CLASSIFIED · FOR YOUR EYES ONLY

Top Secret

Codes, Ciphers, and How to Crack Them



THE ROBOT BOOK CLUB

Top Secret

Codes, Ciphers, and How to Crack Them

THE ROBOT BOOK CLUB

Copyright © 2026 Edward Benson

All rights reserved.

No part of this book may be reproduced in any form without written permission from the author, except for brief quotations in a review.

The ciphers in this book are real and every worked example and puzzle is computed exactly, so the answers in the back can never be wrong. The stories are grounded in the historical record; where a popular legend is exaggerated or a code is still unsolved, this book says so.

Published by The Robot Book Club

For every kid who ever passed a folded note in class and prayed the teacher couldn't read Pigpen.

How to Read the Codes in This Book

This book does two things at once: it tells you true stories about the greatest secret codes in history, and it teaches you to write and crack real codes yourself. Here is the gear you will see on the way:

CAESAR The **cipher tag** tells you which code a section is about.

The **How It Works panel** shows the actual key and a worked example — computed exactly, so it is always right.

The **Spy File** holds one surprising, true fact worth reading out loud.

A **Crack This puzzle** is a real coded message for you to solve. There are twelve, and the **answer key in the back** holds every solution.

The **cartoons** show the great moments. The moment is real; the drawing is ours.

Grab a pencil and a notebook. Read it front to back, or flip straight to the puzzles. Either way — tell no one.

The Secret War of Words

> On July 17, 1586, a prisoner named Mary, Queen of Scots, slipped a secret letter inside the waterproof stopper of a beer barrel. On the page, her message looked like an unbreakable tangle of sixty-four strange symbols. Inside that tangle, Mary was agreeing to a plot to assassinate her cousin, Queen Elizabeth I, and take the English throne. Mary was certain her secret was safe. She didn't know that the beer barrel delivery was a trap set by Elizabeth's spymaster, Sir Francis Walsingham—or that every single letter was going straight to the desk of a brilliant code-breaker named Thomas Phelippes. When Phelippes cracked Mary's symbols and read her deadly secret, he didn't just hand the decoded page to the spymaster. He picked up his pen, drew a tiny picture of a gallows on the envelope, and forged an extra note in Mary's exact secret writing to trick her Accomplice, Anthony Babington, into naming every conspirator. Because one detective knew how to read a page of gibberish, a plot was crushed and a queen lost her head.

Three Ways to Hide a Secret

People toss the words *code* and *cipher* around like they mean the same thing, but to a spy or a detective, they are totally different tools. Before you even scramble a message, you could use **steganography**—hiding the fact that a message exists at all. According to the ancient Greek historian Herodotus, a ruler named Histiaeus once shaved the head of his most trusted enslaved messenger, tattooed a secret call to revolt onto his scalp, and waited for the hair to grow back before sending him off with instructions to "shave my head." (Modern historians suspect Herodotus

exaggerated this wild story, or that the slow-growing hair was actually a way to prove the message wasn't a quick lie!) Either way, if an enemy doesn't know a secret is there, they can't read it.

If you can't hide the message itself, you have to disguise the writing. That's where **ciphers** and **codes** come in. A **cipher** scrambles a message letter by individual letter using a rule. Julius Caesar used a simple cipher that shifted every letter in the alphabet by a set number of spaces—move three spaces, and *A* becomes *D*. Centuries later, in World War II, the German military used the Enigma machine, which looked like a typewriter packed with spinning wheels called rotors and electrical plugs. Press the letter *A*, and an electric current zipped through the spinning wheels to light up a totally different letter, like *X*. Press *A* a second time, and because the wheels shifted with every tap, it lit up a whole new letter!

A **code**, on the other hand, swaps out whole words or ideas instead of single letters, usually relying on a secret dictionary called a codebook. During World War II, the United States Marine Corps recruited 29 bilingual Navajo men to build an unbreakable oral code using their unwritten language, Diné Bizaad. They created a code within a code by giving military machines nature words: a fighter plane became *dah-he-tih-hi* (hummingbird), a tank was *chay-da-gahi* (turtle), a submarine was *besh-lo* (iron fish), and bombs were *ayęęzhii* (eggs). During the fierce Battle of Iwo Jima, six Navajo Code Talkers worked around the clock to send over 800 vital messages in 48 hours without a single mistake—and the enemy never cracked a word of it.

The Endless Duel

The history of secret writing is a giant, centuries-long game of cat and mouse. A code-maker invents a system they swear is 100 percent unbreakable. For a while, it works. Then a sharp-eyed code-breaker spots a tiny weakness, smashes the system wide open, and forces the code-makers to invent something even trickier.

For hundreds of years, simple letter-swapping ciphers like Julius Caesar's ruled the world. Then, around 850 AD in Baghdad's House of Wisdom, an Arab scholar named Al-Kindi changed the game forever. While studying the Arabic text of the Quran, Al-Kindi realized that human languages have habits: some letters show up way more often than others. In English, *E* is the heavyweight champion, followed

by *T*, *A*, *O*, *I*, *N*, *S*, *H*, and *R*. Al-Kindi wrote a book showing that if you count up all the symbols in a secret message, the symbol that appears the most is almost certainly disguising the most common letter. This trick, called **frequency analysis**, ruined simple ciphers overnight.

