|  |
| --- |
| **Digital Technologies Department**  logo**91075 Algorithms Assessment (Internal)** |
| Assessment Type: Internal  Achievement Standard Assessed: 91075 (version 2)  Level: 1  Credits: 3 |

Teacher guidelines

Teachers need to be very familiar with the outcome being assessed by Achievement Standard Technology 91075. The achievement criteria and the explanatory notes contain information, definitions, and requirements that are crucial when interpreting the standard and assessing students.

Setting

Students are required to solve a problem on triangle data as specified in the student instructions.

Conditions

This is an individual assessment activity. Students will have 2 hours of time to complete it. (*4 lessons of in class time for the practice assessment*)

Resource requirements

Students will require either pencils and paper or a computer. Software options are Microsoft Word and Excel

|  |
| --- |
| **Digital Technologies Department**  logo**91075 Algorithms Assessment (Internal)** |
| Assessment Type: Internal  PRACTICE  Achievement Standard Assessed: 91075 (version 2)  Level: 1  Credits: 3 |

| Achievement | Achievement with Merit | Achievement with Excellence |
| --- | --- | --- |
| Construct a plan for a basic computer program for a specified task. | **Skilfully** construct a plan for a basic computer program for a specified task. | **Efficiently** construct a plan for a basic computer program for a specified task. |

Student instructions

Introduction

Context and issue

Design a program to do the following:

For a kite building competition, a triangle has to be cut from a specified size of material. For any number of triangles, the user of the program keys in three lengths for the three sides of a triangle. Input is terminated with a length of -1 for the first side.

After the data for a triangle is entered, the user is given a menu of the following options for that triangle.

[P]: Perimeter of the triangle

[A]: Area of the triangle

The user selects an option by typing in a P or A, and the result of the option is displayed before the data for the next triangle is entered. The sides of the triangle are limited to a maximum of 100cm

*Hint*:

The perimeter of a triangle is the sum of the three sides

Use the following formula to determine the area of the triangle – calculated on the three sides.

Area =  where s = half the perimeter

Note: lengths entered for the three sides of a triangle are valid if the sum of any two sides is greater than the third side. For example, expected data for a triangle could be 30, 40 50.

Your plan needs to do these things:

* Specify variables and their data types
* Specify a set of test cases with expected inputs
* A deskcheck showing how output is obtained
* A testing procedure specifying actions, conditions and control structures
* Specify a set of test cases for unexpected data (boundary and invalid data)

You will be assessed on how clearly you have described your plan. Note that you will not be required to code your plan.

This is an individual task. You have 3 hours to complete it. *(3 lessons of in-class time and homework time*)

Task 1: Analyse the problem

Open the document AS91075\_Practice from P:\Digital Technologies\DT 11\Computer Science with Programming\Assessments\AS91075\BHS\_Practice (2012)

Add in a header on the right with your name and NSN number.

Add in a footer with a page number.

Read the question through again.

Task 2: Identify the input information

What information will the user have to enter? Copy and complete this table.

|  |  |  |
| --- | --- | --- |
| **Variable name** | **Data type** | **How entered** |
|  |  |  |
|  |  |  |

Task 3: Identify the output information

What information will the program need to print out? Copy and complete this table.

|  |  |  |
| --- | --- | --- |
| **Output** | **Format** | **When it happens** |
|  |  |  |
|  |  |  |

Task 4: Identify the stored information

What information will the program need to store? Identify any constant values, if necessary..

Task 5: What calculations are necessary

Write out the calculations in terms of the variables specified above.

Task 6: Test Data table of expected inputs

Create a table of expected input data using Excel or Word.

Task 7: Deskcheck of steps used in processing

Create a deskcheck showing how the output will be obtained. This could be with printed table and pen or in Word or by formula printout in Excel; and add the result to your document.

Task 8: Create a testing procedure

Describe the steps that the computer program will have to take to solve the problem. You may choose to do this as pseudocode or as a flowchart. You must clearly identify sequence (steps in order), selection (choice of actions) and iteration (looping or repetition).

