



National 5 Computing Science Assignment Assessment task

This is the assessment task for the National 5 Computing Science Assignment.

This document provides information for teachers and lecturers about the coursework component of this course in terms of the skills, knowledge and understanding that are assessed. It **must** be read in conjunction with the course specification.

Valid for session 2017-18 only.

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Introduction

This document contains instructions for teachers and lecturers, and instructions for candidates for the National 5 Computing Science assignment. You must read it in conjunction with the course specification.

This assignment has 50 marks out of a total of 160 marks available for the course assessment.

This is one of two course assessment components. The other component is a question paper.

Instructions for teachers and lecturers

This assessment applies to the assignment for National 5 Computing Science for the academic session 2017-18.

The task is valid for session 2017-18 only. Once complete, you must send the assignment responses to SQA to be marked.

You must conduct the assignment under a high degree of supervision and control. This means:

- ◆ candidates must be supervised throughout the session(s)
- ◆ candidates must not have access to e-mail or mobile phones
- ◆ candidates must complete their work independently – no group work is permitted
- ◆ candidates must not interact with each other
- ◆ with no interruption for targeted learning and teaching
- ◆ in a classroom environment

Time

Candidates have 8 hours to carry out the assignment, starting at an appropriate point in the course, after all content has been delivered. It is not anticipated that this is a continuous 8-hour session, although it can be, but conducted over several shorter sessions. This is at your discretion.

You have a responsibility to manage candidates' work, distributing it at the beginning and collecting it in at the end of each session, and storing it securely in between. This activity does not count towards the total time permitted for candidates to complete the assignment.

Candidates are prompted to print their work at appropriate stages of the tasks. They can print on an ongoing basis or save their work and print it later. Whatever approach they take, time for printing is not part of the 8 hours permitted for the assignment.

Resources

Each candidate must have access to a computer system with a high-level (textual) programming language, database application and software that can create, edit and run SQL, HTML and CSS.

This is an open-book assessment. Candidates can access resources such as programming manuals, class notes, textbooks and programs they have written throughout the course. These may be online resources.

You must not create learning and teaching tasks that make use of constructs required in the assessment task, **with the specific purpose of developing a solution that candidates can access during the assignment.**

There may be instances where restriction of network use is prohibited (for example a local authority-managed network with specific limitations).

However, it remains your professional responsibility to make every effort to meet the assessment conditions.

Reasonable assistance

The assignment consists of three independent tasks. They are designed in a way that does not require you to provide support to candidates, other than to ensure that they have access to the necessary resources. Candidates can complete the tasks in any order.

Once the assignment is complete, you must not return it to the candidate for further work to improve their mark. You must not provide feedback to candidates or offer opinion on the perceived quality or completeness of the assignment response, at any stage.

You can provide reasonable assistance to support candidates with the following aspects of their assignments:

- ◆ printing, collating and labelling their evidence to ensure it is in the format specified by SQA.
- ◆ ensuring candidates have all the materials and equipment required to complete the assignment – this includes any files provided by SQA.
- ◆ ensuring candidates understand the conditions of assessment and any administrative arrangements around the submission and storage of evidence, and the provision of required files.
- ◆ technical support.

Evidence

All candidate evidence (whether created manually or electronically) must be submitted to SQA in paper-based format. The evidence checklist details all evidence to be gathered. You can use it to ensure you submit all evidence to SQA.

You should advise candidates that evidence, especially code, must be clear and legible. This is particularly important when pasting screenshots into a Word document.

There is no need for evidence to be printed single sided or in colour.

Alteration or adaptation

The tasks are in PDF and Word formats. Each task is available as a separate file from the secure site. Word files allow candidates to word process their responses to parts of the task.

You must not adapt the assignment in any way that changes the instructions to the candidate and/or the nature and content of the tasks. However, you can make changes to font size, type and colour and to the size of diagrams for candidates with different assessment needs, for example, visual impairment.

