Science Olympiad — CUSO 2025

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.
3. Multiple timers which have a lap function on them - ideally one per volunteer. The timer app on an iPhone or Android Phone that has a stopwatch function with lap function is sufficient.

Before the event begins:

1. Practice starting the timers and using the lap function to record the times. Make sure volunteers understand how to use the lap function and are not accidentally stopping the timer completely.
2. Memorize the answer to the timed question.
3. Check to make sure that this key matches the test you are proctoring.
4. Place one copy of the test for each team in the provided folders with the first page outside the folder.
5. Adjust desks and chairs – teams may have up to 3 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. Five function calculators (addition, subtraction, multiplication, division, and usually square root). The calculator can have a simple memory store/recall function but must not have a modulus or other scientific and programmable functions. If their calculator doesn't meet these requirements, they may not use it.
    iii. If the student has a smart watch (Apple watch, Samsung Gear, etc.) they will need to put it away.
4. Instruct the students that if they answer the timed question within 10 minutes, they can be awarded a bonus if they solve the timed question with no more than 2 letters incorrect.
    i. When they have a solution for the cryptogram they should raise their hand.
    ii. Let them know that you will announce when the 10-minute time is up. After the first 10 minutes, no additional bonus points will be awarded.
    iii. When you see a team raise their hand, hit the LAP function and head to the team.
    iv. Determine if their answer is correct (see next page for grading), If so, write the time on their score sheet.
    v. If their score is incorrect (more than 2 letters incorrect), tell the team that the answer is wrong, but DO NOT tell them what is wrong. They can continue to work on the question and raise their hand again to be checked. A team has an unlimited number of attempts during the 10-minute bonus.
5. 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.
6. Some students may never have used a non-scientific calculator. You should have them enter a simple formula on their calculator: 1 / 26 = * 26 = .. Most will be surprised to see that the answer is not rounded to 1 as they expected but .9999999999
7. When the timers hit the 10-minute point, announce that no bonus points will be awarded and put away the timers. The students may continue to work on the question, but they may not receive any extra

points.

8. A team is not restricted to only the timed question during the 10 minutes. They can move on or split up the work if they would like, but it is in their best interest to try for the bonus.
9. 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)
   SAMPL<u>F</u> S<u>F</u>NT<u>F</u>NC<u>F</u>

   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
   SAMP<u>UL</u> SENTENCE

   It is considered correct with two letter mistakes.
2. For questions which have a numeric answer (such as determining the a= and b= values), Cryptarithms, or ask for the keyword/key phrase to be decoded, no mistakes are allowed.
3. When teams are asked to provide a keyword/key phrase for an aristoctat, there will be a set of boxes under the question which say "Enter the Keyword here" or "Enter the Key Phrase here". For these problems, only the answer in those boxes is to be graded (the actual cipher solution is ignored) and they are not allowed any mistakes for the full score. For each letter mistake, 100 points are to be subtracted until the score is zero.
4. 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.
5. When scoring the Baconian ciphers (with strange text or symbols), they can write the answer under the Baconian symbols or on the line provided. Note that you will see lots of As and Bs, but they are not graded as the answer, only what they put on the answer line.
6. 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 100 points from the score until it would be zero. If a question is worth 240 points and they get 4 letters wrong, you would start with 240 points (for up to 2 letters wrong) and then subtract 100 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 240 point question, they would receive 0 points for that question. With a 650 point question, they could get 8 letters wrong and receive 50 points (2 free letters then 6×100=600 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. Note that while the timed question must have 2 or fewer letters incorrect in order to get the timing bonus, a team solving the timed question after the 10 minutes passed would be accepted as correct with 3 incorrect letters receiving 100 points for the timed question.
7. 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.
8. On a test with Special Bonus Questions (indicated by a ★), if they receive full score for the corresponding question, they will receive an additional bonus depending on the number of special

bonus questions they answered. If they answered any one with no deduction points they receive 150 extra points. If they answered any two they receive 400 extra points. If they answered all three then they receive 750 extra points. A legend is at the bottom of the score sheet to make it easy to figure out the extra bonus.