Code-makers fought back. They invented *homophonic ciphers* that used multiple symbols for popular letters like *E* to hide how often they showed up, and *nomenclators*—like the one Mary, Queen of Scots used—which mixed letter-swapping with special symbols for big words like "Queen" or "Poison." By World War II, the duel went mechanical. To beat the German Enigma machine, British code-breakers at a secret country estate called Bletchley Park—led by thinkers like Alan Turing and Gordon Welchman, building on earlier breakthroughs by Polish mathematician Marian Rejewski—built a one-ton, wire-packed machine of their own called the *Bombe*. The Bombe spun its own mechanical drums to test millions of Enigma settings at lightning speed, winning the duel and kickstarting the age of modern computers.

How to Think Like a Code-Breaker

Today, cryptography isn't just for queens and generals—digital ciphers protect your private text messages, your video game logins, and everything your family buys online. But cracking a cipher on paper doesn't require a one-ton machine or genius-level math. It takes the mindset of a detective: patience, sharp eyes, and a knack for spotting human habits.

When you stare at a block of secret writing, you start by looking for patterns. Count the symbols the way Al-Kindi did. Look for single-symbol words—in English, those almost have to be *A* or *I*. Hunt for three-letter words that repeat (probably *THE* or *AND*) and double symbols side by side, like the *OO* in *LOOK* or the *LL* in *WILL*.

And when counting letters isn't enough, use a secret weapon from Bletchley Park called a **crib**—a word you *guess* is hiding in the message. Alan Turing and his team realized that German radio operators were creatures of habit who sent weather reports at the exact same time every morning, almost always starting with the words *Wetter Vorhersage* (weather forecast). The British also knew Enigma had one huge flaw: it could never encode a letter as itself (an *E* could never become an

E). By sliding the word *WETTER* along the scrambled message until no letters matched themselves, they unlocked the whole cipher. Every wrong guess wasn't a failure; it was a clue. Turn the page, grab a pencil, and get ready—because in this book, you are going to learn how to make and crack real secret messages yourself.

CHAPTER 1

Ancient Secrets

Long before computers, generals and spies were already hiding their words. Meet the very first ciphers — a sliding alphabet, a message that only makes sense wrapped around a stick, and the clever mind who invented code-breaking itself.

THIS CHAPTER TEACHES: THE CAESAR CIPHER

Caesar's Three-Step Secret

In the first century BCE, Roman general Julius Caesar had a big problem. He needed to send top-secret military orders and private letters across dangerous territory. If enemy soldiers ambushed his messengers, Caesar's battle plans would be ruined. So, as the Roman biographer Suetonius recorded, Caesar used a clever trick to turn his writing into gibberish.

Instead of hiding the scroll itself, Caesar hid the meaning of the letters. His method is what cryptographers call a substitution cipher, and the rule is wonderfully simple: every letter in your message takes three steps forward down the alphabet.

When Caesar wanted to write the letter A, he wrote D instead. B became E, C became F, and so on down the line. If he reached the end of the alphabet, he simply wrapped back around to the beginning. To read the secret orders, Caesar's generals just marched every letter three steps backward.

By today's standards, Caesar's cipher looks almost painfully easy to solve. Why didn't his enemies crack it right away? Mostly because the vast majority of the enemies intercepting his messages couldn't read at all, and the few who could had never seen a substitution cipher before!

The Caesar Shift

SHIFT +3

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

MESSAGE

MEET ME AT THE FORUM

↓

SECRET

PHHW PH DW WKH IRUXP

Slide every letter three steps forward to hide it. Slide three steps back to read it.

SPY FILE

Did You Know?

Caesar's heir, Emperor Augustus, used a shift of just one letter—and instead of wrapping around at the end of the Latin alphabet, he replaced X with AA.



Caesar hands off a scrambled order — Rome, around 50 BC.

Puzzle Break

Grab a pencil — decode the secret message.

CRACK THIS #1

CAESAR · SHIFT 3

PHHW PH DW WKH WUHHKRXVH

Hint · *Every letter slid three steps forward. Slide it three steps back.*

ANSWER IN THE BACK OF THE BOOK

Stuck? Every solution is in the answer key at the back of the book.

How to Outsmart an Emperor

Movies love to treat Julius Caesar's secret cipher like an unbreakable ancient superpower. It wasn't. Honestly, Caesar's messages stayed secret mostly because his enemies couldn't read at all, and those who could had never heard of a substitution cipher.

Today, you can shatter a Caesar cipher in minutes without knowing the secret shift. Why? Because the English alphabet only has 26 letters. Since shifting by 26 puts every letter right back where it started, there are only 25 possible ways to slide the alphabet.

If you intercept a mystery message, you don't need to guess the key. You just test every single option. Take the first scrambled word and shift its letters back by one space, then two, then three, writing each version down in a neat stack.

Code-breakers call this a "brute force" attack—kicking down the door by trying every key on the keyring. Twenty-four of your rows will look like total gibberish, but suddenly, on one magic row, real words will snap into focus. Congratulations: you just outsmarted a Roman general.

Only 25 Ways to Slide

SHIFT +5

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

MESSAGE

TRY EVERY SHIFT

↓

SECRET

YWD JAJWD XMNKY

A Caesar cipher has just 25 real shifts. A patient code-breaker can try them all until words appear.

SPY FILE

Did You Know?

A Roman scholar named Probus wrote an entire book about the secret codes in Julius Caesar's letters, suggesting Caesar also used much tougher ciphers—but the book is lost to history!

Puzzle Break

Grab a pencil — decode the secret message.

CRACK THIS #2

CAESAR · SHIFT 7

AOL WHZZDVYK PZ KYHNVU

Hint · *Try shifts until words appear. This one slid seven steps forward.*

ANSWER IN THE BACK OF THE BOOK

Stuck? Every solution is in the answer key at the back of the book.

