

Programming Exercises

The following require you to open the skeleton program and make modifications. They are written in examination style and illustrate how you should prepare your answers.

Question 1

This question refers to GetRowColumn.

It is currently possible to fire at coordinates that are off the board, crashing the game. Amend GetRowColumn so that this is not possible. If a square off the board is targeted, the message: 'Sorry, that is outside the target area. Please select again.' should be displayed and the user prompted to re-enter.

Evidence you need to provide

- Your amended SOURCE CODE PROGRAM for GetRowColumn
- SCREEN CAPTURE(S) of testing a shot at column 14 row -8

6 marks

Question 2

This question refers to PlayGame.

It is currently possible to fire at every square in order until you find every ship. Alter PlayGame so that the player only has 20 torpedoes. The number of torpedoes should decrease by 1 after every move and be displayed on-screen. When the number of torpedoes reaches 0, the message 'GAME OVER! You ran out of ammo' should be displayed and the game should end.

Evidence you need to provide

- Your amended SOURCE CODE PROGRAM for PlayGame.
- SCREEN CAPTURE(S) of testing showing the number of torpedoes going down and the 'game over' message

7 marks

Question 3

This question refers to DisplayMenu and Main.

Alter the menu so that an option 3 is also displayed between options 2 and 9.

The menu should display '3. Load saved game'.

If option 3 is selected, that program should display 'OPTION 3 EXECUTED'.

Evidence you need to provide

- Your amended SOURCE CODE PROGRAM for DisplayMenu
- SCREEN CAPTURE(S) of testing

4 marks

Question 4

This question refers to Main.

Alter the procedure so that if the user enters 9 they are prompted with an 'Are you sure?' message. Only if they respond Y will the program quit.

Evidence you need to provide

- Your amended SOURCE CODE PROGRAM for Main
- SCREEN CAPTURE(S) of testing

6 marks

Question 5

This question refers to Main.

Option 3 currently just displays a message. Amend it so that it prompts the user for a filename and then loads this file and plays the game.

Evidence you need to provide

- Your amended SOURCE CODE PROGRAM for Main
- SCREEN CAPTURE(S) of testing using the filename 'Training.txt'

5 marks

Question 6

Create a procedure called SaveGame. It should accept the board as a parameter that is passed to it along with a variable called filename.

It should then save the current state of the board to a text file named the value of filename and in the same format as Training.txt.

Evidence you need to provide

- Your SOURCE CODE PROGRAM for SaveGame

8 marks

Question 7

This question refers to PlayGame.

After a player has made a move, they should be prompted: 'Do you want to save the game (Y, N)?'

If the player enters Y, they should then be prompted for a filename and the game saved using the procedure created in Question 6.

Evidence you need to provide

- Your amended SOURCE CODE PROGRAM for PlayGame
- SCREEN CAPTURE(S) of loading a game saved by the user

6 marks

Question 8

This question refers to multiple sections of the skeleton code.

Create a menu option '4. Board Test'. It will set up a board and then display the real values stored on a randomly generated board (revealing the location of the ships). After the board has been displayed the program will return to the main menu. A procedure called RealBoard (similar to PrintBoard) should be created to display the board.

Evidence you need to provide

- Your amended sections of SOURCE CODE PROGRAM highlighting your changes
- SCREEN CAPTURE(S) of testing

10 marks

Question 9

This question refers to multiple sections of the skeleton code.

A new ship has joined the fleet called a Frigate. It has a length of 3. Amend the program so that a Frigate is placed in addition to the original ships when option 1 or 4 is selected. 'F' will represent a piece of Frigate.

Evidence you need to provide

- Your amended sections of the SOURCE CODE PROGRAM highlighting your changes
- SCREEN CAPTURE(S) using menu option 4 to show the Frigate

7 marks

Question 10

This question refers to MakePlayerMove.

When a player misses, a radar scan of the adjacent cells should be performed. If any contain an undiscovered section of ship, the message 'Enemy Near!' should be displayed. If not, the message 'All quiet' should be displayed. You should create a function called RadarScan that returns a Boolean value for this operation (True = enemy near).

Evidence you need to provide

- Your amended SOURCE CODE PROGRAM for MakePlayerMove
- Your new SOURCE CODE PROGRAM for RadarScan
- SCREEN CAPTURE(S) showing both types of radar scan message

14 marks

Question 11

This question refers to PlayGame.

When a ship is hit its type must be displayed, e.g.:

Hit Aircraft Carrier at (8,6)

Evidence you need to provide

- Your amended sections of the SOURCE CODE PROGRAM highlighting your changes
- SCREEN CAPTURE(S) of a successful hit and the message

8 marks

Question 12

This question refers to PlaceShip, ValidateBoatPosition and PlaceRandomShips.

Amend the program so that all ships can be placed diagonally down and to the left. They still cannot go off the board or overlap with other ships, e.g.:

B			
	B		
		B	
			B

Evidence you need to provide

- Your amended sections of the SOURCE CODE PROGRAM highlighting your changes
- SCREEN CAPTURE(S) of a board generated by option 4 showing at least one diagonal ship

14 marks

Question 13

This question refers to MakePlayerMove.

Amend the program so that if a ship is hit its size is reduced by 1.

A message will then display how many pieces of the ship are left to hit.

e.g.

Hit Battleship at (5,3)

There are 3 pieces of Battleship left

When the size reaches zero an additional message should say that the ship has been sunk.

e.g.

Hit Battleship at (5,6)

There are 0 pieces of Battleship left

YOU SANK THE BATTLESHIP

Evidence you need to provide

- Your amended sections of the SOURCE CODE PROGRAM highlighting your changes
- SCREEN CAPTURE(S) of a ship being sunk

12 marks

Question 14

This question refers to multiple sections of the skeleton code.

A new menu option needs to be added: '5. Manually place ships'.

When selected the user will be prompted for the starting square and orientation of each ship in turn. The program will then check whether this location is valid using `ValidateBoatPosition`. If a suitable location is selected, a message will confirm that the ship is placed and then place the ship using `PlaceShip`.

e.g. Aircraft Carrier successfully placed at (1,3)

If `ValidateBoatPosition` returns false an error message will be displayed.

e.g. Invalid location. Please choose again.

After each ship has been placed, the `RealBoard` procedure should display the position of all placed ships.

When all ships are placed the game should begin.

Evidence you need to provide

- Your amended sections of the SOURCE CODE PROGRAM highlighting your changes
- SCREEN CAPTURE(S) showing the board before and after the submarine is placed

17 marks

Question 15

This question refers to multiple sections of the skeleton code.

Create a variable to store the current player's score. Everybody starts at 0. Add 1 to score for each shot. A lower score is better.

Create a user-defined data structure (similar to ship) called score.

It should contain a name and a score in suitable data types.

An array/list of five scores will store the scores.

Create a procedure (similar to `SetUpBoard` and `SetUpShips`) called `SetUpScores`. It should populate the scores with the following data. It should only do this once when the program is first run.

George	17
Paul	19
John	23
Ringo	25
Bryan	35

Create a menu option '6. Display high-score table' that executes a suitable procedure.

Create a procedure to bubble-sort the high-score table called `BubSortScores`.

If a player scores less than somebody on the table (remember that a lower score is better) then the worst score on the table will be replaced with their name (you will need to prompt for this) and score, and the table sorted using `BubSortScores`.

Evidence you need to provide

- Your amended sections of the SOURCE CODE PROGRAM highlighting your changes
- SCREEN CAPTURE(S) showing the table being displayed before and after a new high score is added

37 marks

