# Computer Science Summer Homework 2024

Choose at least three of the following tasks. (One of these **MUST** be from the blue group Task A or B**)**This should be handed in during your first computer science lesson in September. You can choose between handwritten or typed, but all work should be ready to hand to your teacher on paper.
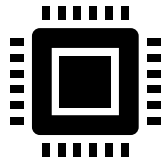
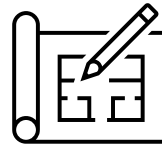| Task A | Task B | Task C | Task D | Task E |
|---|---|---|---|---|
| **Encrypted Battleships** | **Caesar Cipher Program** | **Design** | **Networks** | **Artificial Intelligence** |
| Demonstrate your problem-solving skills by developing your own encryption system. | Demonstrate your programming skills by writing a program that allows a user to encrypt or decrypt a message. | Demonstrate your design skills by designing a screen to order food online. | Demonstrate your knowledge of network hardware by designing a network for a small company. | Demonstrate your awareness of current trends in computer science by discussing the impact of AI on the entertainment industry. |

Task A – Encrypted Battleships



My Ships

Enemy Ships

Battleships is a game where you and your opponent place your ships on a grid. You then take turns guessing at the location of your enemy ships, if you get a hit you guess again, if you miss then it's your opponent's turn. The winner is the first to sink all the enemy ships. The ships for our game are:

Aircraft Carrier – 6x1 Battleship – 5x1 Cruiser – 4x1 Submarine – 3x1 Patrol Boat – 2x1

Where does the encryption come in? What we want is a way of communicating where your ships are located that the enemy won't understand. Your task is to create an encryption scheme that allows you to describe where your ships will be placed without the enemy understanding it. A simple example:
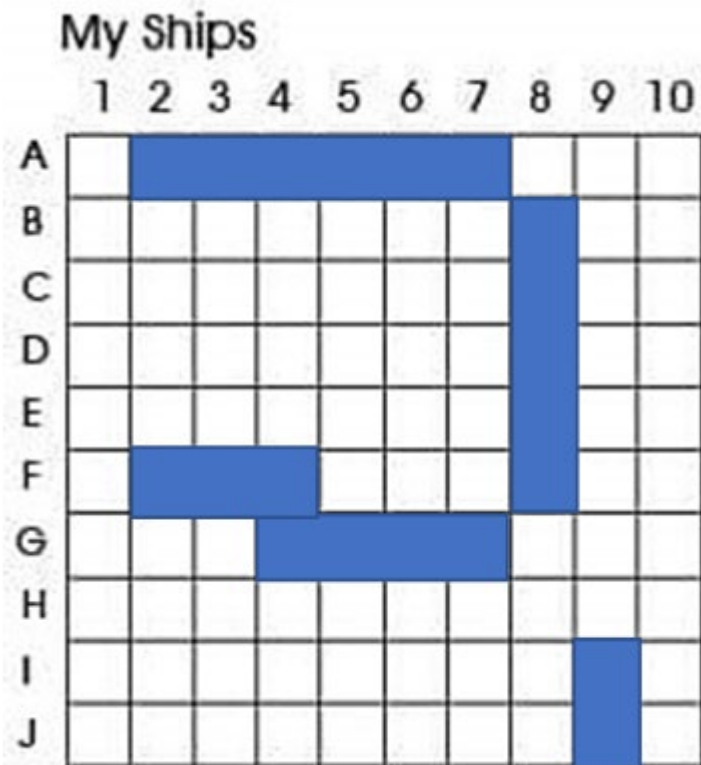
Encryption Key:

A = Aircraft Carrier, B = Battleship, C = Cruiser, S = Submarine, P = Patrol Boat H = Horizontal, V =

Vertical

Top/left co-ordinate of the ship is Caesar Cypher Shifted by one.

Information I would share to describe where my ships are:

AHB3, BVC9, CVH5, SHG3, PVJ10

Actual location of ships on grid:



## What you need to hand in

1. An encryption key which describes the way your encryption system works
2. An example list of ship locations, encrypted using your scheme
3. A grid showing where those ships would be

## What we will do with this

The best examples will be chosen for us to play in lesson in September. I will share the encrypted locations of all the ships with the class and your aim will be to figure out the encryption scheme so that you can work out where all the ships are!

Task B – Caesar Cipher Program

## What is the Caesar Cipher?

A plain text message has an encryption algorithm applied to it, to turn it into cipher text, which then cannot be understood by someone who does not hold the key. The Caesar Cipher is a simple example of encryption.

In the following example the cipher text has been moved 4 places to the right.
**Plain text**: hello
**Cipher text**: dahhj

Plain text

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

Cipher text

| w | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

## Your task

In a programming language of your choosing create a program that allows the user to input a message. The program can then encrypt or decrypt the message using a Caesar Cipher.

Task C – Design

Here is an example of a design for a contact form for a website.



Produce your design for a log in form, this can be hand drawn or you can use a site such as https://support.moqups.com/hc/en-us (for free).

Task D – Networks

Research the following network hardware:

- Router
- Hub
- Switch
- Network interface controller
- Cables
- Wireless Access Point

A small business with 10 employees needs a network. This will have desktop computers and laptops. Employees will need to use a printer and have access to the internet.

Put together a list of equipment needed

- Give a breakdown of the costs of this equipment
- Draw a network diagram for the new network
- Discuss whether it will be peer-to-peer or client server and justify your decision

You will need to research this information, here are some websites to get you started.

Bitesize

Isaac Computer Science

Task E – Artificial Intellegence

Discuss the impact of AI on the entertainment industry. You should consider positive and negative impacts.

You will need to research this information, here are some websites to get you started.

Bitesize

Isaac Computer Science