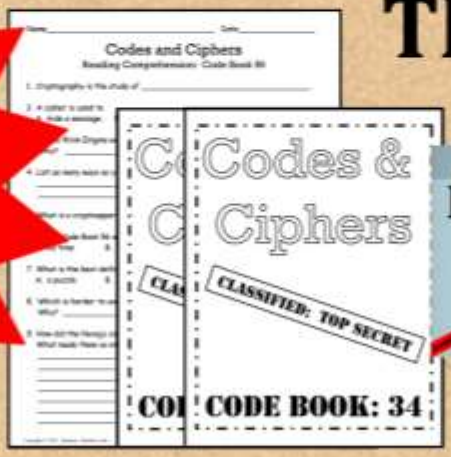
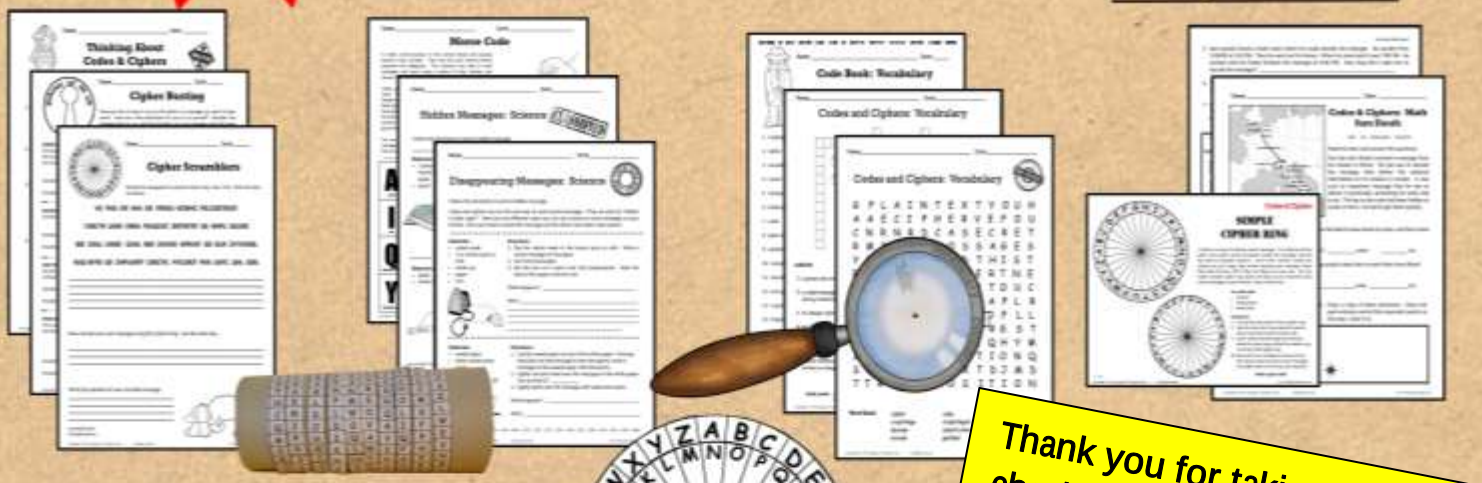
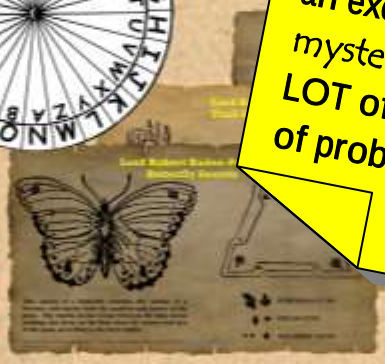
Codes & Ciphers

Thematic Unit

Student Selected Subject







Thank you for taking the time to check out this thematic unit for an exciting exploration of the mystery of secret writing. It's a LOT of fun, and gives kids plenty of problem solving practice, too!

Sandie Flynn

Thematic Teacher

Literacy Through Art, Science, & Social Studies

Grades 3-4 & Grades 5-6

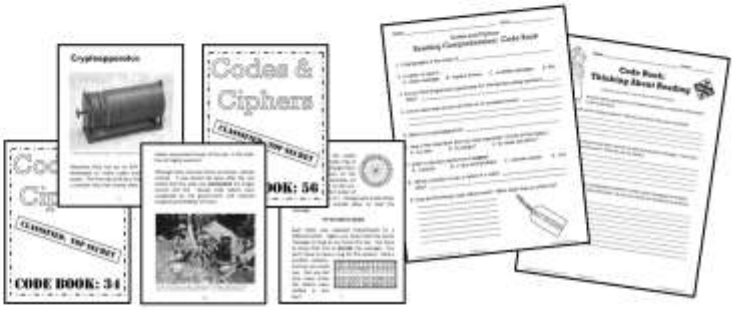
Includes detailed Substitute Plans

Codes & Ciphers
Overview of Unit Materials

"If you could study anything you wanted to, what topics would you choose?" That's the question I asked my third and fourth graders. After thinking and talking about it for a week, they listed and discussed all the possibilities, and then voted for 10 subjects. Cryptography was one of their top choices. If you're looking for something for the first couple of days of school, an exciting subject for use when you need a substitute, or just a fun day or two to practice useful skills, this may be the unit for you! Here's what you'll find in these materials:

File 1: **Teacher's Guide**
Overview, Standards, Book List, Credits, and detailed Lesson Plans you can leave for a substitute. This is an exciting, student-selected topic for a special day or two.

File 2: **Field Kit**
Read and Follow Directions to make a "Spy Field Kit" where students will store items they create.



File 3: **Student Readers and Comprehension Practice**
Code Book 34: Grades 3-4
Code Book 56: Grades 5-6
Students read about Codes and Ciphers in a mini booklet of 14 pages (2 letter sized pages, double-sided, cut in half, stapled).

File 4: **Vocabulary Activities**
Word Search, Crossword Puzzle, Meaning Match

File 5: **Math**
Students read and answer questions about fictional Sam Sleuth, a spy traveling across Europe to deliver an important message to his handler.

File 5: **Science Activities**
Four science activities allow students to explore the properties of "hidden writing." Unusual supplies needed include lemon juice or milk, waxed paper, and an iron. You'll also need white crayons.

File 5 and 6: **Other Worksheets**
Other worksheets give students the opportunity to learn about ciphers and codes, and to practice deciphering and enciphering them. Answers are included.

File 7: **Art Project**
Students read, write, discuss, and draw to produce "spy notes" embedded in a drawing or painting.

File 8: **Spy File Prizes**
Prizes featuring classroom privileges such as free time, reduced homework or class work.

