



WLMJX
GMTLIV - QP
TVSNIGX

Qmgleip Epjers
Mdekqe Epsrws
Nmqqc Hmppsr



SHIFT CIPHER - ML PROJECT

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Unit Plan by the Numbers

11-12

Grade Level

Taught after
AP CSP or AP CSA

Duration

Anywhere from
mini to full-unit

2 - 4
weeks

12

Standards

Based on CSTA
alignment

Unit Plan by Topic

How to use Shift Ciphers

Writing a program to encode/decode
using Shift Ciphers

Considerations for Machine Learning

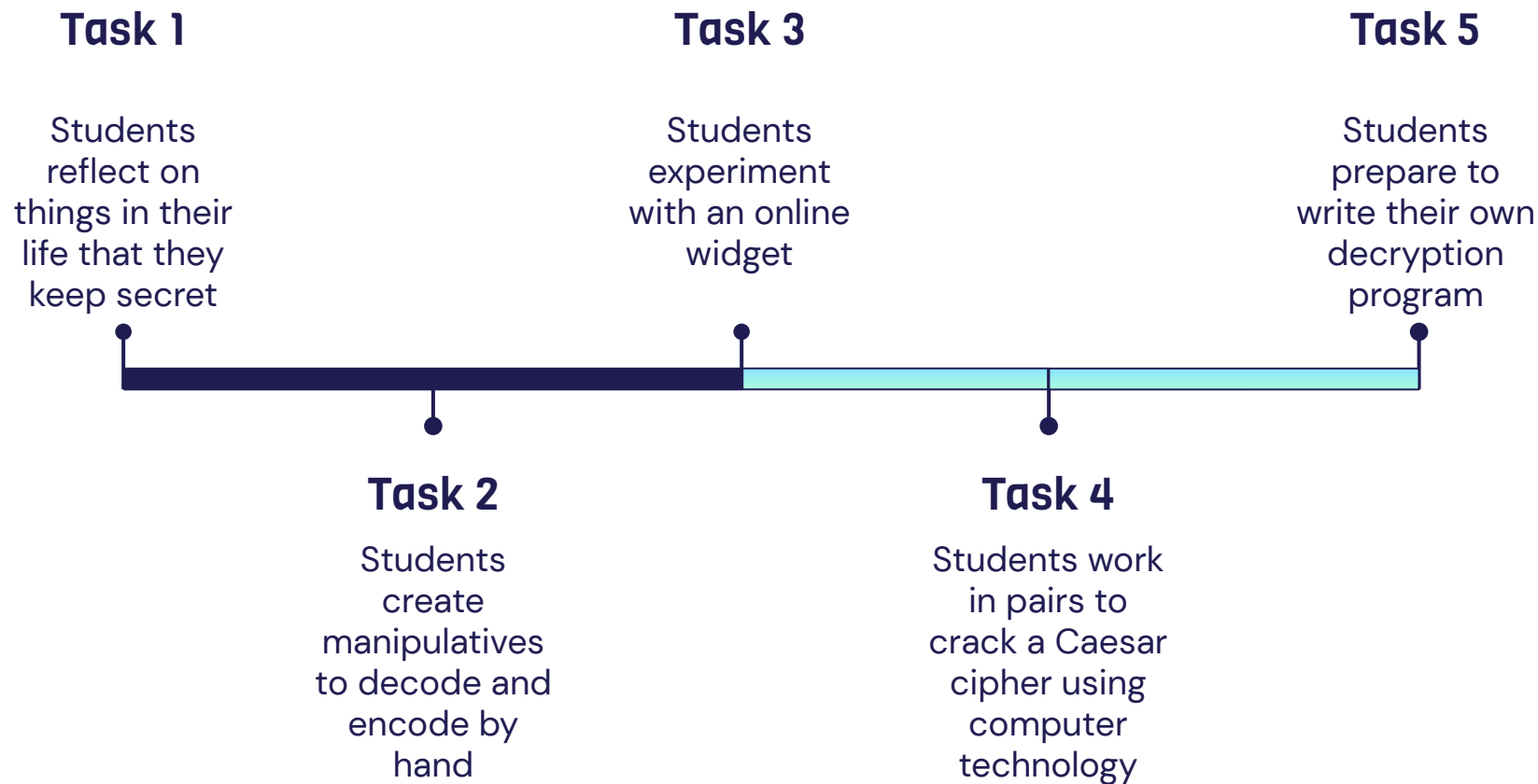


01

SHIFT CIPHERS

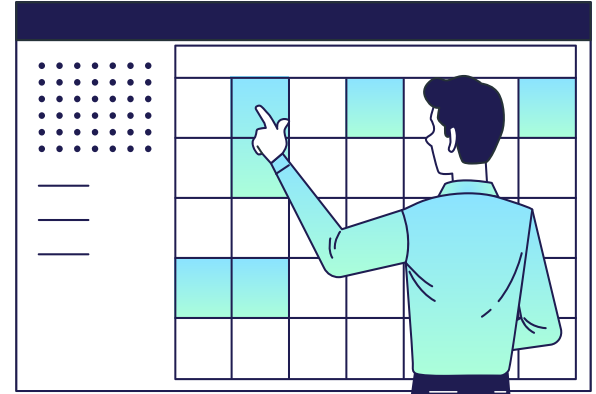


Going from Unplugged to Plugged



02

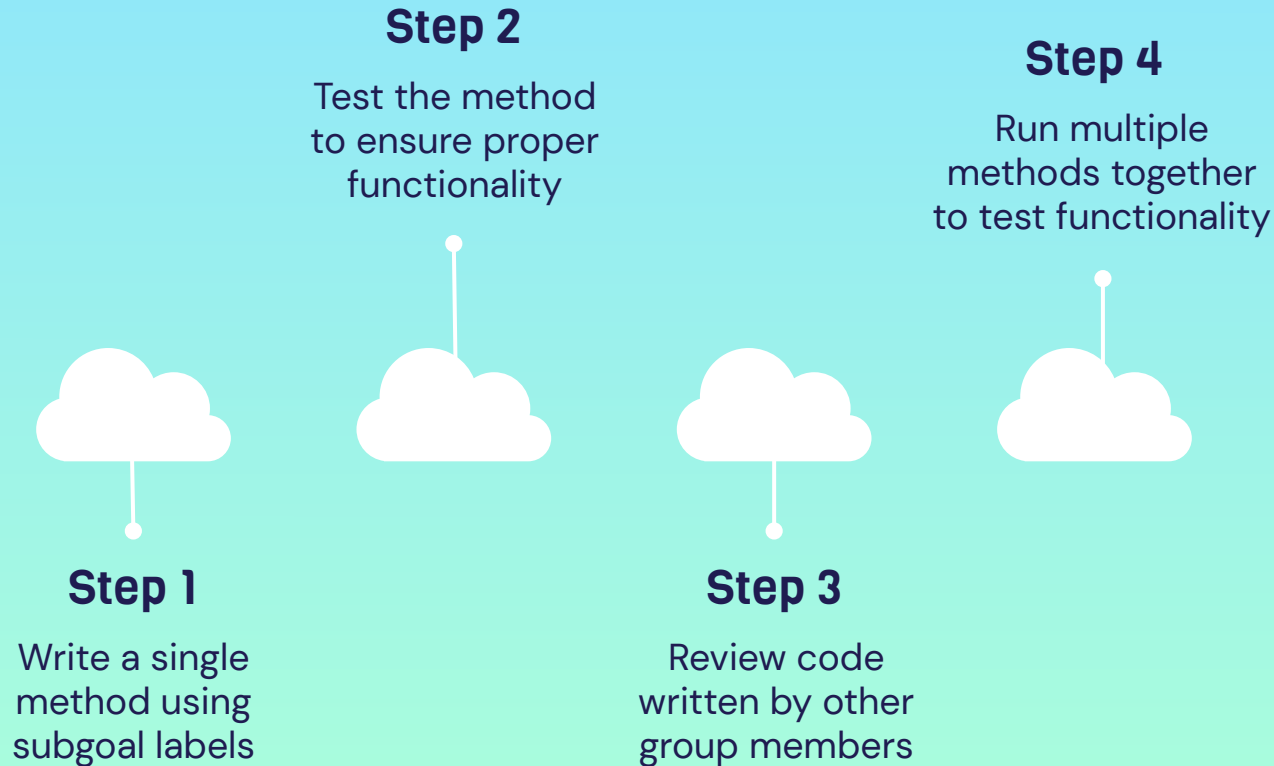
WRITING A SHIFT CIPHER PROGRAM



CREATE A CODING PLAN

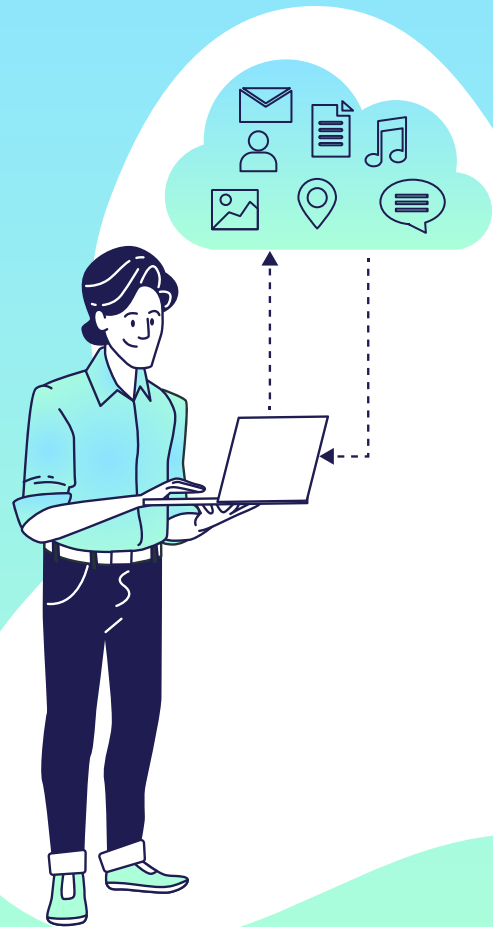


CODING PROCESS (WRITE A PROGRAM)



03

Machine Learning Considerations



Even though our code is not quite M/L, the idea of “training” the program with text can be used to introduce M/L.



Our code exemplifies the most important concepts about training data and bias which are critical for students.



We are becoming more
reliant on predictive models
and data. It is important
that we integrate fairness
into these models.

