

Timed Question [250 points] Solve this Aristocrat. No hints are provided. When you have solved it, raise your hand so that the time can be recorded and the solution checked.

HDM HU EWM OHTE UPSTIEFDJ UMMZFDJT FD EWM BHPZX FT  
 ONE OF THE MOST FRUSTRATING FEELINGS IN THE WORLD IS

QMFDJ TOIPE MDHSJW EH VDHB EWMPM'T I QMEEMP BIK EH  
 BEING SMART ENOUGH TO KNOW THERE'S A BETTER WAY TO

XH THOMEWFDJ, QSE DHE TOIPE MDHSJW EH FDGMDE I BIK  
 DO SOMETHING, BUT NOT SMART ENOUGH TO INVENT A WAY

EH XH FE.  
 TO DO IT.

	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		12	19	8	1	15	7	6	2		14		4	7	3		4	8	3	1	6	3		2
Replacement	Z	W	P	N	T	I	V	O	A	G	Y	Q	E	X	M	R	B	C	U	S	F	K	H	D	J	L

1) [350 points] Solve this Aristocrat. The word drive appears at least once.

**MJ ZQV ISMWG QWGS C BCDECFG MU OQQFT PQSG OMFG C**  
**IF YOU DRIVE OVER A PANCAKE IT LOOKS MORE LIKE A**

**XCJJOG, MJ ZQV ISMWG QWGS C XCJJOG MU OQQFT PQSG**  
**WAFFLE, IF YOU DRIVE OVER A WAFFLE IT LOOKS MORE**

**OMFG C BCDECFG.**  
**LIKE A PANCAKE.**

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	10	2	2	6	12		2	6			8		6	2	10		6	2	2	2	4	2		2
Replacement	Z	P	A	N	C	K	E	B	D	F	G	H	I	J	L	M	O	Q	R	S	T	U	V	W	X	Y

2) [350 points] Solve this Aristocrat. E is not the most common vowel.

**HK ZLR HF WDA LYLFHWA LK YUL HF ZLREUAFF WDA**  
**IF CON IS THE OPPOSITE OF PRO IS CONGRESS THE**

**LYLFHWA LK YULEUAFF?**  
**OPPOSITE OF PROGRESS?**

	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	2	8		5			3	10						2			4		4		6	2
Replacement	E	Q	M	H	G	S	L	I	B	Z	F	O	Y	W	U	V	K	N	X	A	R	J	T	D	P	C

3) [275 points] Solve this Aristocrat regarding justice. It is supposed to be a joke.

**OQMVNBG NM XGMV MGALGK BDHK. XGBPQMG NW NV ZPM  
JUSTICE IS BEST SERVED COLD. BECAUSE IF IT WAS**

**MGALGK ZPAR, NV ZDQHK XG OQMV-ZPVGA.  
SERVED WARM, IT WOULD BE JUST-WATER.**

	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		2			10	2			4	2	8	5	2	4	4	1				6	1	3		4
Replacement	R	C	G	O	H	Y	E	L	Q	K	D	V	S	I	J	A	U	M	N	X	P	T	F	B	Z	W

4) [275 points] Solve this joke regarding your eyes. It is an Aristocrat.

**IBMZ AEL YHM, VBM FGDV QGVV EX AELW TEYA VE DVEQ  
WHEN YOU DIE, THE LAST PART OF YOUR BODY TO STOP**

**IEWRHZU GWM AELW QLQHFD. VBMA YHFGVM.  
WORKING ARE YOUR PUPILS. THEY DILATE.**

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

5) [200 points] Solve this Aristocrat from Macbeth. It has been slightly altered. It was encoded with a K1 alphabet with the keyword Macbeth.

**DAYU AJ R VRDU VFDX TO RE AXAFV, YKDD FY JFKEX REX  
LIFE IS A TALE TOLD BY AN IDIOT, FULL OF SOUND AND**

**YKIO, JAZEAYOAEZ EFVWAEZ.  
FURY, SIGNIFYING NOTHING.**

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

6) [125 points] Solve this Aristocrat.

**AWSSJAA BA QDV GQ DRVBDQ. BV BA GQ DHEBLGVBDQ.  
SUCCESS IS NOT AN OPTION. IT IS AN OBLIGATION.**

K4	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	6		5	1		3	1		1		1				5	1	2			4	1				
Replacement	S	I	Z	O	L	Y	A	B	D	E	F	G	H	J	K	M	N	P	C	Q	R	T	U	V	W	X

7) [200 points] Solve this Aristocrat by Einstein. There is no frequency table.

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

8) [275 points] Solve this Aristocrat with errors by Plato. All words are still real English words.

