Science Olympiad — Eagle STEM Scrimmage

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.

Before the event begins:

1. Adjust desks and chairs – teams may have up to 2 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. If the student has a smart watch (Apple watch, Samsung Gear, etc.) they will need to put it away.
4. 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.
5. 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)

   SAMPLE̲ SE̲NTE̲NCE̲

   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

   SAMPUL̲ SENTENCE

   It is considered correct with two letter mistakes.

2. 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.

3. 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 50 points from the score until it would be zero. If a question is worth 140 points and they get 4 letters wrong, you would start with 140 points (for up to 2 letters wrong) and then subtract 50 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 140 point question, they would receive 0 points for that question. With a 350 point question, they could get 8 letters wrong and receive 50 points (2 free letters then 6× 50=300 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.

4. 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.

5. Add up all the scores and put the total on the bottom of score sheet.

6. 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.

7. 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. Note that if a test is completely blank, with no evidence of work on any of the ciphers, it should be awarded a score of "P".

Tie Breaker Order	Question #

Tie Breaker Order	Question #
1	9
2	2
3	4
4	18
5	17
6	15
7	6
8	7
9	5
10	10
11	14
12	12
13	3
14	16
15	8
16	1
17	11
18	13

8. 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.

1) **[51 points]** Solve this tapcode cipher which is about eagles!

●●●● ●●●● ●● ●●● ● ●●●●●   ● ●●●●● ● ● ●● ●● ●●● ● ● ●●●●●
T   H   E   E   A   G   L   E

● ●●●● ●●● ●●●● ● ●●●●● ●●●● ●●●   ●●● ●●● ●●● ●● ●●●● ●●●●
●●●●
D   O   E   S   N   O   T

●● ●●● ●●●● ●●●●● ●●● ●●● ●●●● ●●●●
H   U   N   T

●● ● ●●● ● ●● ●●●● ● ●●●●● ●●●● ●●●
F   L   I   E   S

2) **[184 points]** Solve this Aristocrat cipher which includes the word "team" twice.

```
EQC ZEMCPTEQ AI EQC ECFD VZ CFJQ
THE STRENGTH OF THE TEAM IS EACH

VPLVYVLNFK DCDXCM. EQC ZEMCPTEQ
INDIVIDUAL MEMBER. THE STRENGTH

AI CFJQ DCDXCM VZ EQC ECFD.
OF EACH MEMBER IS THE TEAM.
```

	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		14	6	10	5			2	2	1	2	4	1		3	8			2		5		2	1	4
Replacement	O	Y	E	M	T	A	W	P	F	C	L	D	R	U	Q	N	H	J	K	G	Z	I	X	B	V	S

3) **[55 points]** Solve this Atbash cipher which is a quote by former president John Adams

G	L		Y	V		T	L	L	W	,		Z	M	W		G	L		W	L		T	L	L	W	,
T	**O**		**B**	**E**		**G**	**O**	**O**	**D**	,		**A**	**N**	**D**		**T**	**O**		**D**	**O**		**G**	**O**	**O**	**D**	,

R	H		Z	O	O		D	V		S	Z	E	V		G	L		W	L
I	**S**		**A**	**L**	**L**		**W**	**E**		**H**	**A**	**V**	**E**		**T**	**O**		**D**	**O**

4) **[175 points]** Solve this Aristocrat cipher which includes the word "eagle"

```
F AFUUPO'E NDGO DE OP OFXC; FJ
A PARROT'S GIFT IS TO TALK; AN

LFNXL'E NDGO DE OP GXH. D'T
EAGLE'S GIFT IS TO FLY. I'D

UFOWLU VL FJ LFNXL.
RATHER BE AN EAGLE.
```

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

5) **[69 points]** Solve this Pig Pen cipher which is a quote from Immanuel Kant

| S | C | I | E | N | C | E | | I | S | | O | R | G | A | N | I | Z | E | D |

| K | N | O | W | L | E | D | G | E | . | | W | I | S | D | O | M | | I | S |

| O | R | G | A | N | I | Z | E | D | | L | I | F | E | . |

6) **[76 points]** Solve this joke which has been encoded as an Atbash Cipher

| W | H | Y | | D | O | | B | I | R | D | S | | F | L | Y | | S | O | U | T | H | | I | N | | T | H | E |

| W | I | N | T | E | R | ? | | I | T | ' | S | | F | A | S | T | E | R | | T | H | A | N |

| W | A | L | K | I | N | G | . |

7) **[69 points]** Solve this Knights Templar cipher!

I	F		Y	O	U		E	V	E	R		F	I	N	D		Y	O	U	R	S	E	L	F

I	N		T	H	E		W	R	O	N	G		S	T	O	R	Y	,		L	E	A	V	E	.

8) **[54 points]** This quote by John O'Hara has been encoded with the ceasar cipher

Y	L		Y	P	R	G	Q	R		G	Q		F	G	Q		M	U	L		D	Y	S	J	R	.
A	N		A	R	T	I	S	T		I	S		H	I	S		O	W	N		F	A	U	L	T	.

