Science Olympiad — RHS Codebuster Test 2019

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 get 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. 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 there are spare calculators in the kit, you may loan up to one per team to use for the test.
   iv. 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:

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KZBAOF  KFXMFXYF
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and the students answered (underlined letters indicate mistakes)

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SAMPUL SENTENCE
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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

```
SAMPL SENTENCE
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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 x 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.

6. 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

<table>
<thead>
<tr>
<th>Minutes</th>
<th>Seconds</th>
<th>Seconds</th>
<th>Seconds</th>
<th>Seconds</th>
<th>Seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>0:xx</td>
<td>2,160</td>
<td>1:xx</td>
<td>1,920</td>
<td>2:xx</td>
<td>1,680</td>
</tr>
<tr>
<td>5:xx</td>
<td>960</td>
<td>6:xx</td>
<td>720</td>
<td>7:xx</td>
<td>480</td>
</tr>
<tr>
<td>8:xx</td>
<td>240</td>
<td>9:xx</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

and then add the seconds value from this table:

<table>
<thead>
<tr>
<th>Time</th>
<th>Bonus</th>
<th>Time</th>
<th>Bonus</th>
<th>Time</th>
<th>Bonus</th>
</tr>
</thead>
<tbody>
<tr>
<td>X:00</td>
<td>240</td>
<td>X:01</td>
<td>236</td>
<td>X:02</td>
<td>232</td>
</tr>
<tr>
<td>X:06</td>
<td>216</td>
<td>X:07</td>
<td>212</td>
<td>X:08</td>
<td>208</td>
</tr>
<tr>
<td>X:30</td>
<td>120</td>
<td>X:31</td>
<td>116</td>
<td>X:32</td>
<td>112</td>
</tr>
<tr>
<td>X:36</td>
<td>96</td>
<td>X:37</td>
<td>92</td>
<td>X:38</td>
<td>88</td>
</tr>
<tr>
<td>X:42</td>
<td>72</td>
<td>X:43</td>
<td>68</td>
<td>X:44</td>
<td>64</td>
</tr>
<tr>
<td>X:48</td>
<td>48</td>
<td>X:49</td>
<td>44</td>
<td>X:50</td>
<td>40</td>
</tr>
<tr>
<td>X:54</td>
<td>24</td>
<td>X:55</td>
<td>20</td>
<td>X:56</td>
<td>16</td>
</tr>
</tbody>
</table>

For example if they solved the time question at the 6:46 mark, you would add 720 (from the 6:xx entry in the first table) to 56 (from the X:46 entry in the second table) to get a bonus of 776. If they had solved it in exactly 4:00 minutes, you would add 1200 and 240 to get a bonus of 1440.

7. Add up all the scores and put the total on the bottom of score sheet.
8. 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.

9. 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.

<table>
<thead>
<tr>
<th>Tie Breaker Order</th>
<th>Question #</th>
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<tbody>
<tr>
<td>1</td>
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<tr>
<td>2</td>
<td>11</td>
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<tr>
<td>3</td>
<td>18</td>
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<tr>
<td>4</td>
<td>12</td>
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<td>5</td>
<td>8</td>
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<tr>
<td>6</td>
<td>17</td>
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<tr>
<td>7</td>
<td>5</td>
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<td>9</td>
<td>14</td>
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<td>10</td>
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<td>11</td>
<td>7</td>
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<tr>
<td>12</td>
<td>6</td>
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<td>13</td>
<td>19</td>
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<td>14</td>
<td>16</td>
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<td>15</td>
<td>15</td>
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<td>16</td>
<td>9</td>
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<tr>
<td>17</td>
<td>3</td>
</tr>
<tr>
<td>18</td>
<td>13</td>
</tr>
<tr>
<td>19</td>
<td>1</td>
</tr>
<tr>
<td>20</td>
<td>2</td>
</tr>
<tr>
<td>21</td>
<td>Timed</td>
</tr>
</tbody>
</table>

0. 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 [100 points] Solve this Quote by Albert Einstein. When you have solved it, raise your hand so that the time can be recorded and the solution checked.

“AJC AZTMRW BGD TMQTMTAD: AZD HMTNDGWD BMX ZHUBM

“TWO THINGS ARE INFINITE: THE UNIVERSE AND HUMAN

WAHOTXTAF; BMX T’U MCA WHGD BSCHA AZD HMTNDGWD.”

STUPIDITY; AND I’M NOT SURE ABOUT THE UNIVERSE.”

|    | 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 | 3 | 9 | 1 | 4 | 6 | 1 | 9 | 2 | 1 | 1 | 1 | 9 | 2 | 5 | 3 | 4 |
| Replacement | T | A | O | E | C | Y | R | K | W | L | X | N | V | P | J | F | G | B | I | M | Q | S | D | Z | H |
1) [150 points] Decode this Caesar cipher which is a quote by Bernard M. Bauch

