

Science Olympiad – Codebusters

Practice Test

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	250			
1	250			
2	200			
3	250			
4	500			
5	450			
6	500			
7	450			
8	100			
9	150			
10	200			
11	250			
12	450			
13	150			
14	200			
15	200			
16	400			
17	550			
18	300			
19	350			
20	300			
21	550			
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

AAAA	A	AABBA	G	ABBAA	N	BAABA	T
AAAAB	B	AABBE	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.”

Morse Code:

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

0	-----	2	••---	4	••••-	6	-••••	8	----••
1	•-----	3	•••--	5	•••••	7	--•••	9	-----•

•	E	-	T	-•	N	--	M	-••	D	-•-	K	-••	G	---	O
••	I	•-	A	•-•	R	•--	W	•--•	P	•---	J	••••-			
•••	S	••-	U	••-•	F	•-••	L	--••	Z	--•-	Q				
••••	H	•••-	V	-•-•	C	-•-•	Y	••••-	4						
-•••	B	-••-	X	••---	2	••••-	3	-----•	9						
-----	0	•-----	1	--•••	7	---••	8								
•••••	5	-••••	6												

Timed Question **[250 points]** Decode this Aristocrat. It is a quote from Winston Churchill. When you have solved it, raise your hand so that the time can be recorded and the solution checked.

YMH UIHLYHZY SHZZKD AD SACH AZ YK QDKV YMLY HWHD

CKKSZ LIH IAUMY ZKOHYAOHZ.

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

Codebusters Practice Test

1) [250 points] Decode this Aristocrat. It is a quote from the movie 'Monty Python and the Holy Grail.'

Y'N XHAWIM! QMZ CT ZTV RMYWE Y MBUA RMYK TVRHBOATVK

BIIAWR, ZTV KYSSZ EYWO?

	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	3	1		2			2	3		3		5	1	2		1	4	2	5	1	4	4	1	6	4
Replacement																										

2) [200 points] Decode this Aristocrat encoded with a K1 alphabet. It is a frequently asked question about taxes and benefits.

G XLZGXLO UMYZ ELMX MHO YZMXZLO XLILGBGHQ YJIGMU

YLIAXGZE VMEKLHZY. OJ G RMBL ZJ VME ZMDLY JH KE

YJIGMU YLIAXGZE NLHLPZY?

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	2	2		1	6		10	5	5	5	2	13	10	1	4	1	1	1			3	2		7	9	10
Replacement																										

Codebusters Practice Test

5) [450 points] Decode this Patristocrat. It is from a college brochure and contains the word 'future.'

IWBNA CPMKN JCCYH CMMCQ OBCXW OPONI QPQAW QXPBP

MMCMC ABCKI WBHCK HPQKR NQCPE BNDRO MNDRO IQZIW

BUWOW BC

	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	8	12	2	1			3	5	1	4		7	6	6	7	7	3			1		7	2	1	1
Replacement																										

6) [500 points] Decode this Patristocrat. It is a phrase commonly found on food product labels.

FSLQT YKEAV FMPQT YKVVQ QWELX PDPVL ULFCF SPFPU

QKTYK VWQQW QDKKE VKXFP LXLXN TWPXA FQGAF XKFKX

FSWQP IWWRA LTIWX F

	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		1	2	3	11	1		2		9	7	1	1		8	10	1	3	5	2	5	9	8	3	
Replacement																										

7) [450 points] Decode this Patristocrat encoded with a K1 alphabet. It is a quote from Louis Pasteur.

BPNTF KUUWG KLPKL PFHMP NFTXU FWNXF TSNYB GXNTY

FSNTY XYNTM NWTNX XOGWB PKYPN FXKTM WNXUN LYOGW

BPKYP NSKJE NLGSN

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		4			1	7	5	1		1	7	4	3	15	2	8			4	8	4		6	8	7	
Replacement																										

8) [100 points] Decode this Caesar. It is a quote from Julius Caesar.

B	Y	R	H	N	F	N	L	M	U	K	X	T	D	M	A	X	E	T	P	,	W	H	B	M	M	H						
L	X	B	S	X	I	H	P	X	K	:	B	G	T	E	E	H	M	A	X	K	V	T	L	X	L	H	U	L	X	K	O	X
										:																						
B	M	.																														
		.																														

Codebusters Practice Test

9) [150 points] Decode this Caesar. It is a quote from Caesar Augustus.

J	O	C	N	A	C	Q	R	B	C	R	V	N	R	B	D	A	Y	J	B	B	N	M	J	U	U	X	C	Q	N	A	B			
R	W	J	D	C	Q	X	A	R	C	H	,	K	D	C	R	Q	J	M	W	X	V	X	A	N	Y	X	F	N	A					
C	Q	J	W	C	Q	N	X	C	Q	N	A	B	F	Q	X	F	N	A	N	J	U	B	X	V	H									
L	X	U	U	N	J	P	D	N	B	R	W	X	O	O	R	L	N	.																

