

Computing

# Lesson 8: Battle Boats

**Programming Part 6: Dictionaries and Datafiles**

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# Play Battle Boats



# Play Battle Boats

**Battle boats** is a **turn based strategy based game** where players eliminate their opponents fleet of boats by **'firing'** at a location on a **grid** in an attempt to **sink** them. The first player to sink **all of their opponents'** battle boats is declared the **winner**.

Each player has **two eight by eight grids**. One grid is used for their **own battle boats** and the other is used to record any **hits or misses** placed on their opponents. At the beginning of the game, players decide where they wish to place their fleet of **five battle boats** and they must keep these hidden from the other player.



# Play Battle Boats

**During game play**, players take it in turns to **'fire'** at a location on their opponents board. They do this by stating the coordinates for their target. If a player hits their opponent's boat then this is recorded on the **target tracker** as a **hit**. If they miss then this is recorded as a **miss**.

The **game ends** when a player's fleet of boats have been **sunk**. The winner is the player with **boats remaining** at the end of the game.

It is up to you to **decide who goes first**. Perhaps a game of rock, paper, scissors?



# Play Battle Boats

**Play Battle Boats** to gain an understanding of how the game works.

- Ask someone in your household to play Battle Boats with you. If they are not available then work through the game rules yourself and pretend that you have an opponent.
- Print the next two slides to use as your player boards. If you are unable to print then create your own boards using pen and paper.



# Player 1 Board

Use this board to track the **'hits'** and **'misses'** that you have made towards your opponent. Mark a hit with a **H** and a miss with an **M**.

## Target Tracker

T	A	B	C	D	E	F	G	H
1								
2								
3								
4								
5								
6								
7								
8								

Use this board to place your fleet at its coordinates. You have **five** boats, each boat takes up **one** square. Mark your boats with a **B**.

## Fleet Grid

F	A	B	C	D	E	F	G	H
1								
2								
3								
4								
5								
6								
7								
8								



# Player 2 Board

Use this board to track the **'hits'** and **'misses'** that you have made towards your opponent. Mark a hit with a **H** and a miss with an **M**.

## Target Tracker

T	A	B	C	D	E	F	G	H
1								
2								
3								
4								
5								
6								
7								
8								

Use this board to place your fleet at its coordinates. You have **five** boats, each boat takes up **one** square. Mark your boats with a **B**.

## Fleet Grid

F	A	B	C	D	E	F	G	H
1								
2								
3								
4								
5								
6								
7								
8								



# Scenario: Battle Boats



# YOUR TASK

The following slides show you the **scenario documentation** for the **Battle Boats game**. Your current task is to read this through carefully in order to familiarise yourself with the task ahead.

**You are not expected to start programming the game at this point.**



# Scenario: Battle Boats

## Introduction

Battle boats is a turn based strategy game where players eliminate their opponents fleet of boats by 'firing' at a location on a grid in an attempt to sink them. The first player to sink all of their opponents' battle boats is declared the winner.

Each player has two eight by eight grids. One grid (**figure 2** - see appendix) is used for their own battle boats and the other (**figure 1**) is used to record any hits or misses placed on their opponents. At the beginning of the game, players decide where they wish to place their fleet of five battle boats (**figure 2**).



# Scenario: Battle Boats

During game play, players take it in turns to fire at a location on their opponents board. They do this by stating the coordinates for their target. If a player hits their opponent's boat then this is recorded as a hit. If they miss then this is recorded as a miss (**figure 1**).

The game ends when a player's fleet of boats have been sunk. The winner is the player with boats remaining at the end of the game.

You have been asked to design a battle boats game where the player fights against the computer to try and defeat its fleet.



# Tasks

1. Develop the part of the program that displays a menu that allows the user to play a new game, resume a game, read the instructions or quit the game.

## Play a new game

2. Develop the part of the program in such a way that when 'play a new game' is selected, the player is presented with a blank fleet grid (**figure 3**). The program should:
  - a. Prompt the player to enter coordinates for each boat
  - b. Check if a boat has already been placed in the specified location
  - c. Display each boat on the fleet grid after each entry
  - d. Only allow the player to enter five boat locations



# Tasks

3. Develop the part of the program that randomly selects five **unique** locations for the computer's fleet. These locations should not be revealed to the player. **NOTE:** The computer's fleet will not be displayed to the user at any point in the game. For testing purposes it will be necessary to display the locations but these should not appear in the finished game.
4. Develop the part of the program that displays a blank target tracker (**figure 4**) for the player.



# Tasks

5. Develop the part of the program that allows the player to take their turn. The program should:
  - a. Prompt for the target coordinates. **NOTE:** The program should not allow the player to select the same coordinates twice.
  - b. Check if the target is a hit or a miss
    - i. If the target is a hit then a H should be displayed on the target tracker (**figure 1**).
    - ii. If the target is a miss then an M should be displayed on the target tracker (**figure 1**).



# Tasks

6. Develop the part of the program that allows the computer to take its turn. The program should:
  - a. Randomly generate target coordinates. **NOTE:** The program should not allow the computer to select the same location twice.
  - b. Display the coordinates to the player.
  - c. Check if the target is a hit or a miss.
    - i. If the target is a hit then a H should replace the B (**figure 5**) on the fleet grid.
    - ii. If the target is a miss then this should be recorded by the program. There is no need to display a miss on the players fleet grid.
  
7. Develop the part of the program that continues to play the game until there is a winner. A game has been won when a player has sunk all of their opponents battle boats. The winner of the game should be displayed to the player.



# Explorer Tasks (Optional)

8. Develop the part of the program that saves the progress of the game externally. Progress should be saved after each turn. If the player closes the game window (stops the execution) then all progress should be saved.
9. Develop the part of the program in such a way that when 'resume a game' is selected, the player is presented with their progress from their previous game. The game should continue from this point.



# Further Explorer Tasks (Optional)

10. Extend the game so that the user can play a version of the game that uses a variety of boat sizes.
- a. The boats will come in three categories:
    - i. 2 x Destroyers (1 cell)
    - ii. 2 x Submarines (2 cells)
    - iii. 1 x Carrier (3 cells)
  - b. The boats can be placed horizontally or vertically. See **figure 6** for an example fleet grid.
11. To allow for varying boat sizes. Develop the program so that it now checks for a hit, a miss and a sunken boat. The boat will only sink if all parts of the boat have been hit.



# Appendices: Board illustrations

**Figure 1: Target Tracker**

T	A	B	C	D	E	F	G	H
1	M				M			
2								H
3	M		H		M			
4								
5								
6	M					H		
7								
8	M				M			

**Figure 2 - Fleet grid**

F	A	B	C	D	E	F	G	H
1								B
2								
3		B				B		
4								
5								
6								
7	B				B			
8								



# Appendices: Board illustrations

**Figure 3 - Blank fleet grid**

F	A	B	C	D	E	F	G	H
1								
2								
3								
4								
5								
6								
7								
8								

**Figure 4 - Blank target tracker**

T	A	B	C	D	E	F	G	H
1								
2								
3								
4								
5								
6								
7								
8								



# Appendices: Board illustrations

Figure 5 - Fleet grid with a hit

F	A	B	C	D	E	F	G	H
1								B
2								
3		H				B		
4								
5								
6								
7	B				B			
8								

Figure 6 - Fleet grid varying boat sizes

F	A	B	C	D	E	F	G	H
1								B
2		B	B					B
3								
4								
5	B	B	B					
6						B		
7								
8				B				

