

Science Olympiad – North Carolina Regional Test 2

2019

Names of participants: (Please print neatly)

School Name: _____

V 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 | 120 | | | |
| 2 | 100 | | | |
| 3 | 400 | | | |
| 4 | 120 | | | |
| 5 | 100 | | | |
| 6 | 600 | | | |
| 7 | 500 | | | |
| 8 | 100 | | | |
| 9 | 400 | | | |
| 10 | 100 | | | |
| 11 | 600 | | | |
| 12 | 250 | | | |
| 13 | 100 | | | |
| 14 | 600 | | | |
| 15 | 200 | | | |
| 16 | 240 | | | |
| 17 | 120 | | | |
| 18 | 220 | | | |
| 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 |
| 1 | 9 | 21 | 15 | 3 | 19 | 7 | 23 | 11 | 5 | 17 |

| | | | | | | | |
|-------|---|-------|-----|-------|---|-------|-----|
| 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% | | | | |

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.”

Timed Question [200 points] Solve this quote by Antoine de Saint Exupery. When you have solved it, raise your hand so that the time can be recorded and the solution checked.

VRCIRZOXPJ XU HZLXRTRQ, JPO ELRJ OLR CR XU JPOLXJK

BPCR OP HQQ, FMO ELRJ OLR CR XU JPOLXJK NRIO OP OHAR

HEHW.

| | 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 | 4 | | 3 | 1 | | 5 | 2 | 8 | 2 | 7 | 1 | 1 | 11 | 7 | 3 | 13 | | 1 | 3 | 1 | 1 | 7 | | 2 |
| Replacement | | | | | | | | | | | | | | | | | | | | | | | | | | |

1) [120 points] Encode this phrase by Roy T. Bennett using a Caesar cipher with a shift of 11. I.e. A is encoded as L

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| W | H | E | N | Y | O | U | O | P | E | N | Y | O | U | R | M | I | N | D | , | Y | O | U | O | P | E | N | N | E | W | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| D | O | O | R | S | T | O | N | E | W | P | O | S | S | I | B | I | L | I | T | I | E | S | F | O | R | Y | O | U | R | S | E | L | F |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A | N | D | N | E | W | O | P | P | O | R | T | U | N | I | T | I | E | S | T | O | H | E | L | P | O | T | H | E | R | S | . | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

2) [100 points] Decode this phrase by Terry Pratchett which was encoded with with the Vigenere cipher using the keyword FIBER.

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|--|
| N | I | N | E | X | W | M | B | X | W | F | V | P | J | J | H | Q | F | R | T | J | , | J | V | X | Z | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H | I | O | R | F | Y | L | P | E | H | Z | I | E | V | R | Y | Q | D | I | H | Z | I | U | M | F | S | . | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

3) [400 points] Figure out what these strange headlines encoded using a Baconian alphabet mean. It was said by Douglas Adams and starts out with I MAY N What does it say?

FIXED PORCH JEWEL BLANK FACED ENTRY TREND FROM A

LEVEL SPLIT PEARL PLATE QUILT.

WATER REBEL BROKE FLOAT, WE SEE OLDER WEIRD POWER.

LOWER LAYER UP FOR DRIED EAGER FLEAS.

WE ALL LEFT A CLEAR ENTRY, FRAME LOSES EVERY MERIT.

UP FOR WORLD MEDAL, JENNA FIXED LOSER RULES.

POWER FRUIT FREED GREAT DWARF REBEL EAGLE.

RELAY FRIED FRESH GERMS, WHACK GRAPE FEAST.

WE ARE OLDER, WE SEE RIVER WATER, LEAVE EXILE.

PRESS PROVE EVEN A CLEAR VAULT FEELS WEIRD

4) [120 points] Encode this phrase by Jim Rohn using the Vigenère cipher with a keyword of JOULE.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| S | U | C | C | E | S | S | F | U | L |
| | | | | | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| P | E | O | P | L | E |
| | | | | | |

| | | | |
|---|---|---|---|
| H | A | V | E |
| | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| L | I | B | R | A | R | I | E | S |
| | | | | | | | | |

| | | |
|---|---|---|
| T | H | E |
| | | |

| | | | |
|---|---|---|---|
| R | E | S | T |
| | | | |

| | | | |
|---|---|---|---|
| H | A | V | E |
| | | | |

| | | |
|---|---|---|
| B | I | G |
| | | |

| | | | | | |
|---|---|---|---|---|---|
| S | C | R | E | E | N |
| | | | | | |

| | | |
|---|---|---|
| T | V | S |
| | | |

5) [100 points] Decode this phrase by Sophie Kinsella which has been encoded using the Atbash Cipher

