An Encrypted Clue

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Published by Common Deer Press

https://www.commondeer press.com/

ISBN

978-1-988761-56-5 (print) 978-1-988761-57-2 (e-book)

Grade Level

This teaching guide is recommended for students in grades 4, 5, and 6.

About the Author

David Cole has been interested in math since he was a very young boy. He pursued degrees in math and computer science and has shared this love of math at many levels, including teaching at the college level, coaching elementary math teams, and running a summer math camp. He also has a love of writing and has written a number of plays that have been performed. *The Math Kids* was born of a desire to combine his interests and exercise both sides of his brain at the same time.

About the Illustrator

Shannon O'Toole is a Toronto based illustrator, painter, and elementary school teacher. Her playful illustration work is inspired by the unique and humorous characters in her life. Aside from illustrating books for children, Shannon has exhibited her artwork in galleries across Ontario. When she is not drawing, Shannon can be found curled up with her dog, Edgar, watching old movies.

Book Summary

When Stephanie Lewis finds secret writing in the margin of an old book in the library, The Math Kids have a new puzzle to solve. But first, they must learn about codes and ciphers, and how to use their math skills to solve them.

As one clue leads to another, the kids are drawn into the mysterious old house that overlooks the town. Is it really haunted like some townspeople say? And who is the man in the long beard who keeps showing up everywhere they go?

But that's not their only problem. Unless they can find a solution, the math competition they've been training so hard for will be cancelled. Jordan, Stephanie, Justin, and Catherine will need to use all their problem-solving skills to figure out the clues before it's too late.

How to Use this Teaching Guide

The purpose of this teaching guide to *The Math Kids*: An *Encrypted Clue* is to help teachers take concepts from the book and create lessons and activities that allow students to engage in critical thinking and creative problem-solving.

The content of this book lends itself strongly to the math curriculum but can also be used to develop cross-curriculum lessons. Some of the lessons in this guide connect to specific chapters of *An Encrypted Clue* but the lessons/activities themselves are more generalized and can be modified to fit the strengths, interests, and needs of students.

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Family Tree

Grade 6 Social Studies - Heritage and Identity: Communities in Canada, Past and Present

Lesson Summary:

In this lesson, students will create their own family trees in connection to chapter 1 of *An Encrypted Clue*. Students will later participate in a gallery walk that allows them to see the family trees of their classmates. Students can also engage in discussion about the various cultures and ethnicities present in the classroom, which will prepare them for the unit's focus on different communities and perspectives in Canada. This lesson connects strongly with the Grade 6 Social Studies Heritage and Identity strand expectations and can be used as an introductory activity to the unit.

Instructions:

- 1. Introduce the assignment to students; this could be done immediately after reading chapter 1 of *An Encrypted Clue*.
- 2. Allow students time to work on their family tree; many students will have to discuss the assignment with their family and may need more than one class to finish.
- 3. After students have had an opportunity to create their family tree, have students participate in a gallery walk, allowing them to see the work of their classmates.
- 4. Regroup and engage in discussion about the family trees; ask students to share parts of their tree that they found interesting or exciting.
- 5. Discuss that there are many different ethnicities, cultures, and communities in Canada and that each have contributed to the development of the country and have their own experiences and perspectives. This will prepare the class for topics that will be discussed throughout the unit.

Expansions and Extensions:

- Students with accommodations or modifications could be asked to cover fewer generations or just one side of their family tree.
- Students could be asked to look into the cultures/ethnicities that their family belongs to and begin to research the contributions they have made to Canadian society.
- When including this assignment in the classroom, remember to recognize that some students may come from "non-traditional" families. There are many templates that can be given to students in order to best represent their family. Helpful links can be found on page 9.

Technological Integrations:

Students can create and fill out their family trees online using website such as Family Echo, Canva, and Ancestry.com. Integrating technology into this project can help students who have writing accommodations or modifications.



Cipher Escape Room

Grade 5 Mathematics - Algebra (Patterns and Relationships)

Lesson Summary:

In this lesson, students will learn about different types of ciphers and codes and be given time to create their own. This lesson ties in to both chapters 2 and 7 of *An Encrypted Clue* and can be used in connection to the grade 5 algebra curriculum. The math curriculum asks grade 5 students to be able to determine pattern rules and create their own patterns and this activity allows them to do this in a fun and creative way. Students will first have to learn about different types of codes and ciphers (ciphers can be chosen based on the students' skill levels) and then will be able to create their own codes or ciphers to share with the class. Upload pictures of each students's cipher to Google Forms to allow students to solve their classmates' ciphers in an "escape room" format!