If you are concerned that any particular adaptation changes the nature and/or the content of the task, please contact our Assessment Arrangements team for advice as soon possible at aarequests@sqa.org.uk.

Submission

Each page for submission has the number of the assignment task that it refers to, for example 1a, and contains space for candidates to complete their name and candidate number. Any other pages submitted, for example prints of program listings, screenshots, must have this information added to them.

Specific instructions for teachers and lecturers: 2017-18

You must follow these specific instructions and ensure that candidates are aware of what you will give them at each stage in the assessment.

Print each task on single-sided paper, where applicable:

- ◆ this allows candidates to refer to information on other pages
- ◆ this helps you manage tasks that are split into more than one part

Task 1 – part A requires candidates to analyse and design a database. They **must** submit their evidence for this part of the task to you before you issue part B.

Task 1 – part B is a separate section. This ensures that candidates are not able to access part A and change their responses. A CSV file (Staff.csv) is provided for you to create the Staff table required for part B.

Entity name: Staff					
Attribute name	Key	Type	Size	Required	Validation
staffID	PK	text			
forename		text			
surname		text			
address		text			
topSkill		text			
custRating		number			

The partially completed database must not include validation as this would provide candidates with examples of validation. Candidates use this partially completed database to complete the task.

Task 2

No additional instructions.

Task 3

The following files are provided and should be given to candidates to complete this task:

- ◆ firstStage.jpg
- ◆ middleStage.jpg
- ◆ finishedStage.jpg

Candidates **do not** need to print completed web pages in colour.

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
- ◆ demonstrating skills in computer programming
- ◆ applying computing science concepts and techniques to create solutions across a range of contexts

Your teacher or lecturer will let you know if there are any specific conditions for doing this assessment.

In this assessment you have to complete three short practical tasks. You may complete the tasks in any order.

Advice on how to plan your time

You have 8 hours to complete the assignment. 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) |

You can use this split as a guide when planning your time for each of the three tasks.

Advice on gathering evidence

As you complete each task, you must gather evidence as instructed in each task.

Your evidence, especially code, must be clear and legible. This is particularly important when you paste screenshots into a Word document.

Use the evidence checklist provided to make sure you submit everything necessary at the end of the assignment. Ensure your name and candidate number is included on all your evidence.

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, textbooks) — these may be online resources
- ◆ any files you have previously created throughout the course

The tasks are designed so you can complete them independently, without any support from your teacher or lecturer. This means that you:

- ◆ cannot ask how to complete any of the tasks
- ◆ cannot access any assignment files outside the classroom

Computing Science assessment task: evidence checklist

Task 1 Evidence	
Part A	
1a	Completed task 1 sheet showing analysis of database inputs <input type="checkbox"/>
1b	Completed task 1 sheet showing data dictionary <input type="checkbox"/>
Part B	
1c	Printout or screenshots of new database table – showing: <ul style="list-style-type: none"> • new fields <input type="checkbox"/> • data types have been created for the new fields <input type="checkbox"/> • 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 edit staff address <input type="checkbox"/> Printout of Staff table showing changed staff address <input type="checkbox"/>
Task 2 Evidence	
2a	Printout of your program code <input type="checkbox"/>
2b	Completed task 2 sheet showing the test table <input type="checkbox"/> Printout evidence of test runs showing inputs and outputs for the test table <input type="checkbox"/>
2c	Completed task 2 sheet showing the required extreme test data values <input type="checkbox"/>
2d	Completed task 2 sheet showing evaluation <input type="checkbox"/>
Task 3 Evidence	
3a	Completed task 3 sheet showing the 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 looks in a web 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)

Greenhands is a gardening company which employs staff to do jobs for its customers. The company keeps its staff details on paper cards.

Staff ID	DS021	Address	12 Leaf Avenue Farmridge Bowness
Forename	Derek		
Surname	Strimmer		
Top Skill (lawn, hedge or weeds)	Weeds		
Customer Rating (1-10)	6		

When requesting work to be completed in their garden, customers fill in a Customer Job Details form and send it to Greenhands. An example of the form is shown below.