9. If they correctly answered the timed question in 10-minutes or less with 2 or fewer letters incorrect, you need to compute the bonus time. Take the value for the minute from this first table below

0:xx	1,080	1:xx	960	2:xx	840	3:xx	720	4:xx	600
5:xx	480	6:xx	360	7:xx	240	8:xx	120	9:xx	0

and then add the seconds value from this table:

X:00	120	X:01	118	X:02	116	X:03	114	X:04	112	X:05	110
X:06	108	X:07	106	X:08	104	X:09	102	X:10	100	X:11	98
X:12	96	X:13	94	X:14	92	X:15	90	X:16	88	X:17	86
X:18	84	X:19	82	X:20	80	X:21	78	X:22	76	X:23	74
X:24	72	X:25	70	X:26	68	X:27	66	X:28	64	X:29	62
X:30	60	X:31	58	X:32	56	X:33	54	X:34	52	X:35	50
X:36	48	X:37	46	X:38	44	X:39	42	X:40	40	X:41	38
X:42	36	X:43	34	X:44	32	X:45	30	X:46	28	X:47	26
X:48	24	X:49	22	X:50	20	X:51	18	X:52	16	X:53	14
X:54	12	X:55	10	X:56	8	X:57	6	X:58	4	X:59	2

For example if they solved the time question at the 6:46 mark, you would add 360 (from the 6:xx entry in the first table) to 28 (from the X:46 entry in the second table) to get a bonus of 388. If they had solved it in exactly 4:00 minutes, you would add 600 and 120 to get a bonus of 720.

10. Add up all the scores and put the total on the bottom of score sheet.
11. 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.
12. 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	12
2	28
3	22
4	11
5	6
6	13
7	16
8	2
9	14
10	21
11	20
12	1
13	8
14	24
15	29

Tie Breaker Order	Question #
16	15
17	4
18	19
19	26
20	30
21	3
22	18
23	10
24	7
25	17
26	23
27	5
28	27
29	9
30	25
31	Timed

13. 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.

Timed Question **[153 points]** Solve this **Aristocrat**. When you have solved it, raise your hand so that the time can be recorded and the solution checked.

VNB TQ HPBY CNS, E WNCKEZFB KIHHFB PK P YIBCHEMF
FOR MY PART NOW, I CONSIDER SUPPER AS A TURNPIKE

YOBNIJO SOEWO NCF TIKY HPKK, EC NBZFB YN JFY YN LFZ.
THROUGH WHICH ONE MUST PASS, IN ORDER TO GET TO BED.

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

1) **[310 points]** The following **Cryptarithm** provides the key to decoding the values **`01324 23571`**. What do they decode to?

Values to decode for solution

0	1	3	2	4		2	3	5	7	1
G	R	A	V	E		V	A	L	O	R

Cryptarithm formula

```
    H O M E R
    6 7 9 4 1

  R O A R E E
+ 1 7 3 1 4 4
-------------
  V E R G I L
  2 4 1 0 8 5
```

HOMER+ROAREE=VERGIL

	0	1	2	3	4	5	6	7	8	9
A										
E										
G										
H										
I										
L										
M										
O										
R										
V										

2) **[348 points]** A piece of life advice has been encoded as a **K2 Aristocrat** for you to solve. **<u>What was the keyword used to encode it?</u>** (You will only receive credit for the keyword. You do not need to solve the quote or fill out the frequency table.)

Keyword Answer:

SOAPY

```
GZFGCZ FSKZE JUR KAUK DFKPMUKPFE XFZJE'K CUJK. NZCC,
PEOPLE OFTEN SAY THAT MOTIVATION DOESN'T LAST. WELL,

EZPKAZI XFZJ VUKAPEO – KAUK'J NAR NZ IZWFDDZEX PK
NEITHER DOES BATHING – THAT'S WHY WE RECOMMEND IT

XUPCR.
DAILY.
```

Replacement	U	V	W	X	Z	S	O	A	P	Y	B	C	D	E	F	G	H	I	J	K	L	M	N	Q	R	T
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	5		5	3	6	7	2		2	5	12		1	3	1	6		3	1		7	1	1	4		11

★(Special Bonus Question) 3) **[263 points]** Solve this **Porta**, a quote from Dr. Seuss. The key used was 6 letters long, and the quote begins with **SOM.**

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

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

4) **[276 points]** Solve this **Aristocrat,** a quote from an aerospace engineer.

EC FIHC ZCZVSBMCZ MI FBOVKJ WIDVZ BSNVCUCFCKMW MNBK
BE MORE DEDICATED TO MAKING SOLID ACHIEVEMENTS THAN

VK HAKKVKJ BLMCH WQVLM EAM WTKMNCMVS NBRRVKCWW.
IN RUNNING AFTER SWIFT BUT SYNTHETIC HAPPINESS.