9) **[216 points]** Try to solve this Aristocrat cipher which includes the work "try"

NXRV YPU PUYWWG XJVSXPUR LT JTL
KIDS ARE REALLY INSPIRED TO NOT

EZVL YSSWG VUJVUV LT PTHTLV YJR
JUST APPLY SENSES TO ROBOTS AND

FYMKXJUV, HZL LT LPG LKUF TJ
MACHINES, BUT TO TRY THEM ON

LKUFVUWIUV.
THEMSELVES.

	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	3	2	1	6	3	10	1	1		5		3	3	7	10	10	4	4	5	2
Replacement	X	Q	G	W	J	M	Y	B	V	N	H	T	C	K	Z	R	F	D	P	O	E	S	L	I	A	U

10) **[67 points]** Solve this quote which has been encoded with the Pig Pen Cipher.

C	L	I	M	A	T	E		I	S		W	H	A	T		Y	O	U

E	X	P	E	C	T	,		W	E	A	T	H	E	R		I	S

W	H	A	T		Y	O	U		G	E	T	.

11) **[48 points]** Solve this Benjamin Franklin quote which has been encoded with the Dancing Men Cipher

| A |

| P | E | N | N | Y |

| S | A | V | E | D |

| I | S |

| A |

| P | E | N | N | Y |

| E | A | R | N | E | D |

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12) **[63 points]** Solve this Knights Templar Cipher

| W | I | N | N | I | N | G |

| I | S |

| O | N | L | Y |

| H | A | L | F |

| O | F |

| I | T | . |

| H | A | V | I | N | G |

| F | U | N |

| I | S |

| T | H | E |

| O | T | H | E | R |

| H | A | L | F | . |
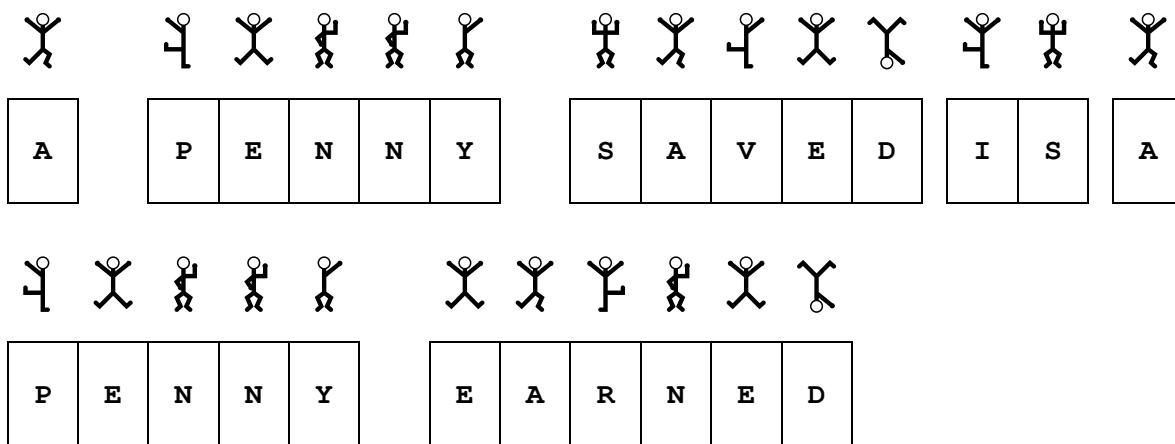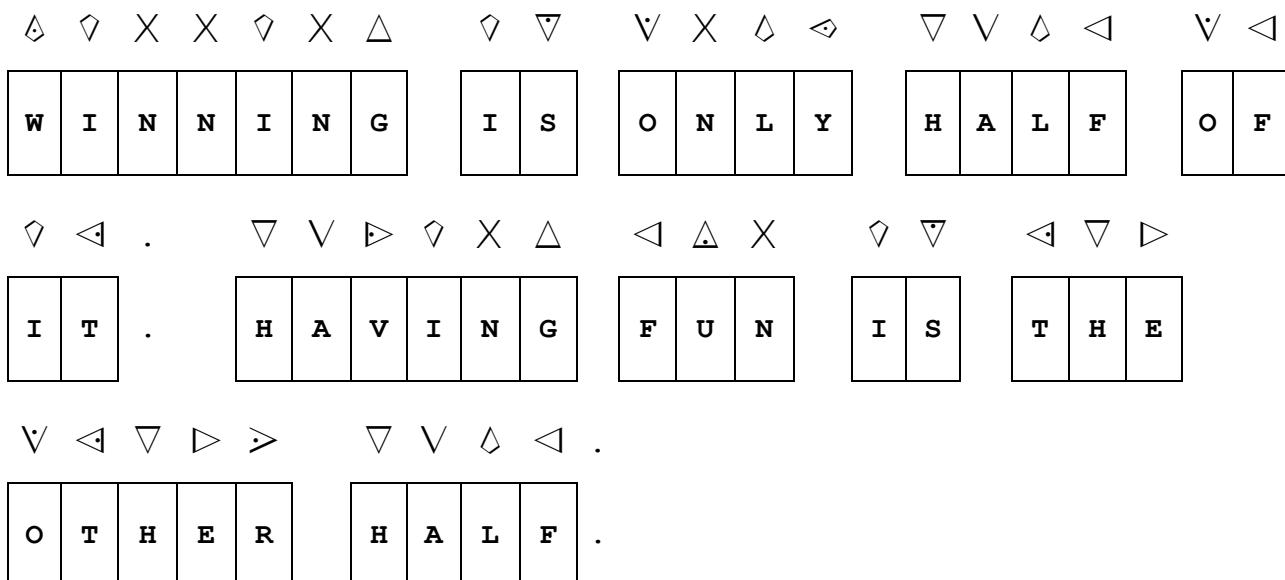
13) **[42 points]** Solve this Caesar Cipher with a shift of 2.