The Spartan Scytale

Around 405 BCE, during the Peloponnesian War, Spartan leaders needed to send top-secret orders to Admiral Lysander across enemy territory. According to ancient writers like Plutarch, they didn't invent a secret alphabet. Instead, they used a wooden baton and a strip of leather called a scytale.

A commander wrapped the narrow leather strip tightly around the wooden rod in a spiral, leaving zero gaps. Then he wrote his message in rows straight across the wood. When he unwound the leather, the letters were still there, but their order was completely scrambled into nonsense.

This is called a transposition cipher: it scrambles the order of the letters without changing the letters themselves. To read it, Lysander just wrapped the leather around a twin rod of the exact same thickness, and the message snapped back into place.

Did Spartans really use it for secret codes? Historians still debate it! No ancient scytale has ever been dug up, and some experts think it was just an official badge of authority. Either way, the story gave the world its first big lesson in letter-scrambling.

SPY FILE

Did You Know?

The Roman writer Aulus Gellius noted that unwinding the leather didn't just scramble the message—it sliced letters in half across the edges, making them look like random ink smudges!



The Spartan scytale: readable only when it is wound just right.

The Checkerboard That Talked Through Walls

In the second century BCE, Greek engineers Cleoxenus and Democleitus had a problem: how do you text someone from a mountaintop before phones exist? The historian Polybius perfected their answer. Instead of writing secret letters on parchment, they turned the alphabet into numbers you could flash across the night sky with flaming torches.

The secret is a five-by-five checkerboard grid, numbered one to five down the side and across the top. In English, you squeeze the twenty-six letters into the twenty-five boxes by making I and J share a room. Every letter now has a two-digit address: its row number, then its column number.

To send a letter, a Greek soldier held up torches on his left for the row number, and on his right for the column. Suddenly, whole words could leap from peak to peak as pairs of numbers.

Centuries later, that exact five-by-five grid saved lives in the dark. Prisoners of war, including Americans held in Vietnam, memorized the square and used it as a knock code. By tapping out the row and column numbers on cell walls, captives could hold secret conversations right under their guards' noses.

SPY FILE

Did You Know?

Polybius didn't have to squish I and J together! The ancient Greek alphabet only had 24 letters, so his five-by-five grid actually had one empty spot left over.

The Scholar Who Counted Letters

For centuries, generals and kings trusted a simple trick: swap every letter in a secret message for a different symbol, and nobody can read it. Then, around 850 CE, an Arab scholar named Al-Kindi working at the House of Wisdom in Baghdad ruined their fun forever.

Al-Kindi realized that every language has a mathematical fingerprint. Some letters are total crowd-pleasers, while others barely show up. In English, the letter E is everywhere—making up about 13 percent of all written text—while Z mostly sits on the bench.

Swapping letters for secret symbols does not change how often they appear. Al-Kindi explained that if you take a normal page of writing, count the most common letters, and compare them to the most common symbols in a long secret message, the disguise falls apart. If the symbol Q is everywhere, it is probably hiding an E.

This method, called frequency analysis, does not crack codes instantly—you still need a long enough message and clever guesswork to fill in the blanks. Even so, Al-Kindi's manuscript birthed the science of code-breaking, forcing code-makers to invent wild new machines just to keep up.

SPY FILE

Did You Know?

Al-Kindi's groundbreaking code-breaking manuscript was lost for over a thousand years, until historians found it sitting unnoticed in an archive in Istanbul in 1987.

The Spinning Wheel That Broke Code-Breaking

Once Al-Kindi figured out frequency analysis, simple shift ciphers were toast. If you always swapped *E* for the exact same letter, a sharp code-breaker could count the letters and bust your secret wide open. Code-makers needed a rescue. In 1467, an Italian Renaissance architect named Leon Battista Alberti stepped up with an actual gadget.

Alberti built a cipher disk out of two copper plates, one nested inside the other. The outer ring stayed still and held the regular alphabet. The inner ring held a scrambled alphabet and could spin freely around the center.

To write a secret message, you lined up the two rings and substituted letters just like a shift cipher. Here was the genius upgrade: after a few words, you gave the inner wheel a spin! You slipped an agreed-upon signal letter into the text so your friend knew to spin their wheel too.

Because the inner wheel kept moving, the rules kept changing mid-sentence. An *E* might become a *Q* in your first sentence and an *M* in your second. Code-breakers counting letters suddenly had a giant headache. While modern math can eventually crack it, Alberti's spinning disk launched a brand-new era of secret writing.

The Cipher Disk

SHIFT +4

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

MESSAGE

SPIN THE WHEEL

↓

SECRET

WTMR XLI ALIIP

Turn the wheel to pick your shift. Here the wheel is set to four steps.

SPY FILE

Did You Know?

Alberti got the idea for his cipher disk while strolling through the Vatican gardens discussing a brand-new invention: Gutenberg's movable-type printing press, which also rearranged metal letters.

Puzzle Break

Grab a pencil — decode the secret message.

CRACK THIS #3

CAESAR · SHIFT 4

PSSO YRHIV XLI XLMVH WXEMV

Hint · *The wheel was set to four. Turn it back four to read it.*

ANSWER IN THE BACK OF THE BOOK

Stuck? Every solution is in the answer key at the back of the book.

CHAPTER 2

Codes at War

When countries fight, secrets win. This chapter is packed with the most famous codes in history — a machine that scrambled a message billions of ways, a code built from a language, dots and dashes flying through the air, and letters hidden inside little fences.