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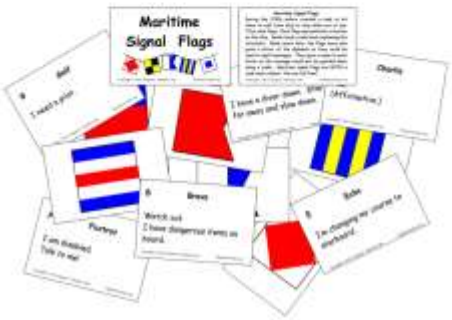
Codes & Ciphers
Spy Center Materials

You can expand this unit by setting up a Spy Center in your classroom. This allows students to continue to explore this interesting subject long after the thematic unit has ended. You may also use these materials as assignments. Here are the available materials:



File 13: **Maritime Signal Flags**
Students use these cards to learn about maritime ciphers and codes using flags.

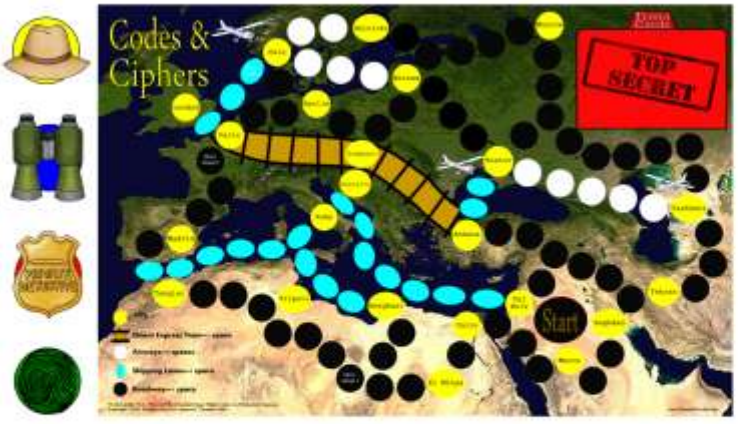
File 9: **Posters and Lettering for the Spy Center**
Posters (about 11X17) decorate your wall, and give students information to which they can quickly refer. Sets of signal flags send messages students can decipher.

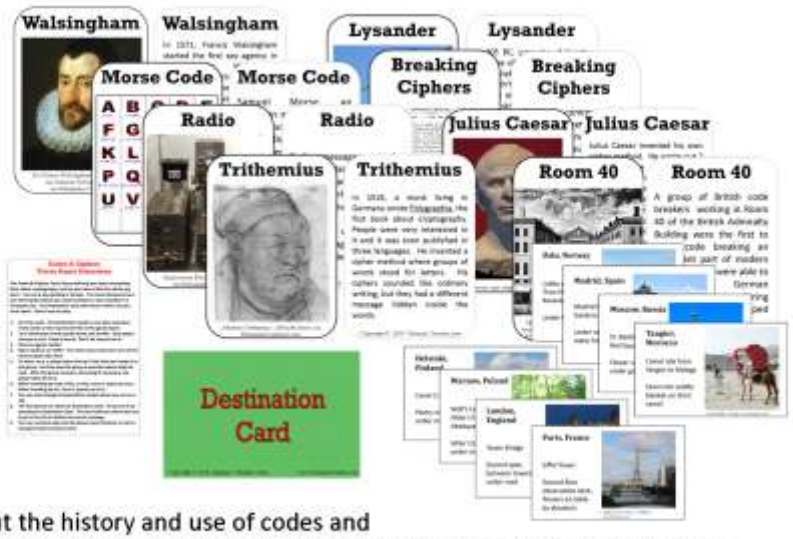
File 11: **Vocabulary Cipher Ring**
Eight of the unit's important words are included in this Vocabulary Cipher Ring. Turn the glass and view a new definition. It's a unique approach to an old topic.

File 15: **Task Cards**
Students learn additional ciphers and follow directions to write their own secret messages. 15 Task Cards and Holder are included.

File 14: **Disk Cipher Directions**
Build a model of a disk cipher for student use.

File 10: **Reading File Cards**
Additional reading assignments are available on 12 reading cards. They contain interesting information about the history and use of secret writing.





File 12: **Codes & Ciphers Trivia Game**
Thirty-two trivia cards give students interesting information about the history and use of codes and ciphers. They read a card to move on a game board as they attempt to be the first to drop off a secret file at a European destination.

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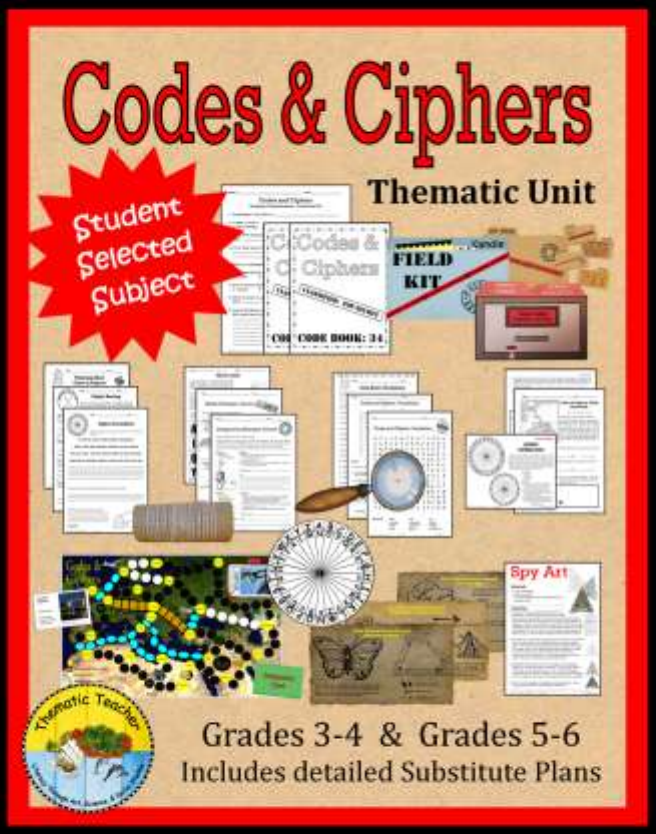
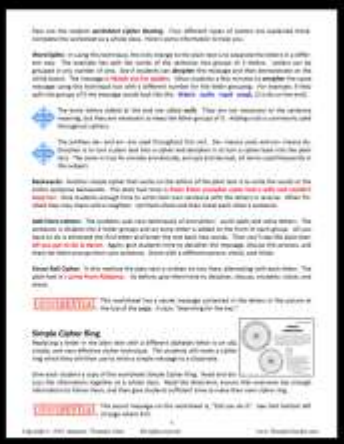
Substitute Lesson Plans