**RUVNO NL EQPH UFOA NQ OVGFRNQC FQ CPT RUNQC  
THEIR IS KNOW HARM IN REPEATING AN GOD THING**

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

9) [375 points] Solve this Xenocrypt.

ZFP UOD RXPYX AOK TKX RX MFPUKIMX, KR TGKUZPK JOKRJK  
 POR MUY LARGA QUE SEA LA TORMENTA, EL SIEMPRE VUELVE

X WPGRRXP KIMPK RXT IOWKT.  
 A BRILLAR ENTRE LAS NUBES.

	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		2	2		3	2	11		3			4	7		7		4	3		2	8	1	2
Replacement	Q	W	H	Y	Z	O	I	C	N	V	E	D	T	Ñ	X	U	R	K	L	J	S	M	F	B	A	G	P

Translation: *However long the storm, the sun will always shine again amongst the clouds.*

10) [325 points] Solve this Xenocrypt about being a good person.

AM ÑLDNS AHJR MMADS NA QLADRH BAPHSDRH. HO DS MRH  
 EL MUNDO ESTA LLENO DE BUENAS PERSONAS. SI NO LAS

ADTLADJPRH, HA LDR NA AMMRH.  
 ENCUESTRAS, SE UNA DE ELLAS.

	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	11	1		8				9		2		4	6	3	1	1	2	1	7	4	1						
Replacement	E	P	Z	N	H	J	Y	S	V	T	X	U	L	D	M	I	R	B	A	O	C	Q	Ñ	F	G	K	W

Translation: *The world is full of good people. If you can't find one, become one.*

11) [400 points] Solve this Patristocrat about a specific instrument. Encrypted K1 with the keyword being the name of that instrument.

**LIXXV JOWFH IJKLM NOAXW NOLWN AJMQL OTLMV LDXMQ  
ILOOK ATMYC LARIN ETSOM ETIME SANDI THINK IWOND**

**NKDTJ OASXL MSOXH XWNXB OXROT NKNOX MLSTO FXBMN  
ERWHA TSGOI NGTOC OMEOU TOFTH ERETO NIGHT YOUNE**

**CNKVM XD  
VERKN OW**

*I look at my clarinet sometimes and I think, I wonder what's going to come out of there tonight? You never know.*

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	3	2	1	3		2		2	2	4	4	8	8	9	10		2	1	3	4		3	4	12		
Replacement	S	U	V	W	X	Y	Z	C	L	A	R	I	N	E	T	B	D	F	G	H	J	K	M	O	P	Q

12) [450 points] Solve this Patristocrat. No hints.

**KQSJV NQSVW JNUCU ZWKKW IRJVO QIRSU TDQTU CUWZF  
SOLID GOLDT IGERE ATSST UPIDC OUPLE WHOVE RETAK**

**JPNRD QWQKQ GJWTJ WDWDU JCOZX UCZRD QPU  
INGPH OTOSO FITWI THTHE IRCAM ERAPH ONE**

*Solid gold tiger eats stupid couple who were taking photos of it with their camera phone.*

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

13) [300 points] Solve this Patristocrat based on the sound of the english language. Encoded K1 with a keyword of English.

TNTHY DWKYF CYKYK JKLMN OPOZJ QWJBO JKLMN OPOYD  
 DIDYO UKNOW TONON ENGLI SHSPE AKERS ENGLI SHSOU

KTOMN WJJKL MNOP  
 NDSLII KEENG LISH

Did you know to non english speakers english sounds like english?

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

14) [75 points] Solve this. This is an atbash cipher.

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

15) **[125 points]** Decode this Caesar Cipher. It is somebody's name.

E	P	I	G	X	R	Z
P	A	T	R	I	C	K

16) **[150 points]** Solve this quote by Dumbledore. This is an affine cipher, given  $BP=PB$ .

C	D	M	O	Q	D	D	M	V	M	Z	J	Q	V	M	M	D	C	W	K	J	Y	C	O	G	Y
O	N	E	C	A	N	N	E	V	E	R	H	A	V	E	E	N	O	U	G	H	S	O	C	K	S

17) [200 points] Encode this Affine with A=7 and B=1.

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

  

D	O	G
W	V	R

18) [200 points] Encode this Vigenère given that the keyword is Homer.

H	O	M	E	R	H	,	O	M	E	R	H	,	O	M	E	'	R	H	O	M	E	R	H	O	M	E	R	H	O	M
S	H	U	T	U	P	,	B	R	A	I	N	,	O	R	I	'	L	L	S	T	A	B	Y	O	U	W	I	T	H	A
Z	V	G	X	L	W	,	P	D	E	Z	U	,	C	D	M	'	C	S	G	F	E	S	F	C	G	A	Z	A	V	M

  

E - R H O !

