

Science Olympiad – Example Test 2 - Div A

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)
 - 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 KFXMFXYP

SAMPLE SENTENCE

and the students answered (underlined letters indicate mistakes)

SAMPLE SENTENCE

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

SAMPUL 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), no mistakes are allowed.
3. Teams 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. It is included in the answer key as an aid to the grader.
4. 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.
5. 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 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 $6 \times 100 = 600$ 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.
6. Add up all the scores and put the total on the bottom of score sheet.
7. 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.
8. 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 #8 (which is the highest value question) and another team didn't, the first team will be ahead.

Tie Breaker Order	Question #
1	12
2	11
3	10
4	9

Tie Breaker Order	Question #
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5	8
6	7
7	6
8	5
9	4
10	3
11	2
12	1

9. 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) [16 points] Solve this Atbash Cipher.

Y	V	G	I	F	V	G	L	B	L	F	I	H	V	O	U	.
B	E	T	R	U	E	T	O	Y	O	U	R	S	E	L	F	.

2) [23 points] Solve this Caesar Cipher with a shift of -2

Y	G	U	J	K	P	G	D	T	K	I	J	V	G	T	V	Q	I	G	V	J	G	T	.
W	E	S	H	I	N	E	B	R	I	G	H	T	E	R	T	O	G	E	T	H	E	R	.

3) [26 points] Solve this Caesar with a shift between -5 and 5.

G	R	Q	W	M	X	V	W	Z	L	V	K	I	R	U	L	W	Z	R	U	N
D	O	N	T	J	U	S	T	W	I	S	H	F	O	R	I	T	W	O	R	K

I	R	U	L	W
F	O	R	I	T

4) [31 points] Decrypt this Vigenère Cipher using the keyword of CARE

C A R E C A R E C A R E C A R E

O	A	B	I	V	O	U	E	A	A	D	E	B	I	E	K
M	A	K	E	T	O	D	A	Y	A	M	A	Z	I	N	G

5) [25 points] Solve this Vigenère Cipher. Use the Keyword TEST

T E S T T E S T T E

W	S	Q	H	N	V	T	X	L	X
D	O	Y	O	U	R	B	E	S	T

6) [50 points] Solve this PigPen.

⊔ ⊔ ⊥ ⊔ ⊔ ^ ⊔ < ⊥ < L ⊔ ⊔ ⊔ ⊔ ⊔ < ⊥ < ' ⊔ ⊔

B	E	L	I	E	V	E	Y	O	U	C	A	N	A	N	D	Y	O	U	'	R	E
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

⊔ ⊔ ⊥ ⊔ ⊔ ∨ ⊔ < > ⊔ ⊔ ⊔ ⊔ .

H	A	L	F	W	A	Y	T	H	E	R	E	.
---	---	---	---	---	---	---	---	---	---	---	---	---

9) [94 points] Solve this Tap Code Cipher which is a quote from Walt Disney.

T H E W A Y
 T O G E T
 S T A R T E D
 I S T O
 S T O P
 T A L K I N G
 A N D S T A R T
 D O I N G .

10) [149 points] Solve this Aristocrat Cipher which is quote by Elenor Roosevelt.

AWO UTATNO GOQHMF D AH AWHDO IWH
 THE FUTURE BELONGS TO THOSE WHO
 GOQBOLO BM AWO GOXTAV HU AWOB N
 BELIEVE IN THE BEAUTY OF THEIR
 YNOXCD .
 DREAMS .

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

11) [153 points] Solve this Aristocrat, which is a quote from Winnie the Pooh.

**CQHFPKHPC FDP CHBGGPCF FDKLWC
SOMETIMES THE SMALLEST THINGS**

**FBMP VY FDP HQCF SQQH KL NQVS
TAKE UP THE MOST ROOM IN YOUR**

**DPBSF.
HEART.**

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

12) [161 points] Solve this Aristocrat which is a quote from Neil deGrasse Tyson.

**QVF AZZB QVMGA RUZLQ KOMFGOF MK
THE GOOD THING ABOUT SCIENCE IS**

**QVRQ MQ'K QILF EVFQVFI ZI GZQ
THAT IT'S TRUE WHETHER OR NOT**

**WZL UFPMFHF MG MQ.
YOU BELIEVE IN 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	2	1			1	9	4	1	3		3	3	7		2	1	10	2			2	5	1			6
Replacement	G	D	F	M	W	E	N	V	R	X	S	U	I	Z	C	L	T	A	P	Q	B	H	Y	J	K	O