Greenhands Gardening Services

Customer Job Details



Name	Paula Smith
Address	49 Daisy Drive, Grangemouth
Post Code	FA12 8HG
Contact Telephone Number	07973 276455
Task (please tick one box only)	<input type="checkbox"/> Lawn Mowed <input checked="" type="checkbox"/> Hedge Cut <input type="checkbox"/> Weeds Pulled
Please return to: Greenhands Ltd, 12 High Street, Falkirk	<i>For Office Use Only</i> Job Information Staff ID _____ Date _____ Time _____ Job ID _____

The office staff complete the Customer Job Details Form by contacting the customer to arrange a date and time for the task. Staff members are selected for each job by matching their 'top skill' to the customer's requested task.

- 1a Greenhands wishes to create a database to store its staff and job details.
Complete the job details in the analysis of inputs table below:

(3 marks)

Staff details:	Job details:
Staff ID Staff Forename Staff Surname Address Top Skill Customer Rating	

- 1b Complete the data dictionary for the Staff entity.

(5 marks)

Entity name: Staff					
Attribute name	Key	Type	Size	Required	Validation
staffID		text	5		length = 5
forename		text	20	Y	
surname			20	Y	
address		text	50	Y	
topSkill		text	5	Y	
custRating		number		N	

- ◆ 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.

Candidate name_____ Candidate number_____

Task 1: database design and development (part B)

- 1c Your teacher or lecturer will provide you with a partially completed database file.

Using the data dictionary below complete the relational database by:

- ◆ creating a new table to store the job details
- ◆ adding all validation to the job entity
- ◆ creating a relationship between the two tables

(5 marks)

Entity name: Staff					
Attribute name	Key	Type	Size	Required	Validation
staffID	PK	text	5	Y	length = 5
forename		text	20	Y	
surname		text	20	Y	
address		text	50	Y	
topSkill		text	5	Y	restricted choice: lawn, hedge, weeds
custRating		number		N	Range >= 1 and <= 10

Entity name: Job					
Attribute name	Key	Type	Size	Required	Validation
jobID	PK	number		Y	
jobDate		date		Y	
jobTime		time		Y	Range >= 9:00 and <= 18:00
custName		text	40	Y	
custAddress		text	50	Y	
custPostcode		text	8	Y	
phoneNo		text	11	N	
task		text	12	Y	restricted choice: Lawn Mowed, Hedge Cut, Weeds Pulled
staffID	FK	text	5	Y	existing staffID from Staff table

Print evidence to show that you have:

- ◆ created a new table to store the job details
- ◆ added all validation to the job entity
- ◆ created a relationship between the two tables

1d Staff member DS021 has moved house recently.

Implement an SQL statement that will change the address of this member of staff to:

99 Willow Way, Falkirk, FK8 7 6FE

(2 marks)

Print evidence of your SQL statement and the Staff table (clearly showing the new address) once the SQL statement has been implemented.

Task 2: software design and development

Scotven offers a mobile wi-fi service at outdoor events. They check the signal strength by taking readings from five locations.



The analysis and design for a program is shown below:

Program analysis

A program is required to display the five readings taken at the event and a signal pattern. The signal pattern will show the strength of readings (S = strong, M = medium and P = poor) in the order the readings were taken (1 to 5), for example "SSMPS".

Assumptions

- ◆ readings of signal strengths are recorded with two decimal places from 0.00% to 100.00%
- ◆ a strong signal is greater than 80% signal strength
- ◆ a medium signal is less than a strong signal and more than a poor signal
- ◆ a poor signal is less than 30% signal strength

