this aristocrat, an excerpt from a terrible essay I wrote on *To Kill a Mockingbird* last year. When you have solved it, unmute yourself and say "Time!" Then type out your answer into the Pear Deck. When you have solved it, raise your hand so that the time can be recorded and the solution checked.

OMOW GENHAF GFO JTNROXHGUNW FCR DUGGDO OMOVOWXO GN

YCXS HJ GFOUT MOTZ ROTUNHR XDCUQR CWV GN TOPHGO GFO

JNBOTPHD GORGUQNWZ NP GFO VOPOWVCWG, GFO LHTZ

WOMOTGFODORR MNGOR GN XNWMUXG GNQ TNYUWRNW NW GFO

XFCTAO.

	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	6	5		11	21	7		3		1	6	16	27	4	3	10	1	10	9	4	12	7	2	3
Replacement																										

1) [250 points] Solve this statement of life encoded with an Aristocrat.

WSRROKNBB OB S KOQN, QAIP, ZNTZNBWOKL VSKLA ISBBO AK

S WAU BXVVNZ PSJ.

	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	7							2	1	5	2		5	5	2	2	2	6	1	1	3	3	1		3
Replacement																										

2) [300 points] Solve this legendary quote from *The Mango Wars* encrypted with a hill cipher and a key of EDDY.

$$\begin{pmatrix} E & D \\ D & Y \end{pmatrix} \equiv \begin{pmatrix} 4 & 3 \\ 3 & 24 \end{pmatrix}$$

K	O	O	J	L	F	B	W	P	E	D	S	N	A	K	K	R	E

3) [200 points] Solve this Aristocrat about customer service.

VKZ YZDV EGDVRJZP DZPMUEZ UD UC VKZ EGDVRJZP NRZDX'V

XZZN VR EIQQ ORG, NRZDX'V XZZN VR VIQA VR ORG. UV

TGDV FRPAD.

	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	9	4	1	5		2	2	2		1	4	2	4	3	10		1	4	13		4	1	13
Replacement																										

4) [275 points] Solve this K2 Aristocrat encoding lines from the twenty one pilots song "Forest".

O QVAK KB WZ NOJKZAZY KB. YBZJ OK WBKLZG VATBAZ ZNJZ

KLVK JBEZBAZ ZNJZ LVJ TBMG AVEZ?

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	6	8			2		2			6	8	3	1	3	3		1			2		5	2		2	13

5) [175 points] Solve this Caesar Cipher.

D	'	H	I	J	O	N	P	M	Z	D	A	5	5	Y	Z	B	M	Z	Z	N	D	N	V	X	O	P	V	G	G	T	
												5	5																		

X	J	G	Y	,	J	M	D	'	Q	Z	E	P	N	O	G	D	Q	Z	Y	D	I	N	V	I	Y	D	Z	B	J	

A	J	M	O	J	J	G	J	I	B	.
										.

6) [250 points] The following quote from a popular Depeche Mode song needs to be encoded with the Vigenère Cipher with a keyword of **GOOGLE**.

A	L	L	I	E	V	E	R	W	A	N	T	E	D	A	L	L	I	E	V	E	R	N	E	E	D	E	D	I	S

R	I	G	H	T	H	E	R	E	I	N	M	Y	A	R	M	S

7) [325 points] Solve this Baconian cipher, a quote from Harry Truman.

茶饭奶茶面饭奶茶面奶茶饭面奶茶奶饭茶面饭面饭面饭面饭奶茶面饭奶面饭茶面饭面饭面饭面饭奶面茶奶饭面饭面
 饭茶面饭面饭面奶饭面饭茶奶面饭面饭面茶奶饭茶面饭面饭奶茶面饭奶面茶饭面饭面饭面饭奶面饭面茶饭面奶茶奶
 饭茶面饭面饭奶茶面饭面饭奶茶面奶饭面茶饭面奶茶饭奶面茶奶饭面饭面茶奶饭面饭茶面饭奶面饭茶面饭面饭面饭
 面饭面奶茶饭奶茶面奶饭面茶奶饭

8) [215 points] Solve this Margaret Atwood quote encoded as an Aristocrat.

T MVPNF NTXC HV QC HZC YTE HZYH TSZYQTHI JVP DVE Y
 UVUCSH VSNJ. T MVPNF NTXC HV QC HZYH PSSVHTOCF YSF
 HZYH SCOCIIYEJ.

	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	1	3	4		12	3	3			2	5	2	4	3		7	8	2	9			2	8	5
Replacement																											

9) **[300 points]** The following quote needs to be encoded with the Affine Cipher using $a=3$ and $b=20$.

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

R	O	L	L	I	N	G	H	E	R	E	Y	E	S	.

10) **[200 points]** The following quote needs to be decoded with the Vigenère Cipher with a keyword of **TREES**.

P	Y	E	X	K	T	E	S	X	Z	X	I	A	S	J	W	W	S	V	L	A	V	W	E	M	K	L	W

11) [500 points] Solve this K1 Patristocrat.

MUVHV QMMCG VWLMK WHBVK MWFEL MIRIN PUVHR INKVV

FIHVD NLMFI IEWMM UVGLU ITEVZ WHZPU CLXVK RINTW

HLVVG V

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	2	1	3	3	3	6	8		4	6	9	4		2	1	3		2	5	13	7	1		2
Replacement																										

12) [350 points] These strange headlines actually encode a quote from *The Office* using the Baconian Cipher. The first word is **BEARS**.

WAGON MOVES SWISS LOUIS VISIT WAGON SCREW ISLAM FOODS

NAMED SQUAD MOMMA FEELS FIERY CLARE IS TOO LOYAL

FISTS MIAMI LOGIC MARTY MOOSE CRAZY A CASE A KING

BE ITS A BOOK A KING A CASE

13) [275 points] The following quote needs to be decoded with the Affine Cipher where $a=5$ and $b=10$.

Y	J	A	C	G	'	R	E	I	Y	N	N	E	Z	,	A	C	G	'	L	E	N	C	W	B	K	L	E	R	A
					'									,				'											

Y	S	H	C	R	B	K	X	B	H	K	R	B	C	J	A	C	G	R	N	Y	J	E	.

14) [400 points] A sentence about the recent war between Armenia and Azerbaijan has been encoded using the Morbit Cipher for you to decode. You are told that 3=-●, 6=xx, 1=x-, 2=-x, and 8=--.

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

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

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

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

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

4 5 4 2 4 5 3 7 4 5 2 3 5 4 6 4 1 7 1 5 4 7 7 5 3 7

4 1 7 7 1 8 5 9 7 1 3 5 9 1 7 4 3 5 7 9 7 7

15) **[450 points]** This twenty one pilots line from the song "Forest" is encoded with the Pollux cipher for you to solve. You are told that 8=-, 7=-, 6=•, and 9=x.

81197485088370530154195792221363911869884528691511094

59077923317629141235200960942548293149972729021157849281

3228301033887940965945626636898596916073050425827498206

58775416940745976758058779147516095201291754094103111

331210525182138613911629619740561029292405967890936822

924669580263039474942552680966508232356623065423472516

58058825962138775423870901159796116568349576984834621

578897123817853277524094445851

18) [50 points] It's an Atbash. You know what to do.

“	S	V	I	V	D	V	Z	I	V	,	W	L	M	'	G	G	F	I	M	Z	D	Z	B	M	L	D	,	”		
“										,				,													,	”		
D	Z	M	T	K	V	M	T	D	S	R	H	K	V	I	V	W	U	I	L	N	Y	V	G	D	V	V	M	S	R	H
O	R	K	H																											