THIS CHAPTER TEACHES: PIGPEN AND MORSE CODE

The Typewriter That Lied

Imagine a typewriter that lies to you. During World War II, the German military used a cipher machine called the Enigma, invented by engineer Artur Scherbius. When an operator pressed a letter key, electricity zipped through a plugboard that swapped pairs of letters, then through three spinning wheels called rotors, bounced off a reflector, and lit up a bulb under a completely different letter.

The wildest part? Every single time you pressed a key, the first rotor clicked forward, changing the electrical maze inside. Press the same letter three times in a row, and three different letters would light up. Without knowing the exact starting setup of the wires and rotors, a spy intercepted nothing but gibberish.

Movies often show British mathematician Alan Turing cracking the Enigma all by himself, but real codebreaking is a team sport. Starting in 1932, three brilliant Polish mathematicians—Marian Rejewski, Henryk Zygalski, and Jerzy Rozycki—used pure math to map the Enigma's secret wiring. In 1938, Rejewski built an electro-mechanical code-breaker called the *bomba*.

Just before World War II began, the Polish team shared their breakthroughs with the British. At a secret headquarters in England called Bletchley Park, Turing, Gordon Welchman, and a massive team built an even bigger machine called the Bombe. By taking a guessed word—like "WEATHER"—and testing 36 Enigma setups at once, they cracked the "unbreakable" code.

SPY FILE

Did You Know?

Because of its spinning rotors and plugboard wires, a standard German military Enigma machine had 158,000,000,000,000,000,000 (158 quintillion) possible starting settings.



Cracking the Enigma at Bletchley Park — England, 1940s.

The Unbreakable Voice of the Marines

In 1942, the United States Marine Corps needed a fast, unbreakable battlefield code for the Pacific Theater. World War I veteran Philip Johnston suggested an ingenious solution: the Navajo language. Deeply complex, tonal, and unwritten, it was nearly impossible for non-speakers to mimic. At Camp Elliott near San Diego, 29 Navajo Marine recruits stepped up to build it.

They did not just chat in their native tongue—they engineered a brilliant two-layer cipher inside it. First, to spell out English words, they chose Navajo words for each letter of the alphabet, like *wo-la-chee* (ant) for A and *shush* (bear) for B. Second, they invented a secret dictionary of over 400 military terms.

In this code, a fighter plane became a "hummingbird" (*da-ha-tih-hi*) and a submarine was an "iron fish" (*besh-lo*). Even an outside Navajo speaker listening to the radio would only hear baffling sentences about ants, bears, and hummingbirds. Memorizing every word so nothing could be captured on paper, about 400 Navajo Code Talkers served—and Japanese cryptanalysts never broke a single message.

SPY FILE

Did You Know?

During the nearly month-long Battle of Iwo Jima, six Navajo Code Talkers sent over 800 messages with zero errors, turning hours of machine coding into two-and-a-half-minute radio calls.



The Navajo code talkers send a code no enemy ever broke — 1940s.

Talking in Dots and Dashes

How do you send a message when no one can hear your voice? Standardized internationally in 1865, Morse code solves this by turning every letter of the alphabet into a rhythm of short signals called dots (or dits) and long signals called dashes (or dahs).

Because it relies purely on timing, Morse code can travel down a telegraph wire, beep over a radio, flash from a lamp, or even be blinked with your eyes. To keep messages fast, common letters get the shortest patterns: E is just one dot, and T is a single dash.

The secret to reading Morse is counting the silence. A dash lasts three times as long as a dot. You leave a one-dot pause between signals inside a single letter, a three-dot pause between letters, and a seven-dot pause between words.

That steady beat gave the world its most famous distress call: SOS. Adopted in Germany in 1905 and made a worldwide rule in 1908, SOS does not actually stand for Save Our Ship or Save Our Souls! Officials chose three dots, three dashes, and three dots strictly because that unmistakable rhythm pierces right through noisy radio static. Check out the full Morse chart in the demo panel and try tapping out a message yourself.

Dots and Dashes

MORSE CODE

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 ––••	0 –––––	1 •––––	2 ••–––	3 •••––
4 ••••–	5 •••••	6 –••••	7 ––•••	8 –––••	9 ––––•

MESSAGE

SEND HELP NOW

↓

SECRET

••• • –• –•• / •••• • •–•• •––• / –• ––– •––

Every letter is a pattern of short and long signals. Read the chart, then read the message.

SPY FILE

Did You Know?

The first American ship to use SOS was the SS Arapahoe in August 1909, when operator T.D. Haubner tapped out the distress call off North Carolina and got everyone rescued.

Puzzle Break

Grab a pencil — decode the secret message.

CRACK THIS #5

MORSE CODE



Hint · *A dot is a short blink, a dash a long one. Use the Morse chart from this chapter.*

ANSWER IN THE BACK OF THE BOOK

Stuck? Every solution is in the answer key at the back of the book.

Letters in Little Pens

Most ciphers swap one letter for another. The Pigpen cipher swaps letters for tiny geometric pictures. In the 1700s, members of a secretive society called the Freemasons used it to guard their private lodge letters and even carved the mysterious symbols onto gravestones.