```
"LOGRYIYEEKOBXNCKIGRKYIYEFOOV",
"BEWHOYOUAREANDSAYWHATYOUFEEL",
"LOMKECODRYCOGRYWSXNNYXDWKDDOB",
"BECAUSETHOSEWHOMINDDON'TMATTER",
"KXNDRYCOGRYWKDDOBNYXDWSXN",
"ANDTHOSEWHOMATTERDON'TMIND",
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2) [100 points] Solve this Mark Twain Quote encoded by an Atbash Cipher

```
"RUBLFGVCOGSVGIFGRSBLTWMESZEV",
"IFYOUTELLTRUTHYUDONTHAVE",
"GLIVNYNYSMBGSRKTM",
"TOREMEMBERANYTHING",
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http://toebes.com/codebusters/TestAnswers.html?test=2
3) [250 points] Solve this Affine Cipher where A=5

"BE CFHZ AFE CF EFCTHQQ FA CUHNVZ NAC"

"IT DOES NOT DO TO DWELL ON DREAMS AND"

MFURHE EFQBOHH"

FORGET TO LIVE"

4) [700 points] Solve this K2 encoded Spanish Xenocrypt with an English Keyword

"ÑKFK EZX OKÑ GZIRNZÑ OR UAUAN PQU AOZ. QIK RÑ HKGK"

"SOLO HAY DOS MANERAS DE VIVIR TU VIDA. UNO ES COMO"

ÑA IZOZ TQRNZ QI GAFZBNK. RF KPNK RÑ HKGK ÑA PKOK
SI NADA FUERA UN MILAGRO. EL OTRO ES COMO SI TODO

TQRNZ QI GAFZBNK ".
FUERA UN MILAGRO ".

| Replacement | Z | S | H | O | R | T | B | E | A | D | C | F | G | I | J | K | L | M | N | Ñ | P | Q | U | V | W | X | Y |
| K2          | 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   | 7 | 2 | 1 | 4 | 5 | 2 | 5 | 14 | 7 | 7 | 5 | 3 | 6 | 7 | 2 | 3 | 1 | 10 |

Translation: “There are only two ways to live your life. One is as though nothing is a miracle. The other is as though everything is a miracle.”
5) [450 points] Solve this K1 encoded Patristocrat

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FSGCS PHZFG KTFSN HOLGC BLHOF SNTXL DCSKT XLDCN
INSAN ITYIS DOING THESA METHI NGOVE RANO VERAG
CFSIW HLEUL JHFSN KFMML DLSDH LGWRH G
AINBU TESPE CTING DIFFERENT RESULTS
```

“Insanity is doing the same thing, over and over again, but expecting different results.”

| 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 | 5 | 4 | 1 | 8 | 5 | 7 | 1 | 1 | 3 | 9 | 2 | 4 | 2 | 1 | 8 | 3 | 1 | 2 | 2 | 1 |