	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	6	10	1	2	3		3	3	2	9	2	9	4	1		1	2	3	1	1	9	6			4
Replacement	U	A	E	L	B	M	J	R	O	G	N	F	T	H	K	Q	W	P	C	Y	V	I	S	Z	X	D

5) **[217 points]** Solve this **Hill**, a quote from the lesser-known school song of a certain university. It has been encoded using a keyword of **LION**.

$$\begin{pmatrix} L & I \\ O & N \end{pmatrix} \equiv \begin{pmatrix} 11 & 8 \\ 14 & 13 \end{pmatrix}$$

F	T	N	E	I	U	V	H	F	U	M	F	E	B	Q	M	M	B	N	G	I	M
T	**H**	**R**	**O**	**U**	**G**	**H**	**T**	**H**	**E**	**S**	**T**	**O**	**R**	**M**	**S**	**O**	**F**	**T**	**I**	**M**	**E**

6) **[389 points]** Solve this **K1 Spanish Aristocrat**, a somewhat comforting quote. It has been encoded using a K1 alphabet and an English keyword.

GCQC GVFVOCG APBCG IAÑ JVM VA QÑ JPUÑ. GPA VOSÑFWC,
SOLO SEREMOS NIÑOS UNA VEZ EN LA VIDA. SIN EMBARGO,

GPVODFV DCUFVOCG UPGNFIHÑF UV QÑ PAOÑUIFVM.
SIEMPRE PODREMOS DISFRUTAR DE LA INMADUREZ.

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	5	1	7	2		7	8	1	3	2			2	1	7	5	6	3		1		5	10	1			
Replacement	N	Ñ	O	P	Q	R	S	T	U	V	W	X	Z	F	A	M	I	L	Y	B	C	D	E	G	H	J	K

Translation: *We will only be children once in a lifetime. However, we can always enjoy immaturity.*

7) **[243 points]** Solve this **Baconian**, an inspiring quote from Elon Musk.

ABBBBBAABABBBABBABBABBABBABBABABBABBBBBABBBBBBABB
BAAAAABBABAAABAABAABAABAABAABABAAABAAAAABAAAAAABAA

R O C K E T S A R E

BBBABBAABABAABABABABABAABBAABAABBAABBBBABBBBBBBAABB
AAABAABBABABBABABABABABBAABBABBAABBAAABAAAAAABBAA

C O O L Y O U C A N

ABBABBBBAABBABBBAABBABAABBABBBABBAB
BAABAAAABBAABAAABBAABABBAABAAABAABA

T D E N Y I T

Rockets are cool. You can't deny it.

8) **[302 points]** Solve this **K1 Aristocrat**, a quote from Ludwig Wittgenstein.

HVX DVL MI VPVFAX MI PIXZAU - VXZ LI JAUDVJL ZI
MAN HAS TO AWAKEN TO WONDER - AND SO PERHAPS DO

JAIJGAL. LYWAXYA WL V PVR IB LAXZWXC DWH MI LGAAJ
PEOPLES. SCIENCE IS A WAY OF SENDING HIM TO SLEEP

VCVWX.
AGAIN.

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

★(Special Bonus Question) 9) **[189 points]** Solve this **Nihilist**, a rousing statement by a certain Columbia alum. It has been encoded using a keyword of **BARACK** and a Polybius key of **OBAMA.**

87	36	66		47	24	69	55		43		64	57	78	55
W	**H**	**Y**		**C**	**A**	**N**	**T**		**I**		**J**	**U**	**S**	**T**

34	45	56		68	65		64	45	35	58	43	34	?
E	**A**	**T**		**M**	**Y**		**W**	**A**	**F**	**F**	**L**	**E**	?

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10) **[250 points]** Solve this **Aristocrat.**

NZOOY WHFO WO KODGOBO NEHN IO PHV HDYU ZOVOI HVQ
TREES MAKE ME BELIEVE THAT WE CAN ALSO RENEW AND

ZOYEHXO UCZ DGBOY, VU WHNNOZ IEHN IO LHPO GV DGLO.
RESHAPE OUR LIVES, NO MATTER WHAT WE FACE IN LIFE.

	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	4	3	1	4	9	4		1	2		6	17	2	1				3	5	3	1	4	5
Replacement	X	V	U	L	H	K	I	A	W	Z	B	F	G	T	E	C	D	Q	Y	J	O	N	M	P	S	R

11) **[402 points]** Solve this **Nihilist**, the alleged last words of a flight-inclined Columbia alum. The quote begins with **WE ARE ON** and was encoded with a Polybius key of **RADIO**. The (non-Polybius) keyword is 5 letters long.