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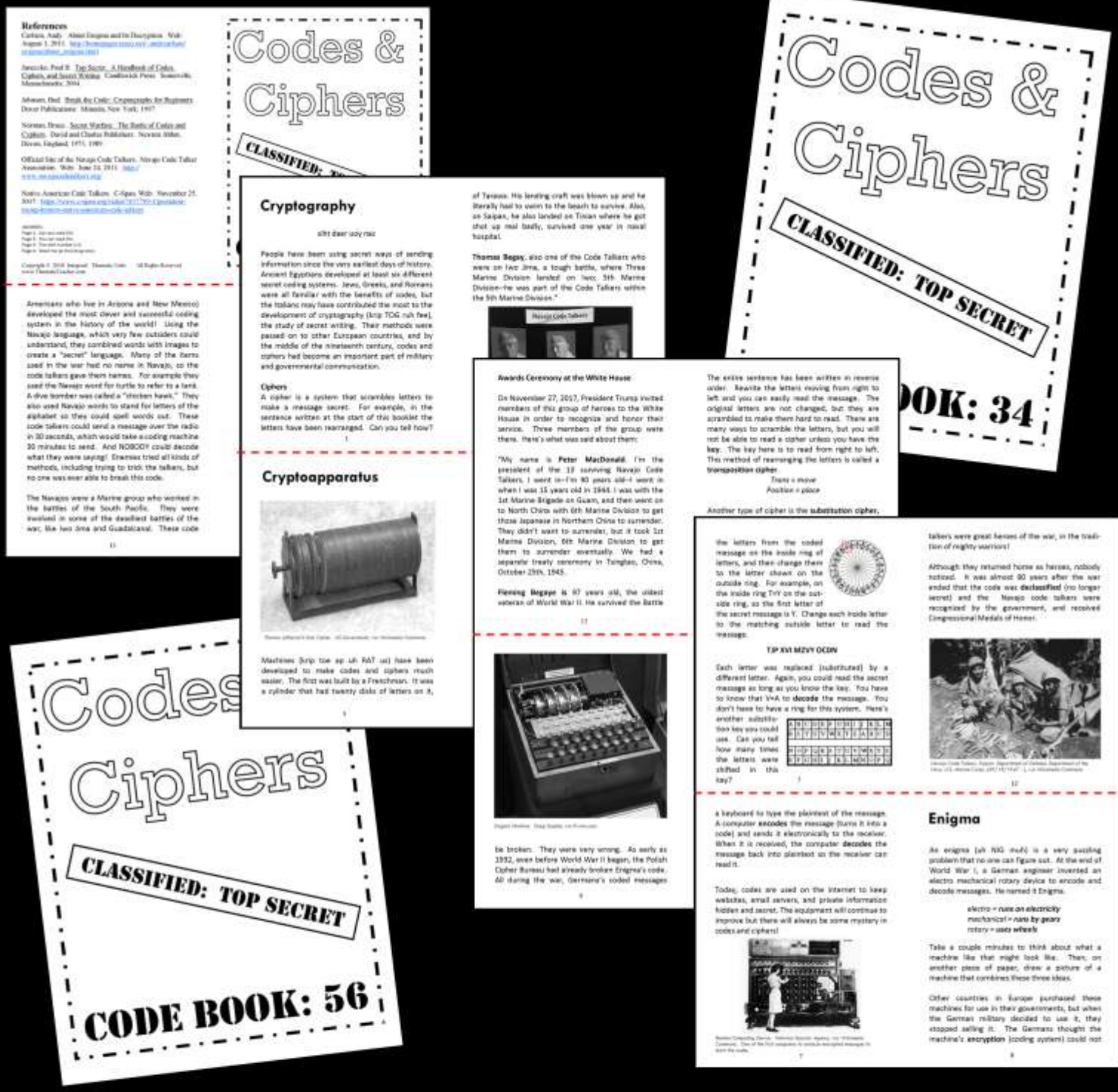

Student Readers: Mini Books

Two Reading Levels: Grades 3/4, & Grades 5/6

4 pages (2 pieces of letter sized paper, 2 sided, cut in half to form mini booklet)

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References

Carlson, Andy. About Enigma and Its Decryption. Web: August 1, 2011. http://homepages.tesco.net/~andycarlson/enigma/about_enigma.html

Janeczko, Paul B. Top Secret: A Handbook of Codes, Ciphers, and Secret Writing. Candlewick Press: Somerville, Massachusetts; 2004.

Johnson, Bud. Break the Code: Cryptography for Beginners. Dover Publications: Mineola, New York; 1997.

Norman, Bruce. Secret Warfare: The Battle of Codes and Cyphers. David and Charles Publishers: Newton Abbot, Devon, England; 1973, 1989.

Official Site of the Navajo Code Talkers. Navajo Code Talker Association. Web: June 24, 2011. http://www.navajocodetalkers.org/

Native American Code Talkers. C-Span, Web: November 25, 2017. https://www.c-span.org/video/?437799-1/president-trump-honors-native-american-code-talkers

ANSWERS:
Page 1: Can you read this
Page 3: You can read this
Page 3: The shift number is 9.
Page 4: Meet me [at the] drug store.

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Codes & Ciphers

CLASSIFIED: TOP SECRET

CODE BOOK: 56

Americans who live in Arizona and New Mexico) developed the most clever and successful coding system in the history of the world! Using the Navajo language, which very few outsiders could understand, they combined words with images to create a "secret" language. Many of the items used in the war had no name in Navajo, so the code talkers gave them names. For example they used the Navajo word for turtle to refer to a tank. A dive bomber was called a "chicken hawk." They also used Navajo words to stand for letters of the alphabet so they could spell words out. These code talkers could send a message over the radio in 30 seconds, which would take a coding machine 30 minutes to send. And NOBODY could decode what they were saying! Enemies tried all kinds of methods, including trying to trick the talkers, but no one was ever able to break this code.

The Navajos were a Marine group who worked in the battles of the South Pacific. They were involved in some of the deadliest battles of the war, like Iwo Jima and Guadalcanal. These code

Codes

A code is a different type of secret writing. It requires a codebook to enable you to read the true meaning. In a code, a word or phrase are replaced by symbols, numbers, or words. Each word needs its own replacement.

3548 9834 2145 6231

If you looked the words up in the code book you might find:

2145=DRUG 3548=MEET
6231=STORE 9834=ME

Now can you figure out what the phrase above says?

This is a very complex system because you have to have a special symbol for every word you would ever want to use! That means you have to carry around a really big code book!

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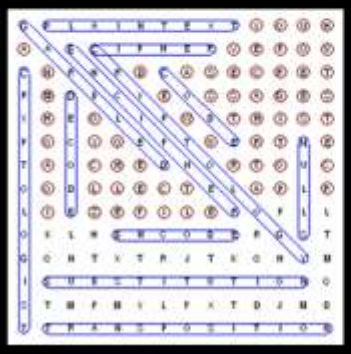
Vocabulary Activities



Name_____ Date_____

Codes and Ciphers: Vocabulary

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

Word Bank

cipher	code	nulls	
cryptology	cryptologist	plaintext	
decode	substitution	encipher	
encode	garbled	transposition	

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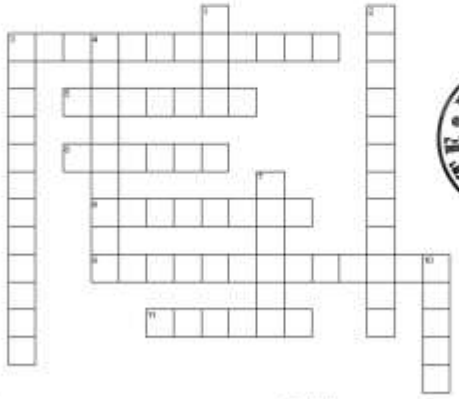
Name_____ Date_____