6) [300 points] Decode this Aristocrat which is a quote by Oscar Wilde

```
“C EQ LT JZSASY IGEI LTQSICQSL C BTX’I OXBSYLEXB E
“I AM SO CLEVER THAT SOMETIMES I DON'T UNDERSTAND A
LCXMZS DTYB TK DGEI C EQ LEWCXM.”
SINGLE WORD OF WHAT I AM SAYING.”
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| 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 | 6 | 2 | 7 | 2 | 6 | 1 | 1 | 6 | 2 | 1 | 4 | 6 | 5 | 1 | 5 | 3 | 2 |
| Replacement | V | D | I | W | A | J | H | Q | T | C | F | S | G | B | U | X | M | K | E | O | P | Z | Y | N | R | L |
7) [300 points] Solve this Aristocrat which is a quote by Albert Camus

"LTE‘I KOBY PE RCTEI TR NZ... P NOM ETI RTBBTK LTE‘I
"DON‘T WALK IN FRONT OF ME... I MAY NOT FOLLOW DON‘T

KOBY XZWPEL NZ... P NOM ETI BZOL KOBY XZJPLZ NZ... HQJI
WALK BEHIND ME... I MAY NOT LEAD WALK BESIDE ME... JUST

XZ NM RCPZEL"

BE MY FRIEND"

| 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 |
| 6 | 2 | 8 | 1 | 6 | 2 | 4 | 6 | 3 | 6 | 6 | 6 | 1 | 4 | 8 | 1 | 3 | 9 |

8) [500 points] Decode this Quote by J.K Rowling using a Vigenere Cipher

"OLYMPIADOLYMPIADOLYMPIA'DOLYM,\n"WQWAJEACHEMNCWZVLRMBIN'VIZTIO,\n"IFYOUWANTTOKNOWWHATAMAN'SLIKE,\nPIADOLYMPIADOLYMPIADOLYMPIADO\n"IIKHORMASTORYLRTDEHHHCMIASHLG\n"TAKEAGOODLOOKATHOWHETREATS\nLYMPIADOLYMPIADOLYMPIADO."

"TLRTZIRFDSLAFFIVBBSMAA."

"INFERIORS, NOT HIS EQUALS."
9) [250 points] Encrypt this Dr. Seuss quote using the Vigenere cipher with keyword THINKERY

"THINKERYTH'INKE" RVC XXSNWB'ZRSR CMOL EUOR PMN JIA'D
ERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINKERYTHINK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11) [550 points] Solve this K2 encoded Patristocrat which is a quote by Marilyn Monroe

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DIMRO LEQD KJDPY RZSQW IZAJR PPDPB RJDSP ZJADQ
IMPER FECTI ONISB EAUTY MADNE SSISG ENIUS ANDIT
PYRQQ ROQKY RZYPK HSQRH WODAD ESHKS PQCZJ ZYPKH
SBETT ERTOB EABSO LUTEL YRIDI CULOU STHAN ABSOL
SQRHW YKODJ B
UTELY BORIN G
```

"Imperfection is beauty, madness is genius and it’s better to be absolutely ridiculous than absolutely boring."

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<table>
<thead>
<tr>
<th>Replacement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z</td>
</tr>
<tr>
<td>-------------</td>
</tr>
<tr>
<td>A</td>
</tr>
<tr>
<td>Frequency</td>
</tr>
<tr>
<td>-------------</td>
</tr>
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<td>3</td>
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</table>
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12) [500 points] Decode this Aristocrat which has a twist to it

```
KP HBWAE, AEDBWYEBWA LZZ EKGABDH, ELR L QELIFKBV AB
IF YOUTH, THROUGHOUT ALL HISTORY, HAD A CHAMPION TO
GALVR WF PBD KA, HBW CBWZRV'A QBVGALVAZH DWV LQDBGG
STAND UP FOR IT, YOU WOULDN'T CONSTANTLY RUN ACROSS
PBZXG ABRLH CEB QZLKI AELA L QEKZR KG KYVDLVA.
FOLKS TODAY WHO CLAIM THAT A CHILD IS IGNORANT.
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<table>
<thead>
<tr>
<th>Replacement</th>
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<tbody>
<tr>
<td>Frequency</td>
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<td>-------------</td>
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```

http://toebes.com/codebusters/TestAnswers.html?test=2
13) **[200 points]** Compute the decryption key for the following Hill Cipher

\[
\begin{pmatrix}
H & A \\
L & L
\end{pmatrix} \equiv \begin{pmatrix} 7 & 0 \\ 11 & 11 \end{pmatrix}
\]

\[
\begin{pmatrix}
15 & 0 \\
11 & 19
\end{pmatrix}
\]

14) **[400 points]** Solve this Spanish Xenocrypt which is a quote by A. A. Milne

"CM SRHGR YBIR XTR HMYM RJ BLVEJBACR, VRPE HE QMSE
"LA GENTE DICE QUE NADA ES IMPOSIBLE, PERO NO HAGO
HMYM GEYEJ CEJ YBMJ".

**NADA TODOS LOS DIAS**.

| 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 | 143724151717211721515 |
| Replacement | BILÑOZTNCSJMAXYVRHEGUVWPFFQD |

Translation: "People say nothing is impossible, but I do nothing every day."
15) [250 points] Solve this Running Key Cipher encoded with a famous document

```
WHEN IN THE COURSE OF HUMAN EVENT, NOT
EVERY CHALLENGE ALONG THE WAY, WITH
THE COMES NECESSARY Y FOR ONE PEOPLE

COURAGE I WILL FACE! I WILL BATTLE

LET ODISS, OL VETHE POLITICAL LANDSW!

