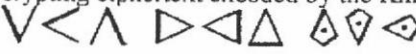


Codebusters and Advanced Codebusters

Codebusters

1. **DESCRIPTION:** Teams will cryptanalyze (decode) encrypted messages using cryptanalysis techniques and show skill with ciphers by decrypting a message.
2. **ESSENTIAL STANDARDS ALIGNMENT:** Science as Inquiry
3. **TEAM OF UP TO:** **2 and a 2nd Team of 2**
4. **MAXIMUM TIME:** 50 minutes
5. **TEAMS:** Must bring writing utensils. No other resource materials are allowed.
6. **EVENT LEADERS:** Will provide scratch paper and a resource sheet for each team to use. The resource sheet will include English letter frequencies, Atbash, DancingMen, and Vigenère tables but will NOT provide the PigPen, TapCode, or Knight's Templar Cipher tables
7. **SAFETY REQUIREMENTS:** None
8. **IMPOUND:** No
9. **THE COMPETITION:** This event consists of participants using cryptanalysis techniques to decrypt messages on a written exam.
 - a. Teams must not open the exam packet nor write anything prior to the "start" signal, nor may they write anything after the "stop" signal
 - b. Participants are free to answer the questions in any order, working individually or in pairs, attempting whichever of the questions seem right for them.
 - c. The code types that may be used on the exam at competitions are as follows:
 - i. Mono-alphabetic substitution Aristocrats – messages with spaces included – with or without a hint
 - ii. Atbash Cipher (in English, not Hebrew)
 - iii. The Caesar Cipher, also called a shift cipher, with a shift of no more than 3 characters in either direction. (e.g. 'a' can map to x,y,z,b,c, or d).
 - iv. The Vigenère Cipher – Decrypting ciphertext given a key.
 - v. The PigPen Cipher, also called the Masonic Cipher – Decrypting ciphertext with no mapping table provided.
 - vi. The Tap Code Cipher – Decrypting ciphertext encoded by a pair of numbers indicating a coordinate in a standard 5x5 table (not provided with the test) with c and k sharing the same cell.
 - vii. The DancingMen Cipher – Decrypting ciphertext encoded by DancingMen symbols based on the Sherlock Holmes story "The Adventure of the Dancing Men"
 - viii. The Knight's Templar Cipher - Decrypting ciphertext encoded by the Knight's Templar symbols with no mapping table provided.  decodes to ABC EFG WXY.
 - d. For the Aristocrat Cipher - no letter can ever decrypt to itself.
10. **SCORING:**
 - a. High score wins.
 - b. Based on difficulty, each question will be worth a clearly indicated number of points.
 - c. For all questions, the final points will be determined based on the number of errors found
 - i. Two or fewer errors will result in full credit.
 - ii. Each additional error results in a penalty of 50 points.
 - iii. The penalty will not exceed the value of the question. For example, a 200-point question with 4 errors is worth 100 points whereas the same 200-point question with 7 errors would be worth 0 points, not -50 points.
 - d. The scores for each question will be added to determine the exam score.
 - e. Tie Breakers: For teams that are tied, select questions predetermined by the event supervisor, will be used to break the tie using the following criteria in this order: score, degree of correctness and attempted.

11. **EVENT RESOURCES:** <https://ncscienceolympiad.ncsu.edu/resources/elementary/>