Codes and Ciphers: Vocabulary



ACROSS

3 a person who studies codes and ciphers

5 a coded message that becomes mixed up during transmission

6 to change a plaintext into a secret code

8 to change a message into a cipher

9 changing the position of word or sentence

11 a secret method of writi letters or changes their

DOWN

1 a system for changing words into secret symbols. It requires a code book for the sender and the receiver

2 changing the letters in the plaintext for a different set of letters

9 the study of secret writing

WORD BANK: cipher, co text, subs

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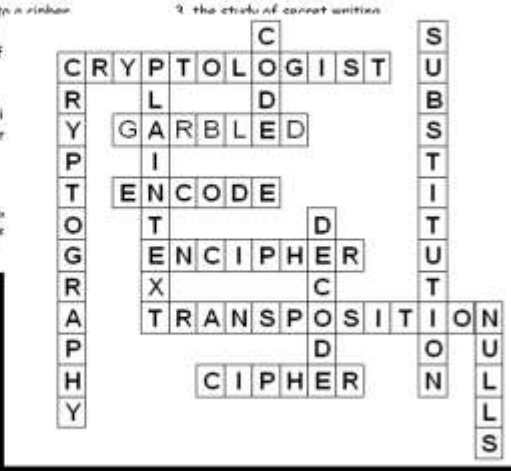

Word Search contains a hidden message for students to find

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Cipher Rings

Codes & Ciphers

SIMPLE CIPHER RING

A cipher ring is a simple and interesting way to introduce students to codes and ciphers. A common childhood toy, this little tool will get your kiddos writing whether they know it or not! It allows students to encrypt or decode messages which they can sent back and forth to each other. You can use it as a whole-class project, or place the ma
exploration. You can teach your students how to use them, or see if they can figure it out o
get your class enthused and ready to learn more about the history and uses of codes and cip

Objective: *Students will read and follow directions to make a cipher ring, which they will the
messages to and from their classmates, and decode information included on worksheets.*

Preparation:

1. Print as many copies of page 2 as you need for your purpose, on card stock (they will last
   per student.)
2. Place at a center and let students explore during their free time, OR use as a class or sma

Uses:

- Introduce the unit using this activity.
- Free time exploration.
- Students write to their chosen friends.
- Students within a small group communicate with each other.
- Class room features a secret message for each day and students earn points or notice for
- Prepare a bulletin board (or use the white board) so that students can post messages for
- Supply the cipher ring and see if students can figure out how it works on their own.

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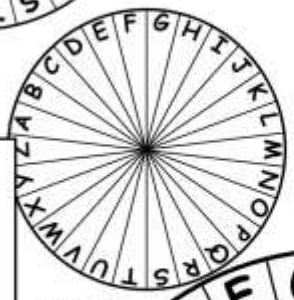
Codes & Ciphers

SIMPLE CIPHER RING

A cipher is a way of writing a secret message. It is made up of two parts—the system used to encode (write) the message, and the key used to decode (read) it. Even if the "enemy" knows the system you are using, they cannot decode your message unless they have the key—OR if they can figure out your key. You can make a simple cipher ring which will allow you to read and write secret messages to your friends. Here's what to do:



You will need:
scissors
sharp pencil
brass brad

Directions:

1. Cut out the two parts of your cipher ring.
2. Use the sharp tip of your pencil to push a hole in the exact center of each ring.
3. Push a brass brad through the hole and attach the two rings so that the smaller ring is on top of the larger ring.
4. Now see if you can figure out how to use the ring to read and write secret messages. ...ant to see if you can read this:

...ks mx?

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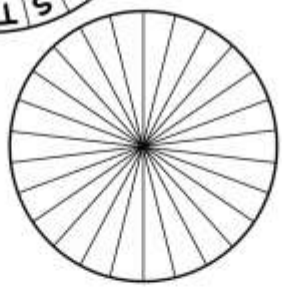
Codes & Ciphers

SYMBOL CIPHER RING

Letters are not the only way to encode a message. You can use pictures (symbols) as well. You can substitute a simple picture for a letter, such as ✥ can stand for the letter A, or any other letter on the ring. Make your own cipher ring using symbols. Keep the pictures simple so that you and your friends can easily write messages in your own picture language. Of course, each person will still need to know the KEY (ex. A= ✥) for each message you send, and you will all need to have the same pictures in the same order. Work together so your rings will match.



You will need:

- scissors
- sharp pencil
- brass brad

Directions:

1. Cut out the two parts of your cipher ring.
2. Draw a symbol on each section of the blank ring.
3. Use the sharp tip of your pencil to push a hole in the exact center of each ring.
4. Push a brass brad through the hole and attach the two rings so that the smaller ring is on top of the larger ring.
5. Now get together with your friends, decide on the KEY and get ready to send some pretty encrypted messages!

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Students read and follow directions to make two types of cipher rings, which they will use during the unit.

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Name _____ Date _____

Codes & Ciphers: Math
Sam Sleuth

Read the story and answe

One day Sam Sleuth rece
his contact in Rome. Hi
the message, then de
information to his contac
such an important mess
deliver it personally, som
to do. The key to the cod
a park in Paris—he had to

Because he didn't want to be followed, Sam decided to leave Rome by
by car and plane.

1. How many miles did Sam travel by train? _____miles
2. Traveling at 50 miles per hour, how long would it take Sam to reach
3. How far did Sam travel by plane? _____miles

Once he arrived in Paris, Sam headed to the park. He had been given directions to help him locate the key. The directions read, "North 20 paces to the old oak tree. West 125 paces to the pretzel stand. North 65 paces to the lake front. Walk east along the lake front 56 paces. You will see a trashcan chained to a rail. There is a false bottom in the trashcan. Reach underneath to find the key."

4. Draw a map of these di
park entrance and all the
the map. Color it in.

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5. Sam quickly found a hotel room where he could decode the message. He worked from 3:55PM to 5:55 PM. Then he went out for dinner. When he came back it was 7:00 PM. He worked until he finally finished the message at 9:46 PM. How long did it take him to decode the message? _____

6. The next morning Sam got on the plane for London. It was 227 miles from Paris to London. The plane flew 100 miles per hour, so how long was Sam's flight? _____

7. He rode the London Tube to Big Ben where he was supposed to meet his English contact. The tube charge was four pounds per zone. He went through 6 zones. How much did Sam have to pay to ride the Tube? _____

Ye Olde Hot Dog Stand

MENU ITEM	add 3% tax
Hamburgers	£ 9.95
Cheeseburgers	£ 10.95
Chili burgers	£ 10.95
Hot dogs	£ 3.50
Chili dogs	£ 3.75
Sauerkraut dogs	£ 4.75
Sandwiches	£ 9.95
Shepherd's Pie	£ 10.95
Fish and Chips	£ 8.95
Soft Drinks	£ 2.50
Tea	£ 2.50

8. All went as planned, and precisely at 2:25 PM a lovely young English girl strolled up to Sam and said, "Lovely day for a hot dog, isn't it?" Sam replied, "I'd be delighted!" He and his "friend" strolled over to the hot dog stand. Sam ordered two hot dogs, one hamburger, a soft drink, and a tea. How much did the meal cost him?