Q	-	T	I	P	!
U	-	K	P	D	!

19) [175 points] Solve this Vigenère given that the first two words are I've been.

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

  

G	L	Y	U	G	L	Y	U	G	L	Y	U	G	L	Y	U	G	L	Y	U	G	L	Y	U
V	F	E	Z	A	R	J	S	H	F	R	H	K	G	C	L	A	R	J	S	A	R	J	S
P	U	G	F	U	G	L	Y	B	U	T	N	E	V	E	R	U	G	L	Y	U	G	L	Y

20) [225 points] Solve this Bacon. First two words are how many.

MONTH UNDER HE TOO IN ALL GOOSE ALLEY FOLLY MAINE  
 AABBB ABAB BABAA ABABB AAAAA ABBAA BABBA AAABA  
 H O W M A N Y C

AMIGO CLUBS UP FOR LEWIS CRIES MARIE PSYCH SUCKS  
 AAAAA ABABA ABBAB BAAAA ABAAA AABAA BAAAB AAAAA  
 A L O R I/J E S A

JAMIE KILOS IN USE OF HIM SAUCE SAILS POUND SWEET  
 BAAAA AABAA ABAAA ABBAA AAAAA AAABA BAABB AAAAB  
 R E I/J N A C U/V B

IN WAY MAILS IRONY IN WAY MANDY WORLD BEADS FELLA  
 ABAAA AAABA ABABA ABAAA AABBA AABBB BAABA BABBA  
 I/J C L I/J G H T Y

AM BOY GO SAY LUCKY STRAP COLOR WAIST POUND BY ITS  
 AABAA AAAAA BAAAA ABBAB AABAB AAAAB BAABB BAABA  
 E A R O F B U/V T

HOWLS I STAY HICKS  
 BAABA AABAA BAAAA  
 T E R

How many calories are in a cubic light year of butter?

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21) [100 points] Solve this Bacon.

BAAABAABAABAAAABBABABABABABBABAABBAABBABABBABABBAAB  
BAAABAABAABAABAAAABBABABABABABBABAABBAABBABABBABABBAAB  
S C I O L Y S U M M E

AABAAAABAABBAABABAABBAABBABBABAAAABAABAABAABBAABA  
AABAAAABAABBAABABAABBAABBABBABBABAABAABAABAABBAABA  
R S T U D Y S E S S

BAAAABBABABBAA  
BAAAABBABABBAA  
I O N

**Scioly Summer Study Session**

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22) [600 points] William has faithfully followed the steps of the RSA key-generation algorithm. Here are the results:

$$p = 193$$

$$q = 283$$

$$n = 54619$$

$$\phi = 54144$$

$$e = 25079$$

Unfortunately, William doesn't know how to compute the value of  $d$  and needs you to do that final step for them.

Enter the computed value of  $d$ , NOT the formula.

**5447**

23) **[575 points]** Jasmine and Hannah are accountants for a very large bank, and have started a friendship. They communicate via email, because they live thousands of miles apart. Hannah gets curious and asks Jasmine the year that they were born. Jasmine doesn't mind telling Hannah, but they know that the bank monitors all employee emails, and is afraid of being the victim of age discrimination. Therefore, Hannah suggests that they use RSA, and they provides their public key: (5963, 2665). Jasmine replies with the ciphertext 5490. Hannah's private key is 4921. In what year was Jasmine born?

Enter the answer:

**1955**

24) **[275 points]** Encode this Hill cipher

$$\begin{pmatrix} H & I & J \\ K & C & B \\ V & D & P \end{pmatrix} \equiv \begin{pmatrix} 7 & 8 & 9 \\ 10 & 2 & 1 \\ 21 & 3 & 15 \end{pmatrix}$$

H	Y	D	R	O	X	Y	C	H	L	O	R	O	Q	U	I	N	E
I	R	E	W	N	Q	N	R	R	E	Z	I	Q	K	S	O	G	H

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25) **[50 points]** Compute the decryption matrix.

$$\begin{pmatrix} F & Q \\ C & B \end{pmatrix} \equiv \begin{pmatrix} 5 & 16 \\ 2 & 1 \end{pmatrix}$$

$$\begin{pmatrix} 25 & 16 \\ 2 & 21 \end{pmatrix}$$

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26) **[475 points]** Given that HILL encodes to FBLA, find the decryption matrix.

$$\begin{pmatrix} 1 & 2 \\ 1 & 3 \end{pmatrix}$$