Instructions:

- 1. After reading chapters 2 and 7 of *An Encrypted Clue*, review different kinds of ciphers used in the novel, such as pigpen and Caesar ciphers, as well as any other ciphers students may know about.
- 2. Practice decoding ciphers with students so that all students are familiar with each cipher and the methods that can be used to solve them.
- 3. Give students paper on which to create a rough draft of a cipher; they can use any of the ciphers discussed in class. Teachers may want to set parameters on the length or difficulty of the cipher being used.
- 4. When students have created a rough draft of their ciphers, ask them to hand them in.
- 5. Take pictures of the ciphers and upload them to Google Forms; each cipher can be its own question.
- 6. Share the Google Form with students. If students have personal or school issued laptops, each student can open the link and solve the cipher on their own. If not, the teacher can lead the class through each cipher using a screen projector.

Expansions and Extensions:

• The appendix of *An Encrypted Clue* has additional information about the Enigma Machine discussed in chapter 7. Students who are especially interested in math, ciphers, or history could do additional research and reading on this topic and create more complex ciphers.

- Using Google Forms to create an "escape room" made up of ciphers can help students to become more familiar with technology and can generate more excitement for the activity.
- Students with accommodations or modifications could use online cipher creators to help them make their ciphers. Links can be found on page 9.

"And on Your Left ... "

Grade 4 Language Arts - Oral Communication

Lesson Summary:

In this lesson, students will practice their oral communication skills by creating and giving a tour of a location in the school. In chapter 5 of *An Encrypted Clue*, the Math Kids go on a tour of the Maynard house and learn about the history of the house and the family. This lesson and activity will allow students to build on this chapter and engage in a form of oral communication that is more relaxed and informal than many other forms of presentations or speeches.

Instructions:

- 1. As a class, discuss the difference between tours and tour guides and other forms of oral communication. What kind of language or body language would a tour guide use?
- 2. Introduce the activity to students; students will give their classmates a tour of a location in the school. It could be the school library, the playground, the classroom, etc.
- 3. Co-create success criteria and requirements of the activity by asking students how they will know if they are successful or what kind of elements their tour should have.
- 4. Give students time to work and create their tours in class.
- 5. After students have had ample time to create their tours, allow students to give their tours. This may be in front of the whole class or in front of small groups, depending on the comfort level of the student presenting.

Expansions and Extensions:

- Students can be encouraged to go beyond what they see in their tours and look into some of the history behind their location (example: students could use a computer to research when a playground was built or ask their teacher questions about how the classroom had been previously arranged).
- Students in need of an extra challenge could be encouraged to memorize as much of their tour as they can.
- Students particularly interested in history or giving tours could be encouraged to go to a local museum and take a tour; they can then share what they learned with the class.

- If available, students can use laptops to type their tours. This can be especially helpful for students with accommodations or modifications.
- Students can look at online tours and online exhibits from popular or local museums to help them gather ideas and inspiration.

Lights, Camera, Action

Grade 6 Language Arts - Reading and Writing

Lesson Summary:

In this lesson, students will create a movie pitch for an *An Encrypted Clue* movie. This assignment could be used as a summative assignment to be done after the book is completed. Students will be divided into small groups and work together to create a movie pitch, focusing on things such as genre, important scenes from the book that would be included in the movie, etc. This lesson focuses on the Grade 6 Reading and Writing expectations and can be used to help determine each students' level of comprehension at the end of the novel.

Instructions:

- 1. Introduce the assignment and requirements to students; some requirement for this project could be:
 - a) picking out 2-3 scenes they will include in the movie;
 - b) choosing a genre and target audience;
 - c) actors they would select to play each character;
 - d) a summary/synopsis of what would be included in their movie;
 - e) an "elevator pitch" that could be presented to the class.
- 2. Divide students in to groups, keeping each student's strengths and areas for improvement in mind.
- 3. Guide students through each stage of the activity; it may be beneficial to provide several days to work on each element introduced so students are able to focus on one task at a time.
- 4. Give students time to work on the assignment in class with their group.
- 5. If you choose to have students create an "elevator pitch," present the pitches to the class!

Expansions and Extensions:

- Challenge students who finish with extra time to create additional elements for their movie pitch, such as a movie poster or a movie trailer.
- Challenge students to look at and think about other books that have been made into movies. Why do producers/directors change some elements between a book and its film adaptation? Would your group try to keep the movie very similar to the book or would you make changes? Why?