You are recommended to develop several versions of your plan showing how you will continually improve and refine your program to solve the given task. The final version in your testing procedure should clearly show how the program will solve the given task on expected data inputs.

Make any additions to the input, output and storage tables that are necessary as you refine your plan to solve the problem.

Task 9: Create a testing table for boundary inputs for testing the program

Add to your test data table to indicate what boundary inputs you would include for testing the program

Clearly indicate in a new version of your plan what extra steps may be needed in your program to ensure the sequence of actions correctly performs the task and has no unintended behaviour or consequences.

Task 10: Create a testing table for invalid inputs for testing the program

Add to your test data table to indicate what invalid inputs you would include for testing the program comprehensively.

Clearly indicate in a new version of your plan what extra steps may be needed in your program to make a robust and flexible program.

Marking Rubric

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Student/  Date | Teacher/  date | Assessment evidence | Assessment strategies |
| **Achieved** |  |  | I have analysed the problem | Problem statement |
|  |  | I have identified the input information | Input table |
|  |  | I have used sensible variable names | Input and storage tables |
|  |  | I have identified the type of all variables | Input and storage tables |
|  |  | I have described each variable | Input and storage tables |
|  |  | I have identified output information | Output table |
|  |  | I have described when each output occurs | Output table |
|  |  | I have described each output | Output table |
|  |  | I have identified what needs to be stored | Storage table |
|  |  | I have specified test data for expected values | Test data table |
|  |  | I have completed a deskcheck | Deskcheck |
|  |  | I have described my testing plan | Pseudocode or flowchart |
|  |  | My plan has sequence (steps in order) | Pseudocode or flowchart |
|  |  | My plan has selection (choice of actions) | Pseudocode or flowchart |
|  |  | My plan has iteration (a loop) | Pseudocode or flowchart |
|  |  | My plan will produce a correct result for a set of expected triangle data | Testdata and Deskcheck  Final version of plan |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Merit** |  |  | I have worked independently | Teacher observation |
|  |  | I have well-chosen actions, conditions and control structures | Testing plan versions |
|  |  | I have created a test data table for boundary data | Extra test data table |
|  |  | I have added statements to my plan so the program has no unintended behaviour or consequences | Final version of plan |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Excellence** |  |  | I have constructed a flexible and robust plan | Pseudocode or flowchart |
|  |  | I have a well-structured logical solution to the task | Testing plan versions |
|  |  | I have created a comprehensive test data table for expected, boundary and invalid data | Pseudocode or flowchart |

Assessment Schedule: Technology 91075 Triangle Algorithm

|  |  |  |
| --- | --- | --- |
| Evidence/Judgements for Achievement | Evidence/Judgements for Achievement with Merit | Evidence/Judgements for Achievement with Excellence |
| The student has provided the following evidence   |  | | --- | | Two or more types of information | | Variable names are meaningful | | Steps in order (sequence) | | IF structure(selection) | | Loop structure (iteration) | | Indicated predefined methods, functions etc. eg  Enter data (coded in language as predefined action) | | Conditions (logical expressions) | | Plan correct | | Test data for expected inputs | | Deskcheck | | The plan itself should not be expressed in program code |   **The student has constructed a plan for a basic computer program for the triangle problem** | The student has met the Achieved requirements and provided the following evidence:   |  | | --- | | Independent development | | test cases with expected and boundary inputs for testing the program | | no unintended behaviour or consequences in plan |   **The student has skilfully constructed a plan for a basic computer program for the triangle problem** | The student has met the Merit requirements and provided the following evidence:   |  | | --- | | checking input for validity | | test cases with expected, boundary and invalid input for testing the program | | no unnecessary duplication or repetition |   **The student has efficiently constructed a plan for a basic computer program for the triangle problem** |

Final grades will be decided using professional judgement based on a holistic examination of the evidence provided against the criteria in the Achievement Standard.