K	O	K	V	C	V	K	Q	P
I	M	I	T	A	T	I	O	N

K	U
I	S

V	J	G
T	H	E

U	K	P	E	G	T	G	U	V
S	I	N	C	E	R	E	S	T

H	Q	T	O
F	O	R	M

Q	H
O	F

V	G	N	G	X	K	U	K	Q	P
T	E	L	E	V	I	S	I	O	N

.

14) **[65 points]** Solve this quote which has been encoded with the Dancing Men Cipher

B	O	O	K	S

A	R	E

A

U	N	I	Q	U	E	L	Y
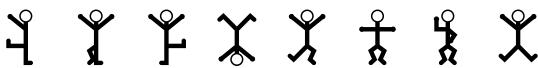
P	O	R	T	A	B	L	E

M	A	G	I	C

.

15) **[97 points]** Solve this Vigenére Cipher which has been encoded using a key word of "can"

C A N	C A N	C A N	C A N	C A N	C A N	C A N
Y E Z	W S G	J A I	G A C	K E F	V R R	U S P
W E M	**U S T**	**H A V**	**E A P**	**I E S**	**T R E**	**S S C**

C A N	C A N	C A N	C A N	C A N	C A N	C A N
C N A	Q T R	Z I F	V I A	V H R	R R R	U E A
A N N	**O T E**	**X I S**	**T I N**	**T H E**	**P R E**	**S E N**

C A N	C A N	C A
E E B	H A C	K E
C E O	**F A P**	**I E**

16) **[54 points]** Solve this Roald Dahl quote which has been encoded with the tap code cipher!

●●● ● ●● ●●●● ●● ● ● ●●●●●   ●● ●●●● ●●●● ●●●
L   I   F   E   I   S

●●● ●● ●●● ●●●● ●●●● ●● ● ●●●●●   ●● ● ●●●● ●●●●● ●●● ●●●
M   O   R   E   F   U   N

●● ●●●● ●● ●   ●●●●● ●●●● ●●● ●●●● ●●●● ●●●●●
I   F   Y   O   U

●●● ●●●●● ●●● ● ● ● ●●●●● ●●●●
P   L   A   Y

●● ●● ● ● ●●● ●● ● ●●●●● ●●●● ●●● .
G   A   M   E   S   .

17) **[97 points]** Solve this joke which has been encoded with the Caesar Cipher.

X	I	B	U		E	J	E		U	I	F		Q	J	S	B	U	F		T	B	Z		X	I	F	O
W	**H**	**A**	**T**		**D**	**I**	**D**		**T**	**H**	**E**		**P**	**I**	**R**	**A**	**T**	**E**		**S**	**A**	**Y**		**W**	**H**	**E**	**N**

I	F		G	P	V	O	E		T	P	N	F	P	O	F	?		J		T	F	B		Z	P	V	!
H	**E**		**F**	**O**	**U**	**N**	**D**		**S**	**O**	**M**	**E**	**O**	**N**	**E**	?		**I**		**S**	**E**	**A**		**Y**	**O**	**U**	!

18) **[102 points]** This Vigenère encoded quote uses a keyword of **EAGLE**. What does it say?

EAGLE   EAGLE   EAGLE   EAGLE   EAGLE

A	H	E	N	E		R	T	E	Z	Y		X	R	A	D	X		E	T	U	X	W		X	H	K	J	Q
W	**H**	**Y**	**C**	**A**		**N**	**T**	**Y**	**O**	**U**		**T**	**R**	**U**	**S**	**T**		**A**	**T**	**O**	**M**	**S**		**T**	**H**	**E**	**Y**	**M**

EAGLE   EAGLE   EAGLE

E	K	K	F	T		I	V	K	C	C		X	H	O	Y	K
A	**K**	**E**	**U**	**P**		**E**	**V**	**E**	**R**	**Y**		**T**	**H**	**I**	**N**	**G**