CODE BUSTERS
Technology

DESCRIPTION: Teams will cryptanalyze and decode encrypted messages using cryptanalysis techniques for historical and modern advanced ciphers.

A TEAM UP TO: 3 per grade level   **APPROXIMATE TIME:** 50 minutes

EVENT PARAMETERS:

a. No resource materials, except those provided by the Event Supervisor, may be used.
b. The Event Supervisor will provide scratch paper for each team to use.
c. The exam packet will include **a copy for each team member** of a resource sheet with information to help solve the ciphers.

THE COMPETITION:

a. This event consists of participants using cryptanalysis techniques and advanced ciphers to decrypt messages on a written exam.
b. Teams will begin the event simultaneously at the indication of the Event Supervisor.
c. Teams must not open the exam packet nor write anything prior to the start signal, nor may they write anything after the stop signal.
d. Participants are allowed to separate the pages of the test to be free to answer the questions in any order, working individually or in groups, attempting whichever of the questions that seem right for them.
e. The code types that may be used at the STEAM Olympiad are as follows:
  i.   The Caesar Cipher, also called a shift cipher
  ii. The Vigenere Cipher, also called autokey cipher
  iii. The Atbash Cipher (In English, not Hebrew)
  iv. Dancing Men Cipher (Monoalphabetic Symbol)
  v.   The Baconian Cipher- decrypting ciphertext encoded with the a and b values represented as one of more letters, glyphs, symbols, or characters rendering variations (**ONLY USED IN 6-8 COMPETITION)**
f. The first question of the exam will be timed.
  i.   A team member should signal when his or her team has broken the cryptogram.
  ii. Before the exam begins, the Event Supervisor will announce the nature of the signal that must be used (e.g., shouting "Bingo" or raising hand)
  iii. The time in seconds, to the precision of the device used, to solve the cryptogram will be recorded by the Event Supervisor or designee.

iv. If a team gets the timed question wrong, they may attempt to answer the question repeatedly without penalty. The timing bonus will be calculated from the start of the event until the question is successfully answered by the team with two or fewer errors, or until 10 minutes has elapsed. After 10 minutes, the timed question can still be answered but the timing bonus is zero.

v. Up to three questions will be marked on the exam as special bonus questions.

SCORING:

a. The high score wins. Final Score = Exam Score + Timing Bonus + Special Bonus

b. The scores for each question will be added together to determine the exam score.

c. Unless otherwise specified, the final points will be determined based on the number of errors found in the decoded plaintext as is appropriate to the question.

   i. Two or fewer errors will be scored as correct and result in full credit.

   ii. Each additional error results in a penalty of 100 points but the penalty will not exceed the value of the question. For example, a 400-point question with 5 errors earns 100 points [400 - 3(100] whereas the same 400-point question with 7 errors would earn 0 points, not -100 points.

d. A Timing Bonus can be earned based on the number of seconds it takes a team correctly decode the first question. The timing bonus is equal to 2 x (600 - number of seconds). For example, 6 minutes = 2 x (600 - 360) = 480 points.

e. A Special Bonus can be earned by solving any of the questions marked as special bonus questions with no penalty points. The bonus will be awarded as follows: One solved = 150 points, Two solved = 400 points, All three solved = 750 points.

f. Scoring example: Team A earns 3600 points on the exam and solved the timed question in 435 seconds and solved on Special Bonus question

Exam Score =	3600 points
+ Timing Bonus 2(600 - 435) =	330 points
+ Special Bonus (One = 150) =	150 points
Final Score	4080 points

h. Tiebreakers: 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 number attempted.