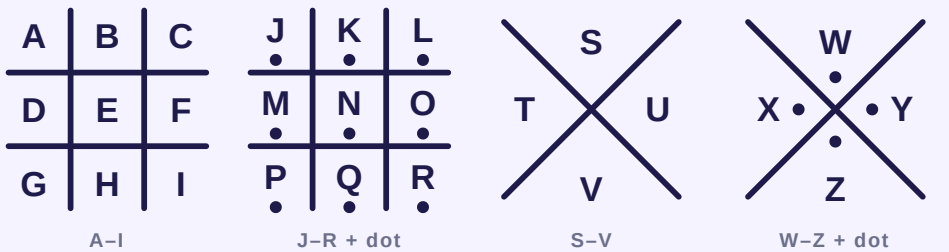
A century later, during the American Civil War, Union soldiers trapped in Confederate prison camps used the exact same code to smuggle secret notes past their guards. When you don't have a fancy coding machine, a pencil and a scrap of paper can still outsmart an army.

Here is the secret: you draw two tic-tac-toe boards and two giant X's, then drop the alphabet into the spaces. Each space is a little "pigpen" for the letter inside.

To write a message, you don't write the letter at all—you just draw the shape of the fence lines surrounding its cell! Because two tic-tac-toe boards and two X's look alike, letters in the second tic-tac-toe board and second X get a dot inside their fence. Check out the demo grids to see how every letter gets its own pen.

The Pigpen Cipher

PIGPEN KEY



A–I | J–R + dot | S–V | W–Z + dot

MESSAGE

SECRET CLUB

↓

SECRET



S E C R E T C L U B

Each letter lives in its own little pen. Draw the fence around it, and add a dot for the second set.

SPY FILE

Did You Know?

In 1785, a Freemason named Thomas Brierley had his epitaph carved in Pigpen cipher on his gravestone in Mellor, England—where codebreakers can still read it today!



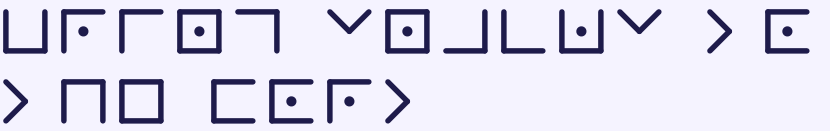
Drawing the pigpen pens by candlelight.

Puzzle Break

Grab a pencil — decode the secret message.

CRACK THIS #4

PIGPEN



Hint · *Each shape is a letter's pen from the grids. A dot means the second grid.*

ANSWER IN THE BACK OF THE BOOK

Stuck? Every solution is in the answer key at the back of the book.

Waving Flags and Scrambled Words

How do you send a text message across a smoky Civil War battlefield? You wave a giant flag. In the 1850s, U.S. Army surgeon Major Albert Myer and his assistant, Lieutenant E. Porter Alexander, invented wig-wag signaling. Signalmen stood on high ridges waving flags by day and flaming torches by night.

The code was brilliantly simple. Holding the pole straight up was the starting mark. Swooshing it left meant one, and swooshing it right meant two. Every letter was a combination of ones and twos. Because enemy lookouts could easily watch the flags from miles away, signalmen used two spinning brass circles—a cipher disk—to scramble the letters first.

Telegraph wires were not safe either, because spies routinely hooked their own listening devices right onto the lines. To protect President Abraham Lincoln's military telegrams, the Union used Stager's Route Cipher. Clerks wrote a message into a grid, swapped important words for fake code words, and read down the columns instead of across the rows.

If a spy tapped the wire, the telegram sounded like total nonsense. Only a receiver who knew the exact size of the grid and the secret up-and-down route could put the words back in order.

SPY FILE

Did You Know?

Wig-wag inventor Albert Myer fought for the Union, while his assistant, E. Porter Alexander, joined the Confederacy—so both armies used the exact same flag system against each other!

Puzzle Break

Grab a pencil — decode the secret message.

CRACK THIS #6

PIGPEN



Hint · *Draw the fences from the pigpen key, then read the letter inside each pen.*

ANSWER IN THE BACK OF THE BOOK

Stuck? Every solution is in the answer key at the back of the book.

Hiding in Plain Sight

Most codes scramble a message so the enemy cannot read it. Steganography does something sneakier: it hides the fact that a message exists at all. After all, a codebreaker cannot crack a secret if they never even look for it.

In the Revolutionary War, spies wrote with lemon juice that turned brown when heated over a candle. By World War II, however, mail censors routinely swabbed letters with iodine and ninhydrin to expose basic inks and fingerprints. Wearing surgical gloves, agents had to write with complex chemicals like phenolphthalein, which dried completely clear until brushed with a special chemical reactor.

Even wilder was the microdot, perfected in Germany using the Zapp technique and heavily used by spies like Georg Nicolaus in Latin America during the 1940s. Agents photographed a full page of typed intelligence, then used special lenses to shrink the photo down to a one-millimeter grain of sand.

They punched out this tiny clear film and glued it right over a period at the end of a sentence in a boring, everyday letter. Censors scanning the mail saw nothing but friendly chatter, while a whole page of military secrets sailed right past them.

SPY FILE

Did You Know?

During the Vietnam War, the CIA smuggled secret microdots to American prisoners of war by hiding them inside packets of Kool-Aid powder!

CHAPTER 3

Still Unbroken

Here is the honest, spine-tingling truth: some codes have never been cracked. Not by spies, not by professors, not by the world's biggest computers. Nobody knows what they say — and this chapter is careful to tell you exactly how much is really known.

THIS CHAPTER TEACHES: NOTHING NEW — THESE ARE THE MYSTERIES

UNSOLVED

The Sculpture That Stumped the Spies

Since November 1990, a giant S-shaped copper scroll has stood in the courtyard of CIA headquarters in Langley, Virginia. Created by artist Jim Sanborn with retiring CIA cryptographer Ed Scheidt, the sculpture is named *Kryptos*. Thousands of letters are punched right through the metal, forming a giant Vigenère grid on one side and four secret messages on the other.