10) [200 points] Decode this Affine. It is related to the video game Fallout 4. A = 15, B = 22.

V	X	E	W	T	T	M	J	M	V	S	Z	W	F	K	E	M	G	X	M	P	P	E	J	.

11) [250 points] Decode this Affine. It is about a chemical property. $A = 21$ and $B = 7$.

Q	Y	N	I	T	A	V	Q	N	E	N	X	Q	A	P	U	H	I	I	T	U	T	Q	T	N	V	Y	H	G	N
U	N	D	H	Q	T	G	N	G	H	E	L	N	V																

12) [450 points] Encode this Hill. It is about the Palatine Hill, one of the Seven Hills of Rome.

$$\begin{pmatrix} F & I \\ N & D \end{pmatrix} \equiv \begin{pmatrix} 5 & 8 \\ 13 & 3 \end{pmatrix}$$

T	H	E	F	I	R	S	T	N	U	C	L	E	U	S	O	F	T	H	E	R	O	M	A	N	E
M	P	I	R	E																					

Codebusters Practice Test

13) [150 points] Decode this Vigenère. It is about the inventor of this cipher. The keyword is 'crypt.'

I	Z	M	K	T

P	S	Y	I	M

K	J	R	P	U

G	C	J	P	L

Q	N	Y	H	T

P	Z	R	P	E

K	R	L	R	K

A	G	R	D	E

Q	X	G	H	M

14) [200 points] Decode this Vigenère. It is about France. The keyword is 'pays.'

U	R	Y	F

R	E	R	Z

T	L	Y	J

V	E	Q	L

R	O	S	F

I	R	W	A

C	W	C	K

I	E	P	F

T	U	P	G

E	E	Z	G

G	D	C	J

H	G	C	J

B	A	L	Q

P	N	B	T

T	L	E	A

J	M	G	F

I	H	C	F

D	R	R	Z

P	N	B	K

E	A	G	F

X	N	R	Z

T	S	M	M

I	H

Codebusters Practice Test

17) [550 points] Decode this Baconian. It is about Bacon's Rebellion. The last letter is 't.'

!&#%\$^@#(%^@*%\$!@#%\$^@#%)^@#(%!@*!)!@*%\$!@*%)!&#%\$^@

#%\$^@#%)^@#(%^@#%\$!@*%\$!@#%)!@*%\$!&#(%!&#(%!&#%\$!&*%\$

)!&*%\$!&#%\$!&*%\$^@#(%!@*!)!@*%\$!&*%\$!&*%)^@#%\$^@#(%!

@*!)!@#%\$!&#(!@*%\$^@#%\$!&#%\$!@#(%!@#%\$!&*%\$!@#(%!&*%\$

%)!&#(%!&*%)!&*%\$!&#%\$!@*%\$^@#%)!&#%\$!&*%\$^@*%\$!@*%)

!&#%\$!@#(%!@*!)!@#(!&#%\$^@#%)!@#(%!&*%)!&*%\$^@#(%!@

%\$!&%\$^@#(%!@*%\$!@#(!@*%)^@#%\$!&*%)!&*%\$^@#(%!&#%\$

%!@*%\$^@#%\$^@#%)!&#(!@*%\$!&*%\$^@#(%!&*%)!&*%)!&#%)!

&*(%!@#%\$^@#%\$^@#(%

18) [300 points] Decode this Morbit. It is a morbid quote from Susan Ee's book 'World After'. 1 = —, 3 = ●●, 5 = ●x, 7 = -x

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

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

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

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

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

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

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

7 4 3 5 3 4 3 9 6 3 4 6 4 5 6 5 5

Codebusters Practice Test

19) [350 points] Decode this Morbit. It is an excerpt from the description of a technology company called 'Morbit.' 2 = xx, 4 = -x, 6 = •x, 8 = -•

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

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

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

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

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

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

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

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

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

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

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

5 8 5 3 7

20) [300 points] Decode this Pollux. It is a description of the Pollux star. 0 = -, 1 = ●, 4 = x, 6 = •

88437586599645105106171687323742904014223460240654604888

5509865652580540285670349852952234109786243345104315219

7781416145891783117995026419965049399521035429984821496

532179668734958364434161959353154090159376887072237621

54695245198468165114285956865480058173711864710472214333

5908843115942147009463995003793257602581614814629859542138

463561943532248217580712214902848582780878884582276198

56940765129

Codebusters Practice Test

21) [550 points] Decode this Xenocrypt encoded with a K1 alphabet using an English keyword. It is a quote from the novel 'Cajas de Cartón.'

FZ QZN EF ZQFWPONW RAYIFW, FZDNZPOYLNW QZY DYIY

HOYZEF EF LYEFOY ÑQF DNZRFOPALNW FZ DQZY XYOY FK

ZQFRN CFCF.

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	2		2	4	4	15		1	2		1	3		7	1	6	3	6	3					5	1	11	11
Replacement																											