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| H | L | N | V | G | R | N | V | H | B | L | F | W | L | M | G | M | V | V | W | Z | T | L | Z | O | R | M | O | R | U | V | , |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | , |
| B | L | F | W | L | M | G | M | V | V | W | G | L | P | M | L | D | G | S | V | Y | R | T | K | R | X | G | F | I | V | . | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | . | |
| B | L | F | Q | F | H | G | M | V | V | W | G | L | P | M | L | D | D | S | Z | G | B | L | F | I | V | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| T | L | R | M | T | G | L | W | L | M | V | C | G | ! | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | ! | | | | | | | | | | | | | | | | | | |

6) [600 points] Solve this Aristocrat encoded quote by Beth Kempton which was misheard and then typed in with mistakes before being encoded with a K2 alphabet.

TIQQPAG WO SQV CWZZWRURQOO KRP KLWZWSH SCA MVQCO

HAE'IQ ACR NKSV KRP QFNQIWQORMQ HAE'IQ ZWQT KO HAE'IQ

SIEQ OQZT.

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|---|---|---|---|---|---|---|---|---|---|--|
| 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 | | 4 | | 4 | 1 | 1 | 4 | 6 | | 5 | 1 | 2 | 2 | 6 | 3 | 15 | 6 | 5 | 3 | 1 | 3 | 7 | | | | 5 | |

7) [500 points] Solve this Patristocrat K2 alphabet encoded quote by Neil deGrasse Tyson that starts with IF YOU.

VPFDC UOHDS ONJZZ ITOJU IOUVO LSOVY LJYNM JRVZZ

JUVOL PUDHJ ROULD YLKDN FJYNI VONIT OHOYN IDOYN

ITORO ULDYB VZZNV O

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|---|---|---|---|---|---|---|---|---|---|---|--|--|
| 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 | | 1 | 1 | 7 | | 2 | | 3 | 6 | 7 | 1 | 6 | 1 | 8 | 15 | 2 | | 3 | 2 | 3 | 7 | 8 | | | 7 | 6 | | |

8) [100 points] Encode this phrase from J.K. Rowling using the Affine cipher with $a=9$ and $b=8$.

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 |
| | | | | | | | | | | | | | | | | | | | | | | | | | |

9) [400 points] Solve this Aristocrat which is a quote by John Keats and was misheard by Alexa and encoded with a K1 alphabet.

SVG VGV ARPE DVL XPG RVUVDLLOM L GXYOKVS PW JLYRD

LRS EOPQTKVD YD EGP DUXPPK LR YREVKKYNVRUV LRS BLAV

YE L DPKV?

| 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 | 1 | | 8 | 5 | | 5 | | | 1 | 6 | 9 | 1 | 1 | 3 | 8 | 1 | 8 | 4 | 1 | 3 | 13 | 1 | 3 | 6 | |
| Replacement | | | | | | | | | | | | | | | | | | | | | | | | | | |

10) [100 points] Decode this phrase by David Levithan which has been encoded using a Caesar Cipher.

| | | | | | | | | |
|-----------|---------|---------|---------------|---------|-------|-------|-----------------|---------|
| F B Z R | Q N L F | N E R | Y V X R | G U V F | . | N A Q | G U R | B A Y L |
| J N L | G B | T R G | G U E B H T U | G U R Z | V F | G B | E R Z R Z O R E | |
| G U N G | G U R L | N E R | B A Y L | B A R | Q N L | , | N A Q | G U N G |
| R I R E L | Q N L | R A Q F | . | | | | | |

11) [600 points] Solve this Patristocrat encoded quote by Isaac Asimov which has been encoded using a K1 alphabet.

DQFGT WDFAN JDJKL UQEMW FDTQF MEJKW NJFKN FDQFT

KFDQM DQFEM IOWDQ FGTWD OJWNT YFEJF WJWKT DFXEF

SMHXD DQMDW PXKKB

| 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 | | 13 | 5 | 14 | 2 | 1 | 1 | 7 | 7 | 1 | 6 | 4 | 2 | 1 | 8 | | 1 | 6 | 1 | | 9 | 3 | 1 | |
| Replacement | | | | | | | | | | | | | | | | | | | | | | | | | | |

12) [250 points] Solve this Aristocrat which is a quote by Calvin Trillin.