By 1999, codebreakers at the NSA, the CIA, and computer scientist James Gillogly had cracked the first three sections. The first two use a Vigenère cipher, where a secret keyword changes the alphabet shift for every single letter. The third uses transposition, keeping the real letters but scrambling their positions on a strict mathematical grid.

Then there is the fourth section, known as K4. It is only 97 characters long, and for decades it has stopped the world's sharpest spies and supercomputers cold. People rumor that the CIA hides the answer in a vault, but the truth is funnier: the spies are just as stumped as everyone else.

Sanborn wants his puzzle solved, so he has slowly dripped out clues. He revealed that specific clusters of letters translate to EAST, NORTHEAST, BERLIN, and CLOCK. Even after sleuths spotted possible answer sheets in Smithsonian archives, K4 remains officially unbroken—because in cryptography, until you can prove the exact rule that turns the code into words, the secret wins.

SPY FILE

Did You Know?

Artist Jim Sanborn has publicly given away the exact translation for 24 of K4's 97 letters—reading "EAST NORTHEAST" and "BERLIN CLOCK"—and the world's best computers still can't crack the rest!



Kryptos: three parts solved, one still glowing in the dark.

Puzzle Break

Grab a pencil — decode the secret message.

CRACK THIS #7

MORSE CODE



Hint · *Dots and dashes again: four letters, then two, then four.*

ANSWER IN THE BACK OF THE BOOK

Stuck? Every solution is in the answer key at the back of the book.

UNDECIPHERED

The Book Nobody Can Read

In 1912, rare book dealer Wilfrid Voynich bought a strange medieval volume in Italy. Now kept at Yale University, the Voynich Manuscript is filled with looping, left-to-right writing that nobody on Earth can read. Beside the neat paragraphs sit bizarre illustrations of impossible plants, star charts, and little figures bathing in green tubes.

If this mystery script—nicknamed "Voynichese"—is a substitution cipher, its creator swapped normal letters from a language like Latin for invented looping symbols. Yet when computers analyze the pages, the words repeat in weird, strict patterns that do not match typical European languages.

For over a century, top codebreakers and artificial intelligence programs have tried to crack it. Every few years someone claims victory, yet not a single translation has ever been proven.

Is it a forgotten language, a complex code, or a clever medieval hoax designed to trick a rich buyer? The honest answer is: we do not know.

SPY FILE

Did You Know?

In 2009, atomic scientists radiocarbon-dated the book's calfskin pages, proving with 95% certainty that the animals died between 1404 and 1438—so the book is definitely no modern fake!



The Voynich manuscript — a whole book nobody can read.

Puzzle Break

Grab a pencil — decode the secret message.

CRACK THIS #8

CAESAR · SHIFT 5

YMJ JFLQJ MFX QFSIJI

Hint · *A five-step Caesar shift. Slide every letter back five.*

ANSWER IN THE BACK OF THE BOOK

Stuck? Every solution is in the answer key at the back of the book.

The Sixty-Million-Dollar Hoax

In 1885, a pamphlet went on sale in Lynchburg, Virginia, with a wild story. It claimed a frontiersman named Thomas J. Beale had buried tons of gold, silver, and jewels in Bedford County back in the 1820s. Before vanishing, Beale supposedly left an innkeeper a locked box containing three pages of numbers.

According to the pamphlet, the second page was cracked using a book cipher. In a book cipher, two people agree on a famous text and number every word. To read the secret message, you match each cipher number to that word in the text and write down its first letter. Using the Declaration of Independence as the key, Page Two promised a treasure worth over $60 million today.

Page One (the exact location) and Page Three (the treasure's owners) have never been solved, despite codebreakers testing thousands of books. For over a century, treasure hunters have dynamited rocks, hired psychics, and dug up Virginia for nothing.

Why? Because historians and cryptographers are almost certain the whole thing is a hoax! It is easy for a prankster to encode one real page as bait and fill the other two with random numbers. Even better, word detectives proved the 1820s letters were fake, turning the Beale ciphers into a cautionary tale about believing every legend.

SPY FILE

Did You Know?

Forensic linguist Joe Nickell busted the supposedly 1820s Beale letters by spotting the word "stampeding"—a term that didn't appear in English print until around 1832!

UNSOLVED

The Composer's Curvy Secret

On July 14, 1897, the famous British composer Edward Elgar tucked a peculiar slip of paper into a letter from Great Malvern, England. It was for a twenty-two-year-old family friend named Dora Penny, whom he nicknamed Dorabella. Instead of words, the note contained eighty-seven squiggly characters arranged across three neat lines.

Elgar built his secret alphabet out of twenty-four distinct symbols. Each symbol is just one, two, or three little semicircles—like bumpy letters C or E—pointed in one of eight compass directions. It looks like a simple substitution cipher where each curvy shape stands for a letter, with pairs like I and J sharing a spot.

Dora never figured out how to read it. Four decades later, in 1937, she published the note in her memoir, and the whole world got stuck too. When codebreakers swap the most common squiggles for common English letters like E and T, the message turns into absolute gibberish.

Over a century later, nobody has convincingly cracked the Dorabella cipher. Because eighty-seven characters is so short, codebreakers do not have enough patterns to prove any single translation works. For all we know, the great composer wrote a private musical tune, an inside joke, or a teasing puzzle that says nothing at all.