_____

As he passed the food to her, Sam gave the girl the message wrapped in the paper lining of the hot dog. He knew she needed a key, so as he talked he held up a finger to show her that each number stood for a letter. She understood. Key: 1=____

9. Sam hurried to an old hotel room. He was exhausted—he had been working since 7:34 AM Saturday morning. It was now 8:45 PM Monday afternoon. How long had he spent on this case? _____

10. When the English girl got back to her room, she opened the important message. Decode the message she found:

16-18-05-19-09-04-05-14-20 23-09-12-12 01-18-18-09-22-05

02-25 16-12-01-14-05 01-20 06-09-22-05 16-13 15-14

20-21-05-19-04-01-25

CIPHER KEY

A-01	K-11	U-21
B-02	L-12	V-22
C-03	M-13	W-23
D-04	N-14	X-24
E-05	O-15	Y-25
F-06	P-16	Z-26
G-07	Q-17	
H-08	R-18	
I-09	S-19	
J-10	T-20	

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Name_____ Date_____

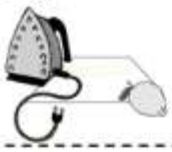
Disappearing Messages: Scienc

Follow the directions to send a hidden message.

Codes and ciphers are not the only way to send secret messages. They c
in plain sight." Here are two different ways you can use science to send
friends. One uses heat to reveal the message and the other uses water co

Materials:
- cotton swab
- 1 oz. lemon juice or milk
- small cup
- paper
- iron

Directions:
1. Dip the cotton swab in the lemon juice secret message on the paper.
2. Let it dry thoroughly.
3. Set the iron on a warm (not hot) tempe back of the paper with the iron.



What happens? _____

Why?_____

Materials:
- waxed paper
- white construction paper
- pencil
- water color paint OR marker

Directions:
1. Lay the waxed paper on top of the white hard (but not hard enough to tear the pa message on the waxed paper with the pe
2. Lightly rub your hand over the message Can you feel it? _____
3. Lightly paint over the message with wate

What happens? _____

Why? _____

2018 0501 2015 2908 0518 1920 0805 2301 2525 1521 2301 1420 2015 0205

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Name_____ Date_____

Hidden Messages: Science

CLASSIFIED

Follow the directions to send a hidden message.

Materials:
- 2 pieces of white or manila construction paper
- pencil

Directions:
1. Put one piece of paper on top of another.
2. Write a message on the top page. Press really hard with the pencil, but don't tear the page.
3. Remove the top sheet, and look closely at the bottom sheet.
4. What do you see? _____
5. Rub across the "blank" sheet of paper with the side of your pencil.

What happens? _____

Why?_____

Materials:
- paper
- white crayon

Directions:
1. Write a message on the paper with the white crayon.
2. Can you see the message? _____
3. Turn the page and look from different angles.

What happens? _____

Why?_____

og ew knvw ot ffo ski oh hgih oh hgih

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Math and Science

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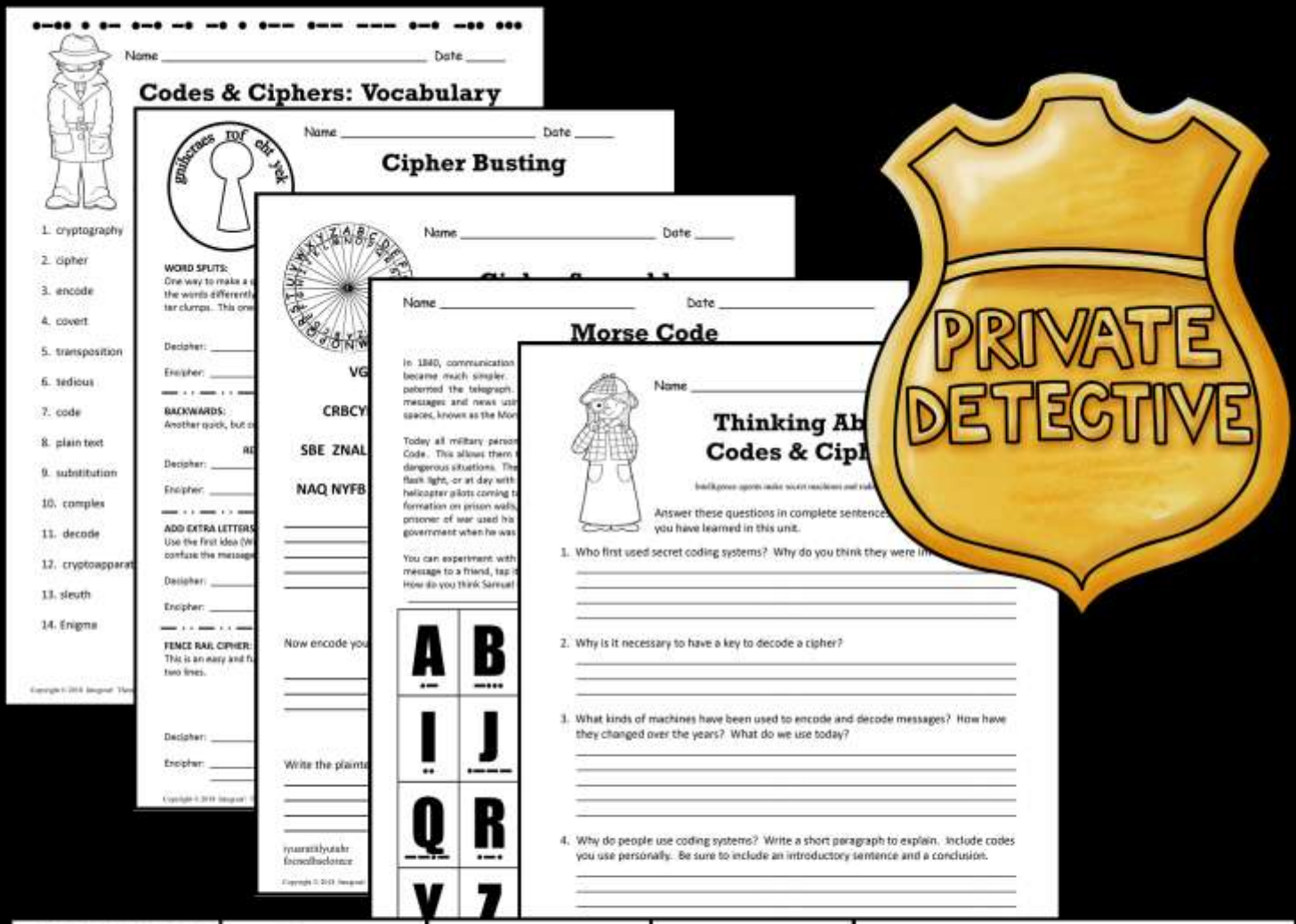