X UQKQC ZXZ KQCH YQTT XU EVAB - X PJWTZ UQKQC IQQE

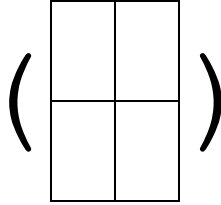
AJ DQCIWVZQ ABQ AQVPBQC ABVA X BVZU'A EQVUA EH

VUIYQCI TXAQCVTTH.

| | 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 | 5 | 7 | 1 | 4 | | | 3 | 4 | 2 | 3 | | | | | 2 | 16 | | | 6 | 6 | 8 | 2 | 6 | 2 | 5 |
| Replacement | | | | | | | | | | | | | | | | | | | | | | | | | | |

13) [100 points] Using a key of **DAMP**, compute the decryption matrix for a 2x2 Hill cipher using a 26 character alphabet.

$$\begin{pmatrix} D & A \\ M & P \end{pmatrix} \equiv \begin{pmatrix} 3 & 0 \\ 12 & 15 \end{pmatrix}$$



14) [600 points] Solve this Xenocrypt in Spanish which is a quote by Georg Cantor that has been encoded with a K1 alphabet using an English keyword.

WV DQH RQIWRQITOQH WD QGIW XW SGUSUVWG JVQ SGWAJVIQ

XWYW IWVWG JV KQDUG RQH QDIU FJW GWHUDKWGDU.

| 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 | | | 6 | | 1 | 8 | 4 | 6 | 4 | 2 | | | | | 1 | | 10 | 3 | 3 | 1 | 6 | 6 | 14 | 2 | 1 | |
| Replacement | | | | | | | | | | | | | | | | | | | | | | | | | | | |

15) [200 points] Solve this Aristocrat which is a quote by Isaac Asimov in which the word THE appears twice.

MROG IOC PS LEHS NLUEHGOCG GROG GRS YINSCIS EV QNVS

GE OCZ NCGSQQNDSCG PSNCD MRE ROY GRS DEEA VEHGJCS GE

PS OQNFS?

| | 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 | | 9 | 3 | 9 | 1 | 11 | 3 | 3 | 1 | | 2 | 2 | 7 | 7 | 3 | 4 | 6 | 13 | | 1 | 3 | | | 2 | 1 |
| Replacement | | | | | | | | | | | | | | | | | | | | | | | | | | |

16) [240 points] Decode this quote by Jennifer White in *Strong Heart Awakening* which has been encoded using a Baconian cipher.

pdddppppdpppddpdpdddppdpdppppdppdpdppppddddppddpddpddppppd

pppdppdpdpdpdpddpddpddppdddppdpddpddpppddppdpddpdp

dddppdpdppdpppdpddpdpppppdppppdppdppppdppppppppppdp

dppppppdpppdppppdpddp

ppppdpdppppdppppppdppppppdppdppdppdppdppppdpddpdpdp

pdppppdppdppdpppdpdpdpddppdddppppdppdppdppdddppdpdpppd

ppdpdppppdddppddp

pdddppddpddppppdppppppdppdppppppdppdppdppdppdppdppppppdp

p

17) [120 points] Encode this phrase by Stanley Victor Paskavich using the Atbash Cipher

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S | O | M | A | N | Y | W | I | S | H | F | O | R | M | A | G | I | C | S | O | M | A | N | Y | B | E | G | F | O | R |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| F | A | M | E | , | B | U | T | I | F | Y | O | U | C | O | U | L | D | M | A | N | I | F | E | S | T | | | | |
| | | | | , | | | | | | | | | | | | | | | | | | | | | | | | | |
| A | N | Y | T | H | I | N | G | Y | O | U | W | A | N | T | L | I | F | E | W | O | U | L | D | B | E | A | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B | O | R | I | N | G | G | A | M | E | . | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | . | | | | | | | | | | | | | | | | | | | |

18) [220 points] Solve this Aristocrat which is a quote by Lorie Myers that starts with UPON.

VAGY RJFPLEPYZ R UPHLUGYZ XNLSR, P IFGVZFI, IFPB PB

IFL TRQ IG UPEL QGVN UPHL -- PY IFL SGSLYI, RYX IG

IFL HVUULBI.

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