SPY FILE

Did You Know?

In 1886, Elgar scribbled the exact same curvy symbols in the margin of a Franz Liszt concert program—and the number of squiggles matches the musical notes printed beside them!

Why Some Secrets Stay Locked Forever

You might think a big enough supercomputer could crack any secret code in history. Not true! Cryptography follows strict mathematical rules, and sometimes those rules mean a puzzle stays locked forever.

First, codebreakers need data to spot patterns. If a secret note is too short, it never reaches what mathematicians call the "unicity distance." A tiny cipher can logically decode into dozens of completely different, grammatically correct sentences, making it impossible to prove which one the author actually meant.

Second, the physical key might be lost to history, like a book cipher whose matching book edition burned up centuries ago. Or the sender might have used a "one-time pad"—a truly random key that is just as long as the message and used only once. Done right, a one-time pad is mathematically proven to be unbreakable.

Finally, there is the sneakiest reason of all: there might be no message hidden inside! Human brains are wired to hunt for patterns, even in static or clouds. A clever hoaxer can write total gibberish that looks just like a real cipher, tricking brilliant codebreakers into chasing ghosts for decades.

SPY FILE

Did You Know?

In cryptography, finding a leaked answer in an archive does not count as solving the puzzle—a cipher is only officially "broken" when you prove the math behind how it works!

CHAPTER 4

Make Your Own

Now it is your turn. This chapter hands you the tools to build codes your friends will actually use — a secret alphabet from a keyword, messages you can flash across a dark room, and the unwritten rules every good spy follows. Grab a notebook. Tell no one.

THIS CHAPTER TEACHES: KEYWORD SUBSTITUTION

Build a Secret Alphabet With One Word

Scrambling all twenty-six letters of the alphabet makes a tough code, but memorizing a random jumble is a nightmare. Instead, clever spies use a keyword substitution cipher. All you and your partner need to remember is a single secret word—like SHADOW.

To build your cipher, write down the letters of your keyword, crossing out any duplicate letters so none repeat. Right after your keyword, write the rest of the alphabet in normal order, skipping the letters you already used. Check out the demo strip to see how SHADOW scrambles the alphabet.

Line your new scrambled row up underneath a normal alphabet. To encrypt a note, find each real letter in the top row and write down the secret letter directly below it. Every letter maps to a new disguise.

Just don't write a novel in it! Over 1,100 years ago in ninth-century Baghdad, the brilliant scholar Al-Kindi realized that every language leaves a mathematical footprint. In English, E is the most common letter—so if a codebreaker counts which secret letter appears most in your note, they can start cracking your code.

The SHADOW Alphabet

SECRET ALPHABET

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

MESSAGE

SPY HEADQUARTERS

↓

SECRET

QMY COSDNTSPROPQ

Write your keyword SHADOW first, then the leftover letters in order. That scrambled row is your secret alphabet.

SPY FILE

Did You Know?

Al-Kindi's ninth-century codebreaking guide—the oldest known book on cracking ciphers—was lost for centuries until historians rediscovered it in an Istanbul archive in 1987.



Secret HQ: build your own codes and gear.

Puzzle Break

Grab a pencil — decode the secret message.

CRACK THIS #9

SUBSTITUTION

BTSPD RCO QOAPOR POAEMO

Hint · *Use the SHADOW alphabet you just built. Match each code letter back to its plain letter.*

ANSWER IN THE BACK OF THE BOOK

Stuck? Every solution is in the answer key at the back of the book.

Flashlight Talk in the Dark

Samuel Morse gets his name on the code, but hisoriginal 1832 plan was a clunky mess of numbers that required a giant dictionary to read. In 1838, at the Speedwell Ironworks in New Jersey, his partner Alfred Vail fixed it. Vail invented the slick dot-and-dash alphabet we still use today.

You do not need an old-timey telegraph to use Vail's system. Two friends with flashlights can talk silently across a dark room or a campsite. Every letter is a pattern of short signals (dots) and long signals (dashes). Give your flashlight a quick blink for a dot, and hold the beam for a long blink to make a dash.

Timing is your secret weapon. If you mash all your blinks together, your friend will just see a frantic light show. Leave a short pause in the dark between each letter, and a longer pause between whole words so your partner knows where one ends and the next begins.

Start by practicing the universal call for help: SOS. It was chosen because it is impossible to forget—just blink three short dots, three long dashes, and three short dots. Once you nail that rhythm, you can tap the same patterns on a shared school desk or knock them through a bedroom wall.

Flash It in Morse

MORSE CODE

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 −−··	0 −−−−−	1 ·−−−−	2 ··−−−	3 ···−−
4 ····−	5 ·····	6 −····	7 −−···	8 −−−··	9 −−−−·

MESSAGE

BLINK TO ME

↓

SECRET

−··· ·−·· ·· −· −·− / − −−− / −− ·

A short blink is a dot, a long blink is a dash. Now you can talk across a dark room.

SPY FILE

Did You Know?

To give the most common letters the fastest codes, Alfred Vail visited a New Jersey newspaper office and counted which metal letter-stamps the printers needed most—making E a single dot!

Puzzle Break

Grab a pencil — decode the secret message.

CRACK THIS #11

MORSE CODE



Hint · *Short blink is a dot, long blink is a dash. Two letters, then three.*

ANSWER IN THE BACK OF THE BOOK

Stuck? Every solution is in the answer key at the back of the book.