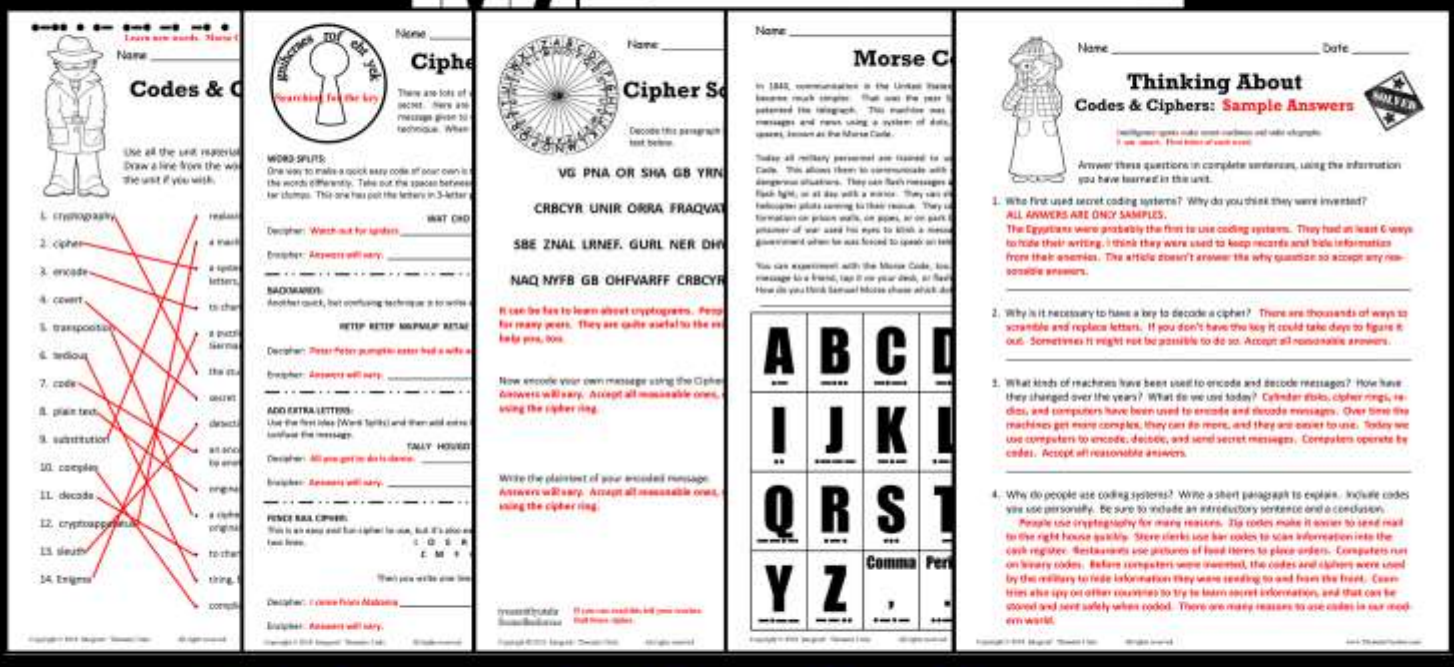

Other Worksheets

allow students to learn and practice coding

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Spy Art

Materials:

- white drawing paper
- black pen or pencil
- ruler or straight edge (optional)
- coloring materials (crayons, colored pencils, paint)
- Discussion Guide

Directions:

1. Pretend you are a spy collecting information for your government. Create a scenario (set the scene). Where are you, what are you looking for, who will you give the information to, and why do they need it? For example, you could be an agent looking for sabotage in a factory that makes tiny, secret drones. You'll look for who is damaging the factory and give the evidence to your boss (your handler). You are undercover and you don't want to be discovered. Write your scenario on the *Discussion Guide* (# 1) before you go on. You can talk your ideas over with a friend if you wish.

2. Draw or write the information you "collect" on a piece of white drawing paper. For example, here is one of Robert Baden-Powell's drawings of a fort. Put as much information in your drawing or notes as you can. Make a second quick copy for later. Draw it on the back of the *Discussion Guide*.

3. Now you can create a drawing to hide your information. The fort here has been turned into a drawing of a stained glass window. Can you see the original information?

4. You can further disguise your hidden information by coloring the picture you drew. No one will be able to decode your papers now!

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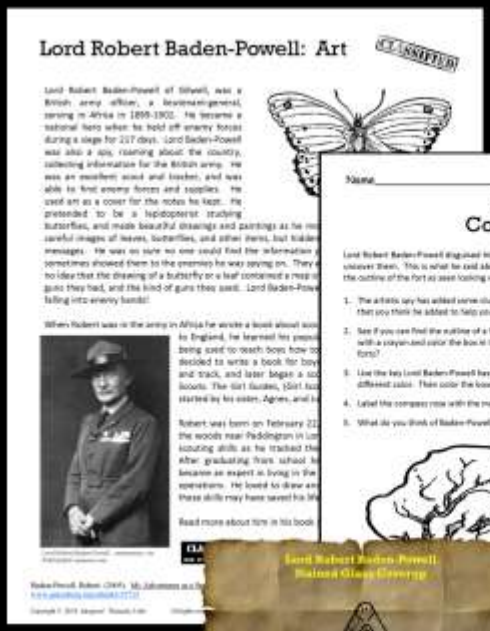

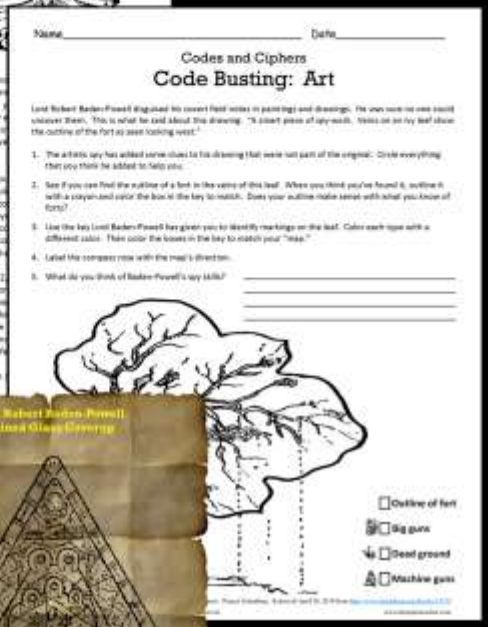

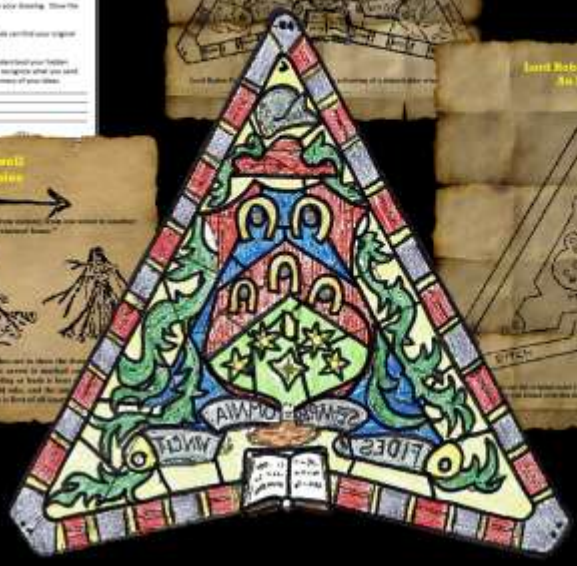

Art Project

Students read and discuss an artistic spy, decode one of his drawings, and make a drawing to embed their own secret information.