Class ShiftCipherNew

ATTRIBUTES

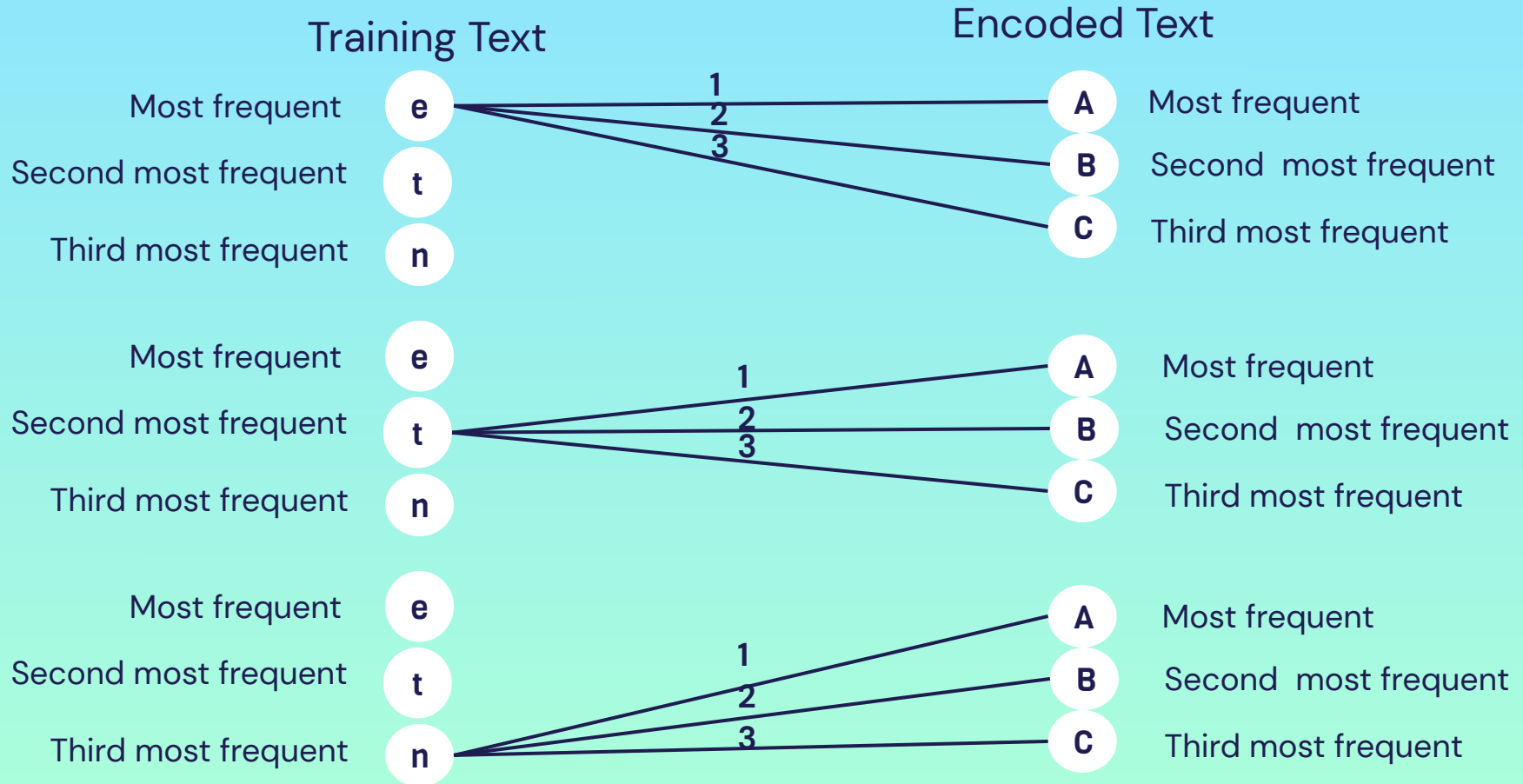
- + **String in** - encoded message provided by the user
- + **int decryptCounter** - tracks number of times decrypt () has been called
- + **int [] arr** - holds letter frequency data for encoded message
- + **int [] defaultEngFreq** - English letter frequency array if user opts not to train
- + **int [] engFreq** - holds letter frequency data based on user training

METHODS

- + **setInput** - Encoded message is set by the user
- + **trainFreq** - Trains the program by creating a frequency array of letters
- + **htmlToString (unused)** - Scrapes a website to train the program
- + **lowerCase** - Sets a String to all lowercase letters
- + **makeFreqArray** - Creates a letter frequency array based on a string
- + **freqLetter** - Returns the most, second most, third most... frequent letter in String
- + **shift** - Shifts a letter by a specified number
- + **calcShift** - Determines how many times to shift the alphabet
- + **decrypt** - Handles the UI and calling of all other methods

Decrypting Algorithm

MAXOPT = 3



Pedagogical Practices

Hands-on/Unplugged

Students interact with computer science ideas through manipulatives

01

Team/Pair Programming

Students collaborate in teams to effectively and efficiently complete a program

04

Discovery-based Learning

Students learn the rules of computer applications through experimentation

02

Project-Based Learning

Students learn by actively working to solve real-world problems

05

Top-Down Design

Break down program into smaller parts, then build it back up piece by piece

03

Rapid Research

Students extend their knowledge through research

06

XLI IRH!

THE END!