Inputs

- ◆ five valid readings from the venue

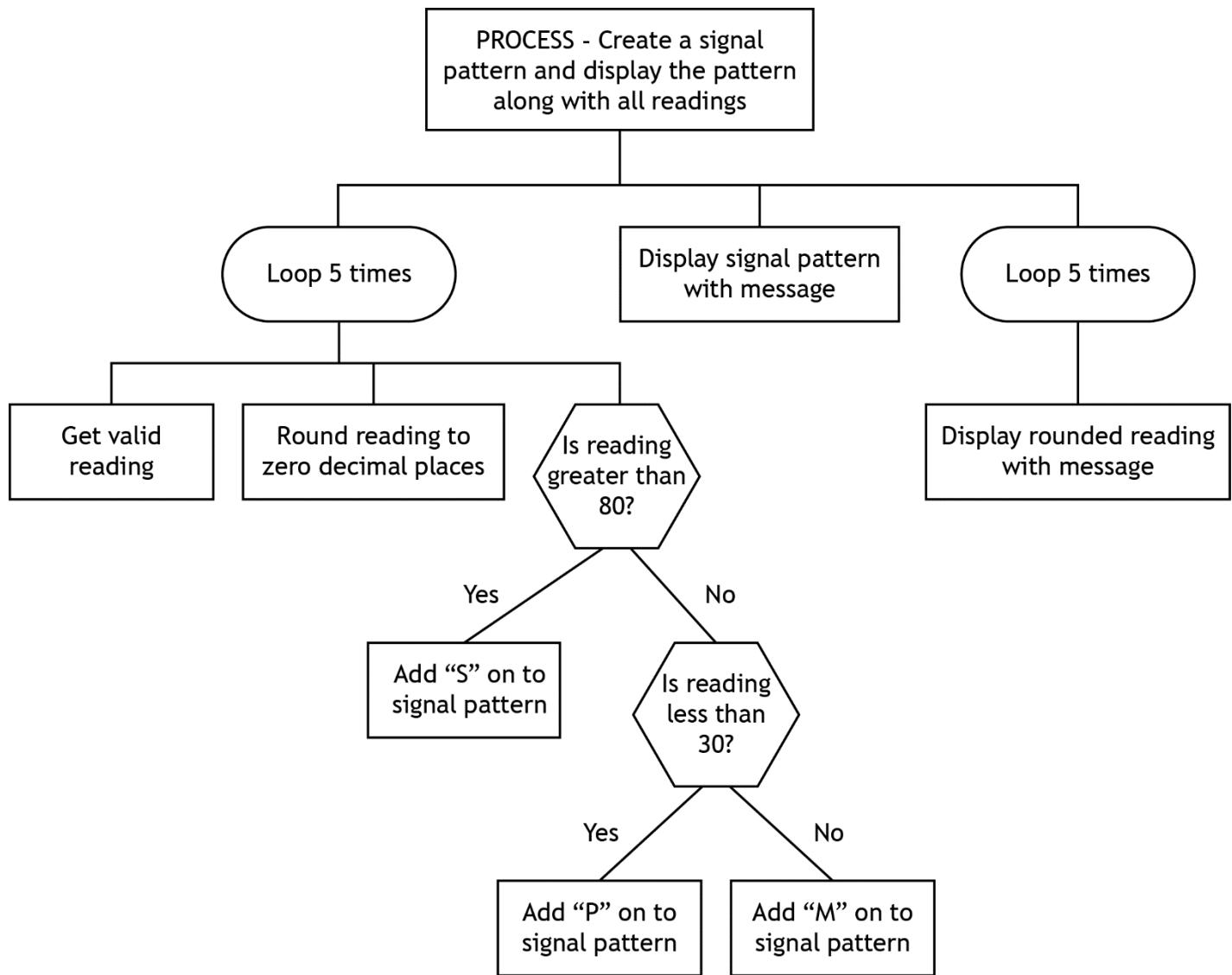
Processes

- ◆ round each reading to zero decimal places
- ◆ create a five character string representing the signal pattern

Outputs

- ◆ a message displaying the signal pattern
for example - Signal Pattern is: SSMPS
- ◆ the five rounded readings with each reading number
for example - Reading 1 - 89
Reading 2 - 82
Reading 3 - 56
Reading 4 - 12
Reading 5 - 99

Program design (structure diagram)



Task 2: software design and development

- 2a Using the program analysis and design, implement the program in a language of your choice. Ensure the program matches the structure diagram provided.

