

Instructions for candidates

This assessment applies to the assignment for National 5 Computing Science.

This assignment has 50 marks out of a total of 160 marks available for the course assessment. It assesses the following skills, knowledge and understanding:

- ♦ applying aspects of computational thinking across a range of contexts
- ♦ analysing problems within computing science across a range of contemporary contexts
- ♦ designing, implementing, testing and evaluating digital solutions (including computer programs) to problems across a range of contemporary contexts
- ♦ developing skills in computer programming
- ♦ applying computing science concepts and techniques to create solutions across a range of contexts

During this 8 hour course assignment you are asked to complete three short practical tasks. You may complete the tasks in any order.

Advice on timing each task

Marks are allocated as follows:

- | | | |
|--|----------|----------------|
| ♦ Task 1 – database design and development | 15 marks | (30% of total) |
| ♦ Task 2 – software design and development | 25 marks | (50% of total) |
| ♦ Task 3 – web design and development | 10 marks | (20% of total) |

This split may be used as a guide when allocating your time to each of the three tasks.

Advice on gathering evidence

As you complete each task, you must gather evidence as instructed in each task. Use the evidence checklist provided to make sure you submit everything necessary at the end of the assignment.

Evidence may take the form of printouts of code/screenshots/typed answers, hand-written answers or drawings of diagrams/designs.

Advice on assistance

This is an open-book assessment. This means that you can use:

- ♦ any classroom resource as a form of reference (such as programming manuals, class notes, and textbooks)
- ♦ any files you have previously created throughout the course

The tasks are designed to be completed independently, without any support from your teacher or lecturer. This means that you cannot:

- ♦ ask your teacher or lecturer (or other candidates) how to complete any of the tasks
- ♦ access any assignment files outside the classroom

Computing Science assessment task: evidence checklist

Part A		
Task	Evidence	
1a	Completed task 1 sheet showing analysis of database inputs	<input type="checkbox"/>
1b	Completed task 1 sheet showing data dictionary	<input type="checkbox"/>
	Printout of new database table – showing new fields and their data types have been created	<input type="checkbox"/>
Part B		
Task	Evidence	
1c	Printout of screenshots – showing correct validation has been set up for the new fields	<input type="checkbox"/>
	Printout – showing evidence that a relationship exists between the two tables	<input type="checkbox"/>
1d	SQL statement to add new employee	<input type="checkbox"/>
	Printout of Employee table – showing new record	<input type="checkbox"/>
2a	Printout of your program code	<input type="checkbox"/>
2b	Completed task 2 sheet showing the two test tables	<input type="checkbox"/>
	Printout evidence of test runs – showing inputs and outputs for each of the two test tables	<input type="checkbox"/>
2c	Completed task 2 sheet showing the required test data values	<input type="checkbox"/>
2d	Completed task 2 sheet showing evaluation	<input type="checkbox"/>
3a	Completed task 3 sheet showing the end-user and functional requirements	<input type="checkbox"/>
3b	Printout evidence of HTML and CSS files – showing new page	<input type="checkbox"/>
	Printout of web page – showing how it is viewed in browser	<input type="checkbox"/>

Please follow the steps below before handing your evidence to your teacher or lecturer:

- ◆ Check you have completed all parts of tasks 1, 2 and 3
- ◆ Label any printouts/screenshots with the task number (for example 1c, 2a)
- ◆ Clearly display your name and candidate number on each printout

Task 1: database design and development (part A)

Whitestar Amps design and build amplifiers for electric guitars. Below is a description of the information currently recorded for each employee and the amplifiers the employees build.

When a new employee starts working at Whitestar Amps, their first name, surname, address, contact telephone number and if they have a driving licence is recorded.

Employees build three different models of amplifier (Jazz8, Rock100 and Blues55). After each amplifier has been built and tested it is given a unique serial number which the employee enters onto a paper form. They also include the date, time of day completed, if the amplifier passed testing and their own unique employee number assigned when they were first employed.

1a Complete the missing information from the analysis of inputs below.

(2 marks)

Employee details:	Amplifier details:
	serial number date built time completed model passed test (True/False) employee number

Candidate name_____ Candidate number_____

1b Complete the data dictionary for the Amplifier entity.

(5 marks)

Entity name: Amplifier					
Attribute name	Key	Type	Size	Required	Validation
serialNumber		text	10	Y	length = 10
dateBuilt		date		Y	
timeCompleted				Y	
model		text	7	Y	
testPassed				Y	
employeeNumber		number		Y	existing employeeNumber from Employee table

Candidate name_____ Candidate number_____

- ◆ Check your answers to part A carefully, as it cannot be returned after you hand it in.
- ◆ When you are ready, hand it in to your teacher or lecturer and collect part B.

Task 1: database design and development (part B)

1c Using the data dictionary below complete the relational database by:

- ♦ creating a new table to store the amplifier data
- ♦ adding all required validation to fields
- ♦ creating a relationship between the two tables

(6 marks)

Your teacher or lecturer will provide you with a partially completed database file. Print evidence to show that you have completed each of the bullet points.