94	35		34	74	37		56	27		66	63	37
W	**E**		**A**	**R**	**E**		**O**	**N**		**T**	**H**	**E**

55	44	37	55	,		39	56	44	37	57		29	56	54	66	63
L	**I**	**N**	**E**	,		**G**	**O**	**I**	**N**	**G**		**N**	**O**	**R**	**T**	**H**

26	57	34		65	46	59	86	43	.
A	**N**	**D**		**S**	**O**	**U**	**T**	**H**	.

12) **[511 points]** Solve this **K1 Patristocrat**, a derisive quote from everyone's favorite pop star.

GNWCD ZXDJD QZOWN RGOFZ YPTRF WRZVR FGVOJ GXYOF
IRODE ANELE VATOR WITHA GUYWH OWASW HISTL INGTH

DOPXD WEOFG VGVOF DVWXY OFZOX DQDND XCVLP OOGXY
ETUNE OFTHI SISTH ESONG THATN EVERE NDSPU TTING

OFZOW XKDBW KDWXC PCD
THATO NMECO MEOND UDE

I rode an elevator with a guy who was whistling the tune of 'this is the song that never ends'. Putting that on me? Come on dude..

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	4	12	1	8	7			2	2	1		3	13	4	2	4		1		6	8	9	4	6
Replacement	B	C	D	E	F	H	I	J	K	L	M	P	Q	R	T	U	V	W	X	Y	Z	S	O	N	G	A

13) **[361 points]** Solve this **Complete Columnar**, a mildly funny joke. You are told that the quote has **SANDAL** somewhere in it.

TFLOR OAOAR ATTSS GOAHE DFENW PNOWE YADSP D

Answer: _WHAT TYPE OF SANDALS DO FROGS WEAR? OPEN-TOAD._

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14) **[346 points]** Solve this **misspelled K1 Aristocrat,** a quote from one of many, many required readings.

GBG BPFF IGAGW NPIGJ YOKY FPNG NTZW BOPMO GBG KWG
EWE WILL NEVER FINED THAT LIFE FOUR WHICH EWE ARE

FTTRPIH. JKIMG KIJ LG SKWWD; NTWG YOPX YTT PX YOG
LOOKING. DANCE AND BE MARRY; FORE THIS TOO IS THE

FTY TN SKI.
LOT OF MAN.

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	4		1		5	13	1	6	3	6	1	2	5	5	7		1	2	8			6	2	6	1
Replacement	V	W	X	Y	Z	L	E	G	N	D	A	B	C	F	H	I	J	K	M	O	P	Q	R	S	T	U

15) **[277 points]** Solve this **Complete Columnar**, a quote from a rather obscure reading. You are told that the quote has **DELIGHT** somewhere in it (which is not how this test writer felt while reading it).

EHROX LXTTI OUIXE FISEH XLLTN HDTHO SNDGX IIHGE

DXKGE MEEX

Answer: _LIKE THE LIGHT OF THE RISING MOON, SHE EXUDED DELIGHT._

★(Special Bonus Question) 16) **[351 points]** Solve this **Baconian**, a quote about the possessions of a Columbia-graduated founding father. You are told that the plaintext ends with **RAIN**.

```
A CASE A KING A PLAN BE OLD ALPHA A BABY ACRES A KING
AAAAA  AAABA  ABBAB  BAABB  ABBBA ABABA  AABAA AAABA

  A      C      O      U      P      L      E      C

BACK A ACRES A CALL A BOOK BE ITS BACON A CASE ABBEY
BAAAA  AABAA AAABB  ABAAA  BAABA  BAAAB AAAAA  ABBAA

  R      E      D      I      T      S      A      N

A CALL A CASE BE ITS A PLAN ALPHA ABBEY A PLAN BE ITS
AAABB  AAAAA  BAABA  ABBAB  ABBBA ABBAA ABBAB  BAABA

  D      A      T      O      P      N      O      T

A KING EARTH A GOOD BACK A A CASE A BOOK ABBEY
AAABA  AABBB AAAAB  BAAAA  AAAAA  ABAAA  ABBAA

  C      H      B      R      A      I      N
```

a couple credits and a top-notch brain

17) **[231 points]** Solve this **Aristocrat**, yet another imperative about life.

WMTXO WHWVO FUIZW IMZ MWY FWMFIJNXM JUIJ GXLWF YNJU
ENJOY EVERY SHADE AND NEW SENSATION THAT COMES WITH

NJ, LICNMQ OXB EWWK IKNHW.
IT, MAKING YOU FEEL ALIVE.