- Students could record their "elevator pitches" or movie trailers using recording software. Students could also use movie or video editing apps they are familiar with to add graphics or sound effects to their recordings.
- Students could use Photoshop or graphic editing tools to create virtual movie posters.



Problem Solved!

Grade 5 Mathematics - SEL Skills and Mathematical Processes

Lesson Summary:

In this lesson, students will learn about and practice social-emotional learning (SEL) skills and problem solving skills through the use of math problems from *An Encrypted Clue*. There are many problems throughout *An Encrypted Clue* that students could use to work on problem solving skills; though these questions may be too difficult for some students to solve, working on difficult problems gives students the opportunity to put their SEL skills and problem solving skills into practice.

Instructions:

- 1. Introduce students to SEL skills, which can be found in the Ontario math curriculum. The curriculum includes skills such as: "maintain positive motivation and perseverance," "recognize sources of stress and cope with challenges," and "think critically and creatively."
- 2. Explain to students that building on these skills will help us to better understand ourselves and how we think and make it easier for us to solve difficult problems.
- 3. With the class, create a framework for solving difficult problems for students to refer to. This can use elements from Mary Marks Krpan's self-talk cards, an image of which can be found on page 8. Ask students what process they think they should use when going through a difficult problem. What will they do to persevere through difficult problems? What strategies can they use to help understand the problem?
- 4. Give students some of the questions from the appendix of *An Encrypted Clue*; put students in small groups and assign them a question to work through.
- 5. Remind students to adhere to the problem solving process they created.
- 6. Give students time to work and then take up the answers they got. Ask each group about their use of the problem solving process and how it helped them find answers to the difficult problems.
- 7. Remind students that it is okay if they don't solve their problem! The point of this lesson is to work on their problem solving skills.

Expansions and Extensions:

- Groups that finish their initial question can continue to work on other questions from An *Encrypted Clue*.
- Discuss with the class how their problem solving process can be used in other subjects. How else can students apply the self-talk and SEL skill strategies?

- Students could create their own online posters of the problem solving process they co-created.
- There are a number of online manipulative websites that students could use to help them solve these math problems. Links can be found on page 9.

Math Self-Talk Cards

	Planning Self-Talk: This self-talk helps us to organize our thinking. It helps us to think about what we need to do and when we need to do it.	
	Math Strategy Self-Talk: This self-talk focuses on the mathematics we are using in our thinking.	
J	Self-Editing/Monitoring Self-Talk: This self-talk checks the strategies we are using. It tells us whether we are on the right track and if things are making sense. It may also tell us to change our ideas and try a different approach.	
- <u>2</u> -2->	Connections Self-Talk: This self-talk helps us to think about other times when we have experienced a similar problem or used a specific strategy, whether in mathemat- ics or in our personal lives. It helps us to link math ideas to other ideas and experiences.	
1	Struggle Self-Talk: This self-talk is what we express when we feel confused or unable to do a specific task. It alerts us that we need to begin to think positively about our work and figure out what to do to complete the task.	
	Focus Self-Talk: This self-talk keeps us on track. It reminds us that we need to concentrate on the task, or the small part of the task, that we are completing and not get distracted.	
	Encouragement, or Growth-Mindset, Self-Talk: This self- talk helps us to persevere and keep going when we face challenges. It reminds us that we have good math skills and knowledge, and that we should not give up.	

URL Links, Resources, and References:

Heritage Assignment Resources:

https://www.familytreetemplates.net/category/nontraditional http://www.adoptionpolicy.org/Adoption_Awareness_Schools.pdf https://www.familyecho.com/ https://www.canva.com/graphs/family-trees/

Cipher Assignment

https://www.giftofcuriosity.com/secret-codes-for-kids/ https://cryptii.com/pipes/caesar-cipher

Math Manipulative and Resources

Toy Theatre Math Manipulatives: https://toytheater.com/category/teacher-tools/virtualmanipulatives/ Mathigon Math Manipulatives: https://mathigon.org/polypad Geogebra: https://www.geogebra.org/ Didax Math Manipulatives: https://www.didax.com/math/virtual-manipulatives.html

Curriculum Documents

Math (2020) Curriculum: https://www.dcp.edu.gov.on.ca/en/curriculum/elementary-mathematics Language Arts (2006) Curriculum: http://www.edu.gov.on.ca/eng/curriculum/elementary/language18currb.pdf Social Studies (2018) Curriculum: http://www.edu.gov.on.ca/eng/curriculum/elementary/socialstudies-history-geography-2018.pdf

Other

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