(15 marks)

Print evidence of your program code.

- 2b Your program should be tested to ensure it produces different signal patterns correctly.

Complete the table below to create one set of test data that will produce the expected output for the signal pattern shown.

(2 marks)

Type of test	User Input	Expected output for signal pattern	Actual output
Normal	reading 1 reading 2 reading 3 reading 4 reading 5	Signal pattern is: MPSPS	Attach printouts of inputs and outputs as evidence.

You must demonstrate that your program correctly outputs the signal pattern and the rounded readings.

Print evidence of inputs and outputs to show that you have completed the test.

- 2c Your program should be tested to ensure that each signal strength character is correctly assigned as S, M or P. Six extreme test values are required to test this fully.

State the six test data values required:

(3 marks)

Extreme 1 _____

Extreme 2 _____

Extreme 3 _____

Extreme 4 _____

Extreme 5 _____

Extreme 6 _____

Candidate name_____ Candidate number_____

2d With reference to your code, evaluate your program by commenting on the following:

Fitness for purpose (1 mark)

Where your code demonstrates efficient use of programming constructs (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

Grieve Crafts builds eco-friendly garden products. They wish to create a web page with the following content:

- ◆ a coloured top section which includes the company name
- ◆ a coloured middle section which includes a heading and short paragraph titled “About our Company”
- ◆ a coloured bottom section which include a heading, three photographs showing their most popular product being built and descriptions to accompany the photographs
- ◆ an external link to a web page about their wood source.

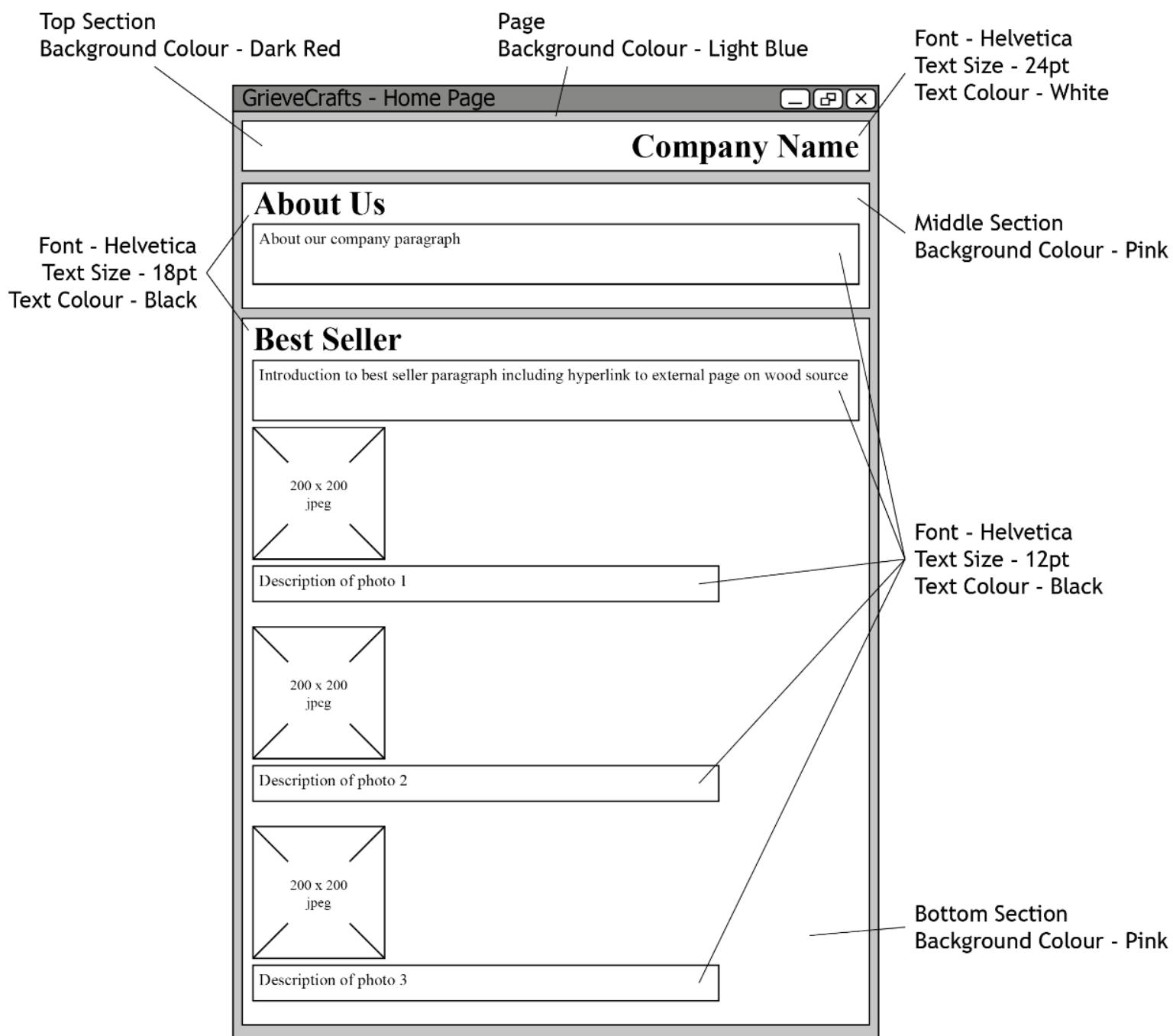
3a State **two** functional requirements for the web page.