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Spy Files Rewards

There are several hidden messages contained in these materials. When students locate and decrypt one, they may take a "file" from the "Spy Files". Rewards include free time and class work reduction.

Print on manila construction paper.

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Spy Central

Add a Spy center to your classroom for student exploration. Students can learn a lot about cryptography by doing some research on their own.

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SIR JOHN TREVANION

NATHAN HALE

EMMA EDMONDS

ROOM 40

JEFFERSONS'S DISK CIPHER

CULPER SPY RING

A CODE FOR THE UNITED STATES

CODE SPEAK

KNOT A CODE

THE CAESAR CIPHER

BREAKING A CIPHER

THE BEALE CIPHER

One of the first recorded uses of ciphers was made by the Roman Emperor Julius Caesar. Although ciphers were probably used long before his time, he created a simple cipher to make sure that messages sent throughout his vast empire could not be read by his enemies. Of course, most people of that time couldn't read anyway, so maybe his efforts weren't all that necessary.

The Caesar Cipher is also called a shift cipher because he simply moved the letters of the alphabet three spaces to the right. For example, if he wanted to send the message "wait there," he would write

WAIT THERE
TXFQ QEBOB

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

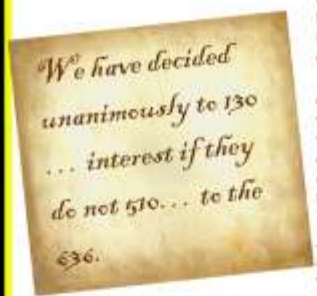
You can use strings of alphabet letters like you see above to make a huge number of ciphers. You can make shift ciphers that move to the right (clockwise) or to the left (counterclockwise). Moving clockwise is called a + shift. Caesar's Cipher is a +3 shift cipher because he moved three alphabet spaces ahead. Moving counterclockwise is — shift. Using a cipher ring you can make any number of shift ciphers and you only have to tell your reader if it is a + or a —, and how many moves you made.

Portrait of Gaius Julius Caesar (Vatican Museum: Musei Vaticani ... via Wikimedia Commons.

A CODE FOR THE UNITED STATES

Coded messages were used by both sides throughout the Revolutionary War between the Colonies and Great Britain). When the war ended, a new country was born—the United States of America. It needed a code so that it could safely send secret messages around the world.

Robert Livingston was the Secretary of State. He was in charge of all the diplomats that represent the United States in other countries. He created a code for the new nation. First, he made a list of all the words, syllables and letters that he might need to use. Then, he made a form where he listed all numbers from 1-1,700. Next to each number he wrote the words, syllables, and letters from his list in alphabetical order. Finally, he gave each diplomat had a copy of the code.



To keep the code safe, Livingston changed it at random times. Sometimes it was good for a few days. Other times it worked for a week, or a month. He changed others to figure out. Every person using th changed and what the changes were. Since it was quick and easy to change.

Livingston's code was used for about eigh Jefferson was working in France. He sent a a member of the House of Representatives was that Madison was on vacation and had

EMMA EDMONDS

"I am naturally fond of adventure, a little ambitious, and a good deal romantic—but patriotism was the true secret of my success." —Emma Edmonds

Historians think that at least 400 women served in the Civil War as soldiers, but very few of them left any evidence of their service. Emma Edmonds (Sarah Emma Evelyn Edmonds) wrote a book telling of her adventures as a woman, posing as a man, with the Flint Union Grays. Her story is full of danger, intrigue, and just plain craziness.

Emma was born in New Brunswick, Canada in December of 1841. Her father was a farmer and he was very disappointed that the son he was hoping for turned out to be a daughter. He never accepted Emma, so at the age of 16 she packed up her belongings and moved to Flint, Michigan. There Emma went door-to-door selling Bibles, and worked as a medical orderly.

In April of 1861, Abraham Lincoln called for 75,000 volunteers to join the Union army. The War Between the States had begun. Emma cut her hair, dressed like a man, and joined the long line of men signing up for Company F, the Flint Union Grays of the US army. When she signed the enlistment papers the name she used was Franklin Thompson. She was now "Frank", a field nurse with the army. No one knew she was a woman. Could she keep her secret as she lived and served among hundreds of men?

One day, when working in the field hospital, Emma (Frank) heard about the death of a very valuable spy who had been caught by the Rebels. After a little thought, she decided to volunteer as his replacement. She (he) got the job.

Emma used lots of different disguises as she worked behind enemy lines. "Cuff" was a young black man who worked with the slaves in the Rebel's camp. "Bridget O'Shea" was a plump (plumped with a pillow) Irish woman, traveling through the camps to sell her wares. She once dressed as a soldier from a Rebel division. She also carried secret messages between Union camps.

Franklin Thompson (Sarah Emma Edmonds) via Wikimedia Commons.

Dressed as a black washerwoman, Emma found a set of very important papers on the desk of a general. She quickly stuck them in her petticoat, and left the camp. She hid until night time in an old cabin. As she snuck out in the dark, she ran into a group of Rebel soldiers. She convinced them that she belonged with them, and they gave her a horse. At the first opportunity she rode off and returned safely to her Union camp. She now had a horse she named Rebel.

Emma spent 2 years in the army, serving as a field nurse, a spy, and a soldier in battle. Then she came down with malaria and could no longer serve. During her time in the army, she had many close encounters with the enemy, risked her life every time she went out on a mission, and served her people well. No one ever knew that she was a woman until the war was over. A special act of Congress gave her an honorable discharge, an army pension, and a bonus.

12 Reading File Cards

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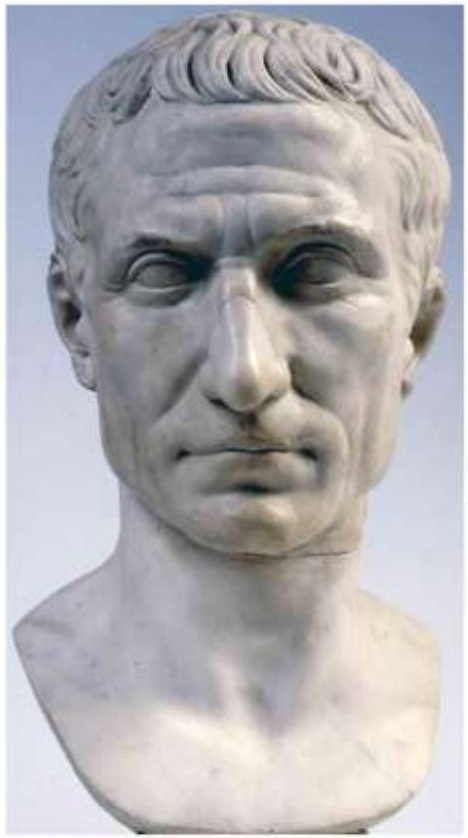
THE CAESAR CIPHER

One of the first recorded uses of ciphers was made by the Roman Emperor Julius Caesar. Although ciphers were probably used long before his time, he created a simple cipher to make sure that messages sent throughout his vast empire could not be read by his enemies. Of course, most people of that time couldn't read anyway, so maybe his efforts weren't all that necessary.