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

18) **[251 points]** The following **Cryptarithm** provides the key to decoding the values **31264 6967**. What do they decode to?

Values to decode for solution

3	1	2	6	4		6	9	6	7
T	I	R	E	D		E	Y	E	S

Cryptarithm formula

```
  S T U D Y
  7 3 5 4 9

+ T H E S I S
  3 8 6 7 1 7
-------------
D E G R E E
4 6 0 2 6 6
```

STUDY+THESIS=DEGREE

	0	1	2	3	4	5	6	7	8	9
A										
B										
C										
D										
E										
F										
G										
H										
I										
J										
M										
N										
O										
P										
R										
S										
T										
U										
Y										

19) **[274 points]** Solve this **Baconian**, a quote from Mark Twain concerning a part of speech.

AXAXZXZOAOZXAXZXAOZXZOZXZXAOZXZXZOAXAOZOAXZOAXZXZO
BABAAAABBBAABAAABBAAABAAAABBAAAAABBABBABBAABBAAAAB

W	H	E	N	I	N	D	O	U	B

AXZOZOZXZOAXZOZOZXZXZOZXZXAXZOZXAXZXAXZXAXZOZXAOZO
BAABABAAABBAABABAAAAABAAAABAABAABAAABAAABAABAABBAB

T	S	T	R	I	K	E	I	T	O

AXZOAOZXAX
BAABBBAABA

U	T

When in doubt, strike it out.

20) **[341 points]** The following **Cryptarithm** features remarkably ugly buildings and provides the key to decoding the values **91607**. What do they decode to?

Values to decode for solution

9 1 6 0 7

B	R	A	I	N

Cryptarithm formula

```
  M U D D
  5 2 3 3

    P U P I N
  + 8 2 8 0 7

    C A R M A N
+ 4 6 1 5 6 7

-------------
  M C B A I N
  5 4 9 6 0 7
```

MUDD+PUPIN+CARMAN=MCBAIN

	0	1	2	3	4	5	6	7	8	9
A										
B										
C										
D										
I										
M										
N										
P										
R										
U										

21) **[341 points]** Solve this **K1 Spanish Xenocrypt**, which was encoded using a K1 alphabet and an English keyword.

QG VZJ XJ UÑJWKJ JS ZS QZFHW XJ MGRUJSXH MGS QG VZJ
LO QUE SE PIERDE EN UN LUGAR SE COMPENSA CON LO QUE

XJ GLYÑJSJ JS GYWG. NWHMHXHW JS ZSH GMHXÑGS D
SE OBTIENE EN OTRO. FRACASAR EN UNA OCASION Y

YWÑZSNHW JS QH GYWH.
TRIUNFAR EN LA OTRA.

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				1		1	10	10		14	1	1	4	2	4			4	1	11		2	2	8	6	4	6
Replacement	V	W	X	Y	Z	G	O	A	H	E	D	B	C	F	I	J	K	L	M	N	Ñ	P	Q	R	S	T	U

Translation: *What is lost in one place is compensated for by what is gained in another. Fail on one occasion and succeed on the other.*

22) **[413 points]** Solve this **Fractionated Morse**, a quote from Albert Einstein. You are told that the quote has **EVERY** in it corresponding to the encoded text **T N U P V J**, with **T** = ●×●.

P O J H V M B U T G Y O O W M
●−●●×−−−×−−−×−●−××−●●×●×●×●−−●××●●×−●×−×−−−××
L O O K / D E E P / I N T O /

F C K C P U R V V A D L J N
−●×●−×−×●●−×●−●×●××●−×−●×−●●××−●−−×−−−×●●−
N A T U R E/ A N D / Y O U

Y J S P T B
××●−−×●●×●−●●×●−●●
/ W I L L

Y C F B U P Q O R V V A
××●●−×−●×−●●×●×●−●×●●●×−×●−×−●×−●●××
/ U N D E R S T A N D /

T N U P V J K I Q V W A
●×●●●−×●×●−●×−●−−×−×●●●●×●●×−●×−−●××
E V E R Y T H I N G /

B T X K R A
−●●●×●×−×−×●×●−●××
B E T T E R

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

23) **[222 points]** Solve this **Porta,** a quote from the immortal J.R.R. Tolkien. It has been encoded using the key **ELVES.**

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

24) **[291 points]** Solve this **K2 Aristocrat**, a piece of advice for those visiting lesser-known schools.