Functional requirement 1 (1 mark)

Functional requirement 2 (1 mark)

- 3b When designing the web page, Grieve Crafts produced a wireframe and a low-fidelity prototype of the page showing an external link to a web page about the source wood.

The wireframe design of the page (annotated with required styles) is shown below:



The low-fidelity prototype of the page is shown below:

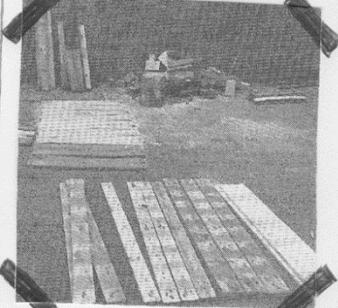
Grieve Crafts

About Our Company

Formed in 2016, Grieve Crafts is an environmentally-friendly company whose products are all made from recycled wood.

Our Best Seller

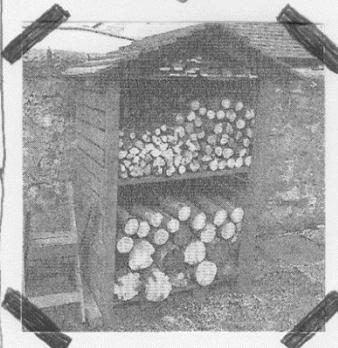
Built from recycled wooden pallets our exclusive wood shed is available at a discounted price of \$235.



Starting Point: Dismantle four or five old pallets.



Halfway Point: The basic structure is assembled.



Finishing Point: The finished, painted product.

Your teacher/lecturer will provide you with the following three graphic files:

- ◆ firstStage.jpg
- ◆ middleStage.jpg
- ◆ finishedStage.jpg

Implement the design using HTML and CSS. All style information should be placed in an external CSS file as Grieve Crafts may add more web pages in the future.

The web page should include a hyperlink to:
<https://en.wikipedia.org/wiki/Pallet>

(8 marks)

Print evidence of the following:

- ◆ HTML file
- ◆ CSS file
- ◆ Web page showing how it looks in a web browser

Acknowledgement of Copyright
Task 1 - RetroClipArt/Shutterstock.com
Task 2 - Claudio Divizia/Shutterstock.com

Administrative information

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History of changes

Version	Description of change	Date

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