EVERY DAY, TO CLAIM MY RIGHTFUL PLACE!

HIGH HAVE CONNECTED THEM WITH, HANO

COME WITH ME, THE TIME IS RIGHT, THERE

HER AND TO ASSUMES! EAMONGTH, EPowers

NO BETTER TEAM! ARM IN ARM, WE’LL WIN

OFT HEAR, THAT THESEPARE AND EQUAL!

THE FIGHT, IT’S ALWAYS BEEN OUR DREAM!
```

16) [250 points] Solve this Baconian Cipher that ends with "ove"

```
wisalarsnwdsairsslswrslsdplasrdiswslansdlsdlwndai BABAABBABABABABBABAAAAABAAAAAAABABBABAAABABAAABAAAABA

raslandislwlsndisslwrranswadiisldislsrswarndslwala BBABAAAABAAAABAAABBABABBBAAAABBBBBBBAAABAAAABABBABABABA

AKEOURAPOL

rsndiasdiaslswddisldiswlsldisldislsdlswandar BABAABBABABAAAAABABBABABABBBAAAAABABBBAAAABABBABABAA

OGIESTONIG

swisalrasndislwlanndiswslansdlsdlswlsranndislsdlswandar BBABABAABAAABABABABABABABAAABAAAAAABAABABABABABABAAA

TWEMAKEOUR

aswnardwisarlasd ABBABABABABAAABAAA

MOVE

Tomorrow we make our apologies, tonight we make our move
17) **[450 points]** Ella and Isabella are accountants for a very large bank, and have started a friendship. They communicate via email, because they live thousands of miles apart. Isabella gets curious and asks Ella the year that they were born. Ella doesn’t mind telling Isabella, but they know that the bank monitors all employee emails, and is afraid of being the victim of age discrimination. Therefore, Isabella suggests that they use RSA, and they provide their public key: (201277, 101639). Ella replies with the ciphertext 174071. Isabella’s private key is 92999. In what year was Ella born?

Enter the answer:

**1955**

18) **[500 points]** Decode this Hill cipher which is a quote from the Communist Manifesto which has keyword **TRAP**

\[
\begin{pmatrix}
T \\
A
\end{pmatrix}
= \begin{pmatrix}
19 & 17 \\
0 & 13
\end{pmatrix}
\begin{pmatrix}
D \\
A
\end{pmatrix}
\]

| D | A | I | X | B | A | K | I | Y | Z | L | Z | A | C | C | B | F | J | W | J | W | Y | D | C | T | N | O | A | I | X | N | N | G | E |
| H | A | L | F | L | A | M | E | N | T | A | T | I | O | N | H | A | L | F | L | A | M | P | O | O | N | H | A | L | F | A | N | E | C |
19) [275 points] Decode this message encrypted with an Affine Cipher that starts with THEW

```
D U A H N
L E A R N
```

20) [400 points] Solve this Spanish Xenocrypt which is a Donald Trump quote

```
OHORJO ÑJSYE SÑ XSPCÑHCXE RGCOXS. OHORJO XSÑCKHE SÑ
NINGUN SUEÑO ES DEMASIADO GRANDE. NINGUN DESAFIO ES
XSPCÑHCXE RGCOXS. OCXC XS TE FJS FJSGSPEÑ BCGC
DEMASIADO GRANDE. NADA DE LO QUE QUEREMOS PARA
OJSÑAGE KJAJGE SÑAC PCÑ CTTC XS OJSÑAGE CTMCOMS.
NUESTRO FUTURO ESTA MAS ALLA DE NUESTRO ALCANCE.
```

<table>
<thead>
<tr>
<th>Frequency</th>
<th>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</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>4 1 17 9 2 7 5 9 2 2 11 12 4 4 17 4 10 1</td>
</tr>
</tbody>
</table>

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

Translation: No dream is too big. No challenge is too great. Nothing we want for our future is beyond our reach.