Entity name: Employee					
Attribute name	Key	Type	Size	Required	Validation
employeeNumber	PK	number		Y	range >=1000 AND <= 9999
firstName		text	15	Y	
surname		text	15	Y	
address		text	50	Y	
contactNumber		text	11	Y	length = 11
drivingLicence		Boolean		Y	
Entity: Amplifier					
Attribute name	Key	Type	Size	Required	Validation
serialNumber	PK	text	10	Y	length = 10
dateBuilt		date		Y	
timeCompleted		time		Y	
model		text	7	Y	restricted choice: Jazz8, Rock100 and Blues55
testPassed		Boolean		Y	
employeeNumber	FK	number		Y	existing employeeNumber from Employee table

1d The personal details of a new employee are listed below.

Employee number:	1599
Name:	Jeremy May
Address:	67 Red Lane
Driving licence:	True
Contact telephone number:	07923782534

Implement the SQL statement that will add this new record to the correct table.

(2 marks)

Print evidence of both the implemented SQL statement and the Employee table (clearly showing the new record).

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

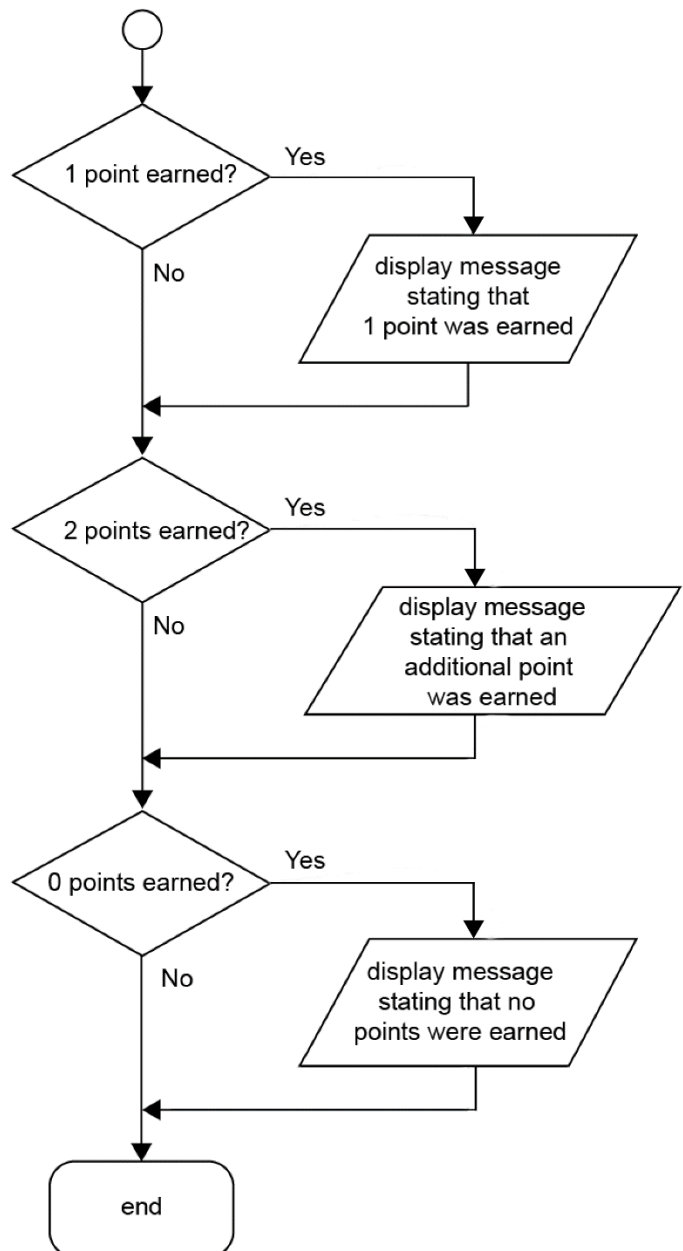
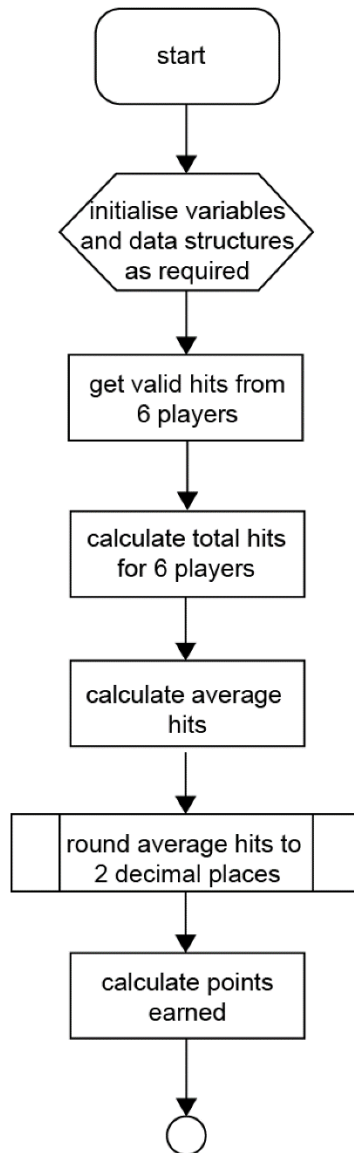
Outputs