Double Trouble Locking Down Your Cipher

Once you build a keyword cipher, you face an ancient enemy: Al-Kindi's letter counting. A clever snoop can still tally up your letters and spot the "E"s. To fight back, swap your keywords often—or level up to a spy technique called superencipherment.

Superencipherment is a ten-dollar word for a simple trick: putting a lock on top of another lock. First, scramble your message using your keyword alphabet. Then, take that scrambled gibberish and encrypt it a second time using a Caesar shift, sliding every letter a few spaces down the alphabet.

Just don't use the exact same cipher twice in a row—mathematically, that doesn't add security and can even accidentally unscramble your secret! You need two different rules so a codebreaker has to beat two puzzles at once.

German military radiomen did this in World War I with their famous ADFGVX cipher, and you can do it at your kitchen table. A determined expert with enough time can still crack simple layered ciphers, so they aren't magic. But layering buys you time—and in spycraft, time is everything.

The MIDNIGHT Alphabet

SECRET ALPHABET

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

MESSAGE

DOUBLE THE SECRET

↓

SECRET

NLUIFG SAG RGDQGS

A second keyword, MIDNIGHT, makes a brand-new secret alphabet. Swap keys often to stay ahead of crackers.

SPY FILE

Did You Know?

The U.S. National Security Agency (NSA) uses a strict "Rule of Two," requiring top-secret government data to be protected by two completely independent layers of encryption.

Puzzle Break

Grab a pencil — decode the secret message.

CRACK THIS #10

SUBSTITUTION

SQURS KL LKG IUS JLJ

Hint · *This one uses the MIDNIGHT alphabet. Line the code letters up under it.*

ANSWER IN THE BACK OF THE BOOK

Stuck? Every solution is in the answer key at the back of the book.

The Unwritten Rules of Spycraft

The toughest cipher in the world is useless if somebody catches you handing a folded note across the classroom. Before you send a single secret message, you need real spycraft. First rule: meet your partner in private to agree on your cipher key in advance. Second rule: keep your messages short so codebreakers have less to study, and never, ever write your key on the same paper as your message!

Movie spies swap briefcases on moving trains, but real agents try never to be seen in the same room. Instead, they use a dead drop—a secret hiding spot like a hollow tree or a loose brick. George Washington's Culper Spy Ring used dead drops in 1778 during the American Revolutionary War, and Cold War spies turned them into a high art.

To use one, hide your note in the agreed-upon spot when nobody is looking. Then leave a signpost—a normal-looking signal somewhere else—to tell your friend a message is waiting. In 1778, Culper spy Anna Strong signaled fellow agents by hanging a black petticoat and specific numbers of handkerchiefs on her clothesline in New York. Your signpost can be a piece of tape on your locker or a certain book on your desk.

Finally, follow the ultimate rule of kid spycraft: be kind. Real agents use secrets to protect countries, not to be mean. Use your codes to share jokes, play games, and solve mysteries—never to leave classmates out.

A Quick Caesar Recap

SHIFT +7

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

MESSAGE

TRUST YOUR TEAM

↓

SECRET

AYBZA FVBY ALHT

Even a simple seven-step Caesar shift keeps a note secret from anyone who does not know the number.

SPY FILE

Did You Know?

In 1985, double agent Aldrich Ames signaled his Russian handlers that a hidden package was ready simply by drawing a chalk mark on a public mailbox in Washington, D.C.

Puzzle Break

Grab a pencil — decode the secret message.

CRACK THIS #12

SUBSTITUTION

RCO USTIR ALDO EQ KEKO

Hint · *Back to the SHADOW alphabet, and yes, spell out the number.*

ANSWER IN THE BACK OF THE BOOK

Stuck? Every solution is in the answer key at the back of the book.

The Secret World Around You

Every time you type a video game password, send a text message, or watch your parents buy something online, you are using secret codes. The ciphers in this book are the direct ancestors of the digital locks that protect our messages and money today.

Modern computer security is really just the ideas of Al-Kindi, Alfred Vail, and the Culper Spy Ring sped up by silicon chips. A password is simply a secret key. When you hide a cipher keyword under your mattress, you are practicing key management—the exact same puzzle multi-billion-dollar tech companies face every day.

Even with supercomputers, human ingenuity has not solved everything. Locked inside Yale University is the Voynich Manuscript, a 200-page book carbon-dated to between 1404 and 1438. Written in an unknown script beside bizarre drawings of Imaginary plants, it has defeated every codebreaker and artificial intelligence on Earth.

Now it is your turn. Every time you log in, a code far tougher than Caesar's is working for you. Go build your own ciphers, keep practicing, and tell no one.

SPY FILE

Did You Know?

In 2009, scientists carbon-dated the calfskin pages of the mysterious, undeciphered Voynich Manuscript, proving it was made between 1404 and 1438—not a modern hoax!

Answer Key

No peeking until you have really tried! Here is what every **Crack This** puzzle actually said.

#1 MEET ME AT THE TREEHOUSE
CAESAR

#2 THE PASSWORD IS DRAGON
CAESAR

#3 LOOK UNDER THE THIRD STAIR
CAESAR

#4 BRING SNACKS TO THE FORT
PIGPEN

#5 HELP IS COMING
MORSE

#6 THE DOG ATE MY HOMEWORK
PIGPEN

#7 MOVE AT DAWN
MORSE

#8 THE EAGLE HAS LANDED
CAESAR

#9 GUARD THE SECRET RECIPE
KEYWORD

#10 TRUST NO ONE BUT MOM
KEYWORD

#11 ABORT NOW
MORSE

#12 THE VAULT CODE IS NINE
KEYWORD