Q PIBM SDRV AMVDAXML NAYW JYRVYX. QV QR VPM YXUF
I HAVE JUST RETURNED FROM BOSTON. IT IS THE ONLY

RIXM VPQXO VY LY QN FYD NQXL FYDARMUN LYCX VPMAM.
SANE THING TO DO IF YOU FIND YOURSELF DOWN THERE.

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

25) **[175 points]** Solve this **Hill**, a verse from the New Testament (more readings, yay!). The quote has been encoded with keyword **TEST**.

$$\begin{pmatrix} T & E \\ S & T \end{pmatrix} \equiv \begin{pmatrix} 19 & 4 \\ 18 & 19 \end{pmatrix}$$

W	B	S	B	Z	N	J	S	L	K	C	W	C	X	W	R	D	W	B	I	A	T
I	**N**	**A**	**L**	**L**	**T**	**H**	**I**	**N**	**G**	**S**	**G**	**I**	**V**	**E**	**T**	**H**	**A**	**N**	**K**	**S**	**Z**

26) **[268 points]** Solve this **K1 Aristocrat**, a quote from Kelly Martin. **What was the keyword used to encode it?** (You will only receive credit for the keyword.)

Keyword Answer:

ADVICE

THG'M EXM AHSE LXMMVGA YXWHFX BXSUQ OXVABML. KXFSVG
DON'T LET GOAL SETTING BECOME HEAVY WEIGHTS. REMAIN

ZEXPVYEX SGT SEEHO KHHF ZHK VGMNVMVUX WBSGAXL.
FLEXIBLE AND ALLOW ROOM FOR INTUITIVE CHANGES.

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	3			6	3	6	7			3	3	7	1	2	1	1		6	2	2	7	2	11	2	2
Replacement	G	H	J	K	L	M	N	O	P	Q	R	S	T	U	W	X	Y	Z	A	D	V	I	C	E	B	F

27) **[211 points]** Solve this **Complete Columnar**. You are told that the quote has **LURE** somewhere in it.

EDUMG WUHTX USAEA IORTE CAICN TYEMR SSFRE OHAAT

CNLOD SOTAS

Answer:
SUCCESS AND FAILURE COME AND GO. IT'S WHO YOU ARE THAT MATTERS.

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28) **[498 points]** Solve this **K1 Patristocrat**, a quote which could be useful to some of you this coming February. You are told that the sequence **ORWC** decrypts to **LOVE.**

FBCGC UFORW CUFRE LCUDE CQRFF BRUCL QXBLH BORWC
THEBE STLOV ESTOR IESAR ENOTT HOSEI NWHIC HLOVE

LURQO ZUSRN CQGVF FBRUC LQXBL HBLFL UDHFC IVSRQ
ISONL YSPOK ENBUT THOSE INWHI CHITI SACTE DUPON

The best love stories are not those in which love is only spoken, but those in which it is acted upon.

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		7	10	2	2	9	2	3	1			8		1	3		6	9	2		8	2	2	2		1
Replacement	Z	H	E	A	R	T	B	C	D	F	G	I	J	K	L	M	N	O	P	Q	S	U	V	W	X	Y

29) **[284 points]** Solve this **misspelled Aristocrat,** a quote from Brandon Sanderson.

FFJ PCM CGCEOAU IBP GCAR WBBNM PBA HBDYL SFFJ OAJB C
EET WAS AMAZING HOW MANY BOOKS WON COULD FEET INTO A

QBBG, CMMDGOAU PBA LOLA'J PBAJ JBB GBTF CQBDAL TFQR
ROOM, ASSUMING WON DIDN'T WONT TOO MOVE AROUND VERY

GDHI.
MUCH.

	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	14	7	4	1	6	6	2	2	6		4	4	1	4	5	3	2	1	2	2		1		1	
Replacement	N	O	A	U	Z	E	M	C	H	T	J	D	S	K	I	W	R	Y	F	V	G	P	B	Q	L	X

30) **[265 points]** Solve this **Aristocrat**, a timeless observation about travel.

LATB IXZ FTUGT BTL IXSQ, IXZ UST UHVXBNHATY UV AXL
WHEN YOU LEAVE NEW YORK, YOU ARE ASTONISHED AT HOW

MFTUB VAT STHV XC VAT LXSFY NH. MFTUB NH BXV TBXZEA.
CLEAN THE REST OF THE WORLD IS. CLEAN IS NOT ENOUGH.

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