- ◆ 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)



Task 2: software design and development

- 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_____

Task 3: web design and development

Woodline Academy holds a 'pupil of the month' competition. They wish to add a new page to their school website each month with the following content:

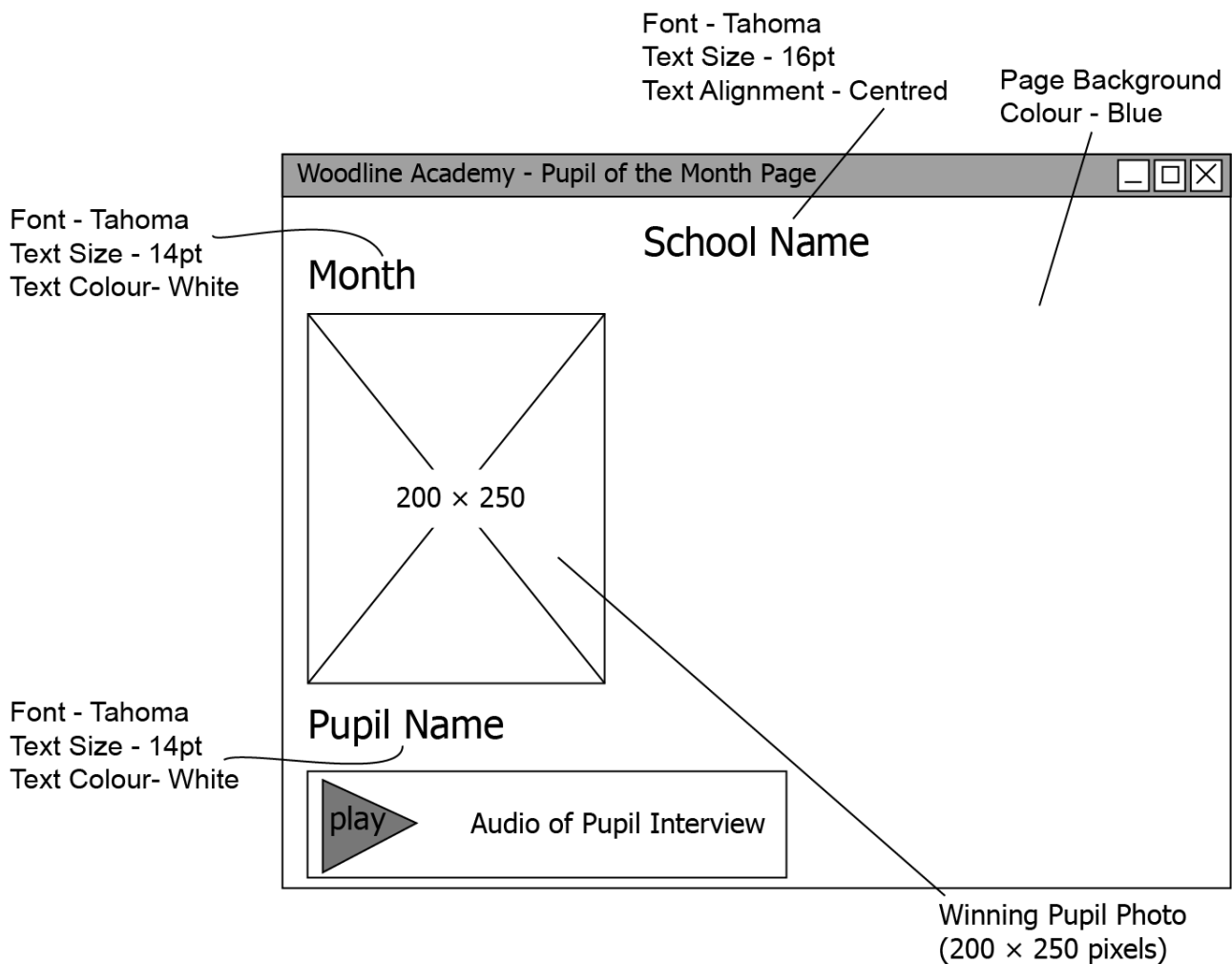
- ◆ the school name
- ◆ the month of the competition
- ◆ the name of the winning pupil
- ◆ a photo of the winning pupil
- ◆ a sound recording of an interview with the winning pupil

3a State **one** end-user requirement and **two** functional requirements for the new page.

End-user requirement (1 mark)
Functional requirement 1 (1 mark)
Functional requirement 2 (1 mark)

Candidate name_____ Candidate number_____

- 3b A wireframe design of the new page (annotated with required styles) is shown below.



You have been given the following two files:

- ♦ winning pupil photo
- ♦ pupil interview

Implement the above design using HTML and an external CSS.

(7 marks)

Print evidence of the following:

- ♦ HTML file
- ♦ CSS file
- ♦ Web page