Task 2: software design and development

In the board game 'Capturing Olympus', six players work as a team to earn points. One point is earned if the six players score a combined total of more than 50 hits. An additional point is earned if the average number of hits is greater than or equal to 10.

Read the following analysis and design carefully.

Program analysis
A program is required to determine the number of points earned by the team. The program will ask the user to enter the number of hits scored by each of the six players and store these values. When all six players' hits have been entered, the program will calculate the total and average number of hits. A message indicating the points earned is then displayed to the user.

Inputs
♦ a valid number of hits scored by each of the six players

Processes
♦ calculate the total hits achieved by all six players
♦ calculate an average number of hits (total/6)
♦ determine if the six players have earned points

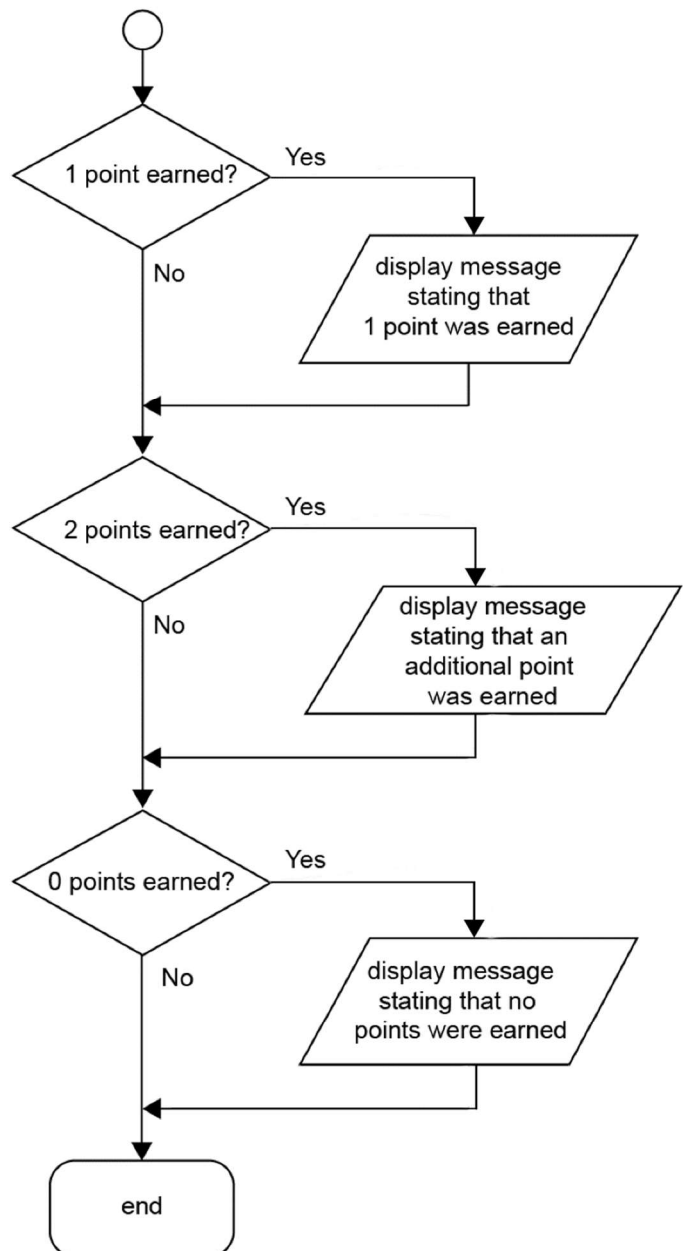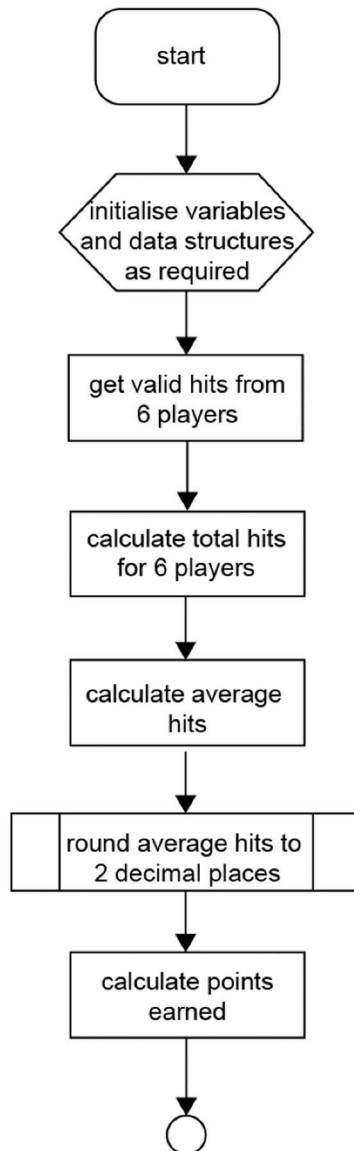**Outputs**
♦ a message is displayed if one point has been earned
♦ a message is displayed if the additional point has been earned
♦ a message is displayed if no points have been earned

Assumptions
♦ the number of hits a single player can achieve is greater than or equal to 0 and less than or equal to 30
♦ the average should be displayed to two decimal places
♦ one point is earned if the total number of hits is greater than 50. An additional point is earned if the average number of hits is greater than or equal to 10

Program design (flow chart)

start

↓

initialise variables
and data structures
as required

↓

get valid hits from
6 players

↓

calculate total hits
for 6 players

↓

calculate average
hits

↓

round average hits to
2 decimal places

↓

calculate points
earned

↓

○

○

↓

1 point earned? —Yes→ display message
stating that
1 point was earned

│No

2 points earned? —Yes→ display message
stating that an
additional point
was earned

│No

0 points earned? —Yes→ display message
stating that no
points were earned

│No

end

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2a   Using the program analysis and flowchart design, implement the program in a language of your choice. Ensure the program matches the design.

(15 marks)

Print evidence of the program code.

2b   Complete the table below to create two sets of test data. You must demonstrate that the program correctly outputs the messages that one or both points have been earned.

(3 marks)

Type of test	Input		Expected output	Actual output
Normal	Player 1		Program displays message stating one point earned.	Attach printouts of inputs and outputs as evidence.
	Player 2			
	Player 3			
	Player 4			
	Player 5			
	Player 6			
Normal	Player 1		Program displays message stating two points earned.	Attach printouts of inputs and outputs as evidence.
	Player 2			
	Player 3			
	Player 4			
	Player 5			
	Player 6			

Test your program using both sets of test data. Print evidence of inputs and outputs to show that you have completed each test.

2c   The program should ensure that only a valid number of hits can be entered for each of the six players.

State **two** extreme and **one** exceptional numerical value that could be used as part of a test run to check that only a valid number of hits can be entered:

(2 marks)

Extreme 1 _____ Extreme 2 _____

Exceptional _____

Candidate name_____ Candidate number_____

2d   Evaluate your program by commenting on the following:

Fitness for purpose **(1 mark)**

Efficiency of your code **(1 mark)**

Robustness of your completed program **(1 mark)**

Readability of your code **(2 marks)**

Candidate name_____ Candidate number_____