Portrait of Gauis Julius Caesar (Vatican Museum): Musei Vaticani (Stato Città del Vaticano), via WikimediaCommons.com.

The Caesar Cipher is also called a shift cipher because he simply moved the letters of the alphabet three spaces to the right. For example, if he wanted to send the message "wait there," he would write

WAIT THERE
TXFQ QEBOB

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

You can use strings of alphabet letters like you see above to make a huge number of ciphers. You can make shift ciphers that move to the right (clockwise) or to the left (counterclockwise). Moving clockwise is called a + shift. Caesar's Cipher is a +3 shift cipher because he moved three alphabet spaces ahead. Moving counterclockwise is a — shift. Using a cipher ring you can make any number of shift ciphers and you only have to tell your reader if it is a + or a —, and how many moves you made.

Can you tell what shift cipher this ring is set to?

ELT BXPV FP QEXQ

+1 shift

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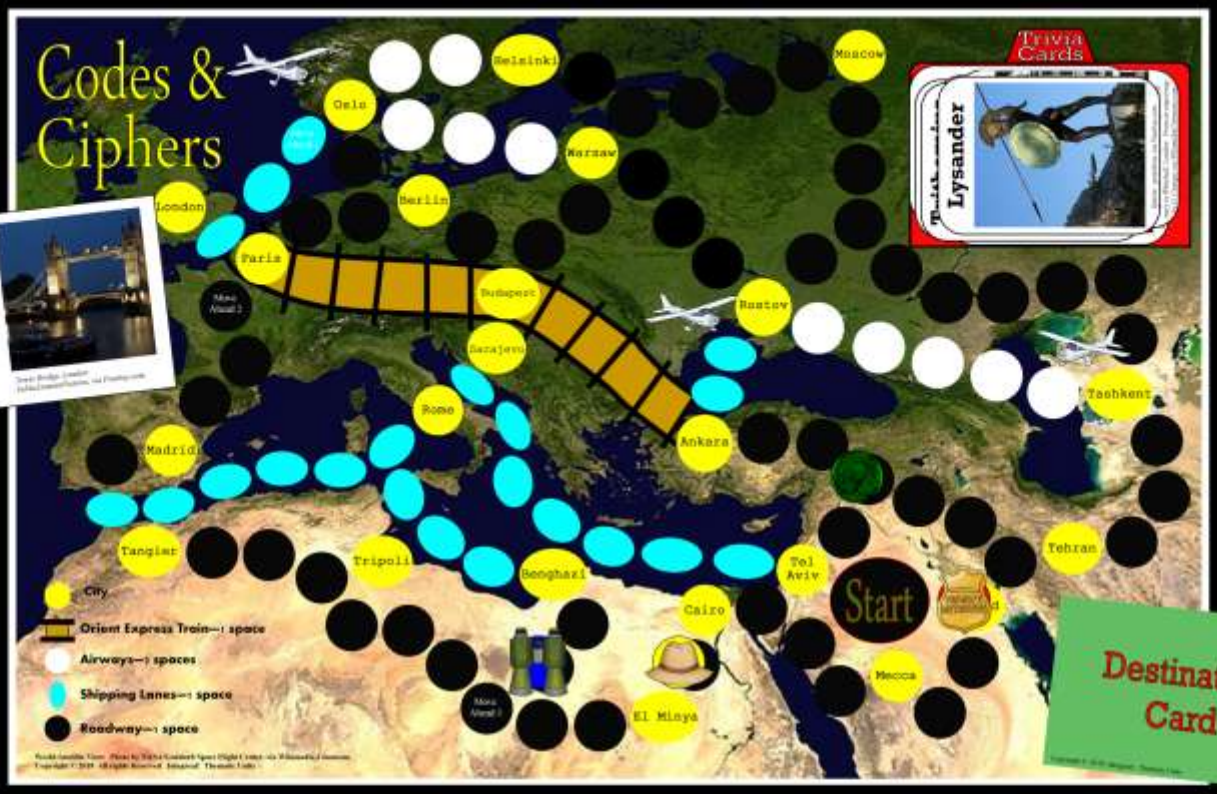

Trivia Game

Students read and ask questions about interesting information contained on 32 trivia cards as they move across a map of Europe to a secret destination where they deliver a classified file.

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15 Task Cards with Holder

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CIPHER 14
POE'S CIPHER

Edgar Allan Poe was an American author who wrote mysteries and spooky books in the 1800s. Sometimes he used ciphers as an important part of his story telling. He made up this cipher for an article he wrote called *"A Few Words on Secret Writing."* Here's the alphabet. Notice that U and V have the same symbol.

A	)	J	?	S	]
B	(	K	!	T	[
C	—	L	&	U	£
D	*	M	0	V	£
E	.	N	'	W	$
F	,	O	†	X	¿
G	;	P	‡	Y	¡
H	:	Q	¶	Z	☞
I	?	R	☞		

Can you decipher this?

_†O.[†Oi
‡)☞[i

Materials: pencil, paper

Directions:

1. Write the plaintext of your message.
2. On another piece of paper encipher it using Poe's alphabet.
3. Send it off to a friend. (Make sure he or she has the key!)
4. If you like this alphabet, make a copy of it for your Field Kit. You could change some of the symbols.

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CIPHER 15
PIG PEN CIPHER

The Pig Pen Cipher is another cipher where letters are replaced by symbols. It works in the same way as the Rosicrucian Cipher.

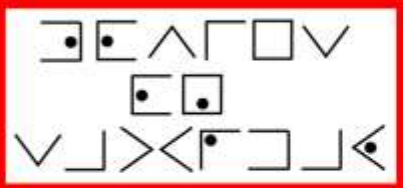
Here's the key:

A	B	C
D	E	F
G	H	I

J	K	L
M	N	O
P	Q	R

S	W
T U V	X Y Z

See if you can decipher this:



CONFIDENTIAL

Materials: Tic-Tac-Toe grid, pencil, paper

Directions:

1. Make a copy of the Pig Pen Cipher key and put it in your Field Kit.
2. Write a plaintext message.
3. Encipher it using the Pig Pen Cipher on another piece of paper.
4. Send it to a friend or post it on the bulletin board for your classmates to decipher.

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Clip Art Credits

Credits

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