

Challenge 1: Solution Guide

Students are required to “break” an encoded message. They must demonstrate initiative, persistence, and some understanding of coding to successfully decode the message. A system for organizing known information will be essential for efficient problem solving. Counting the frequency of selected letters in a portion of text, for example, the first paragraph on text page 219, may provide clues for decoding. Students who play Scrabble or Boggle will be able to consider “probable letter partners.”

For example, the position of the double Q in the second last word of the message suggests that this letter combination represents two vowels such as EE or OO.

The Canadian term "Eh?" might be the last word.

The message is CONGRATULATIONS! YOU HAVE FIGURED THIS ONE OUT! PRETTY COOL, EH?

More important than decoding the message is the process of looking for a solution. Students should be explicitly aware of forming a hypothesis, collecting data, searching for patterns, noting evidence to support or refute a hypothesis, and so on.

CHAPTER 3: RUBRIC FOR CHALLENGE 1

Assessment Category	Scores and Criteria			
	Passable level of achievement – below provincial standard LEVEL 1	Moderate level of achievement – below, but approaching provincial standard LEVEL 2	High level of achievement – at provincial standard LEVEL 3	Very high to outstanding level of achievement – above provincial standard LEVEL 4
Thinking, Inquiry, Problem Solving				
Formulation and defence of hypothesis/conjecture	A hypothesis is created, but variables may be identified incorrectly and/or insufficient links are made to the problem.	A hypothesis is created but the connection to variables and/or the problem is weak.	Variables are identified correctly and the hypothesis relates to the problem.	A clearly stated hypothesis relates to the variables and the context of the problem.
Justification of reasoning and/or conclusion	Reasoning is evident but lacks consistency.	Reasoning is evident and logical for parts of the problem.	Reasoning is logical and consistent within the context of the problem.	Reasoning is logical and consistent and relates to the broader context of the problem.
Making conclusions and inferences	Conclusions are somewhat connected with work but are not supported.	Conclusions are consistent with work but are not fully supported.	Conclusions are supported by evidence and integrate aspects of the problem.	Conclusions are supported, integrate all aspects of the problem, and are convincing.
Application				
Selection of a tool or strategy to solve a problem	The selected tool is only partially appropriate to the context of the problem.	The selected tool is generally appropriate to the problem.	The selected tool is appropriate and relates to the context of the problem.	The selected tool is appropriate and efficient, and relates to the broadest context of the problem.
Use of selected tool or strategy	The selected tool/strategy is used with some inaccuracies.	The selected tool/strategy is used but with some minor errors.	The selected tool/strategy is used correctly.	The selected tool/strategy is used correctly and is verified or supported.

Challenge 2: Solution Guide

This challenge provides an opportunity for interested students to enrich their understanding and knowledge about cryptography. It will require research and time outside of class time. A bulletin-board display or an entry in a “Mathematics Fair” might be used to share collected information. A simple error-correcting code would be to just repeat “HI” three times: HIHIHI. It would be possible to correct this message even if this message were sent and one letter received in error. More than one error might confuse the optical reader, so this code is a single error-correcting code. There are many such codes in use for electronics and telecommunications packaging.

CHAPTER 3: RUBRIC FOR CHALLENGE 2

Assessment Category	Scores and Criteria			
	Passable level of achievement – below provincial standard LEVEL 1	Moderate level of achievement – below, but approaching provincial standard LEVEL 2	High level of achievement – at provincial standard LEVEL 3	Very high to outstanding level of achievement – above provincial standard LEVEL 4
Communication				
Appropriate use of mathematical vocabulary	Few mathematical words are used correctly.	Some mathematical words are used correctly.	Most mathematical words are used correctly.	Mathematical words are used correctly.
Degree of clarity in explanations and justifications	Explanations and justifications lack clarity.	Explanations and justifications are understandable but lack clarity.	Explanations and justifications are clear.	Explanations and justifications are clear and thorough.
Application				
Selection of a tool or strategy to solve a problem	The selected tool is only partially appropriate to the context of the question.	The selected tool is generally appropriate to the context of the question.	The selected tool is appropriate and relates to the context of the question.	The selected tool is appropriate, efficient, and relates to the broadest context of the question.
Use of a selected tool or strategy	The student uses the selected tool or strategy somewhat inaccurately.	The student uses the selected tool or strategy with minor errors.	The student uses the selected tool or strategy correctly.	The student uses the selected tool or strategy correctly and provided verification or support.