Monash University

Semester One Examination Period 2013

Faculty of Information Technology

EXAM CODES: FIT1040

TITLE OF PAPER: SAMPLE PAPER PROGRAMMING FUNDAMENTALS

EXAM DURATION: 3 hours writing time

READING TIME: 10 minutes

THIS PAPER IS FOR STUDENTS STUDYING AT: (tick where applicable)

- Berwick
- Clayton
- Malaysia
- Off Campus Learning
- Open Learning
- Caulfield
- Gippsland
- Peninsula
- Enhancement Studies
- Sth Africa
- Parkville
- Other (specify)

During an exam, you must not have in your possession, a book, notes, paper, electronic device/s, calculator, pencil case, mobile phone or other material/item which has not been authorised for the exam or specifically permitted as noted below. Any material or item on your desk, chair or person will be deemed to be in your possession. You are reminded that possession of unauthorised materials in an exam is a discipline offence under Monash Statute 4.1.

Answers are to written within this examination paper. If more space is needed extra script books are available.

No examination materials are to be removed from the room.

AUTHORISED MATERIALS

CALCULATORS  □ YES  ☑ NO
OPEN BOOK  □ YES  ☑ NO
SPECIFICALLY PERMITTED ITEMS  □ YES  ☑ NO

if yes, items permitted are:

Candidates must complete this section if required to write answers within this paper

STUDENT ID  _______  _______  _______  _______  _______  _______  _______  _______
DESK NUMBER  _______  _______
Instructions to Candidates

This paper will be marked out of 100 marks. It contributes 60% to the final mark for the unit FIT1040. The paper is divided into 4 parts labelled A, B, C and D.

Part A contains multiple-choice questions and is worth 20 marks. Each question in part A is worth 1 mark. There are a total of 20 questions. Marks are awarded for each correct answer. No mark is awarded (or deducted) for incorrect answers.

Part B contains 5 questions that will require short answers and is worth 25 marks. Most questions will require you to read and interpret Scribble code. Each question in this section is worth 5 marks.

Part C is contains 3 questions and is worth 30 marks. Each question will require you write a short Scribble script. Each question in this section is worth 10 marks.

Part D contains a single question worth 25 marks. The question requires that you to write a description of a complete Scribble application including all the scripts.

Three reference guides have been included within the paper to assist you in answering the questions in the paper. The first shows the flowchart symbols to be used in the paper. The second provides a list of the Scribble code blocks. The third provides a guide to handwriting Scribble code.

Answer all questions in the spaces provided within this examination paper. Spare space is provided at the end of the paper that can be used if the space required to answer a question exceeds the space available. Please use a pen (other than red) to write your answers.

Flow Chart Symbols

Please use these symbols when drawing flowcharts in this paper.

![Flow Chart Symbols](image)
Scribble Code Block Reference Guide

Motion Code Blocks

- move 10 steps
- turn ← 15 degrees
- turn → 15 degrees
- point in direction 90°
- point towards
- go to x: -170 y: -83
- go to
- go to random location
- glide 1 secs to x: -170 y: -83
- change x by 10
- set x to 0
- change y by 10
- set y to 0
- if on edge, bounce
  - x position
  - y position
  - direction

Looks Code Blocks

- switch to costume costume1
- next costume
- costume#
- say Hello! for 2 secs
- say Hello!
- think Hmm... for 2 secs
- think Hmm...
- change color effect by 25
- set color effect to 0
- clear graphic effects
- change size by 10
- set size to 100%
- size
- show
- hide
- go to front
- go back 1 layers
Variable Code Blocks

- Make a variable
- set ▼ to 0
- change ▼ by 1
- show variable ▼
- hide variable ▼
- delete ▼
- script variables ▼

- Make a list
- list ▼
- add ▼ thing to ▼
- delete ▼ of ▼
- insert ▼ thing at ▼ of ▼
- replace item ▼ of ▼ with ▼ thing

- item ▼ of ▼
- length of ▼
- ▼ contains ▼ thing
- ▼ as text
- copy of ▼
- Make a block

Shape Code Blocks

- clear
- circle radius 50
- oval radius 80 by 50
- rectangle 50 by 50
- start shape
- end shape

- change fill color by: 10
- set fill color to ▼
- change fill shade by 10
- set fill shade to 50
- change fill ghosting by: 10
- set fill ghosting to: 50
Text Code Blocks

clear

write

set font to Aardvark

set font size to 12

change font color by 10

set font color to

change font shade by 10

set font shade to 50

SAMPLE PAPER ONLY
Handwriting *Scribble* Code

In this paper, when hand writing *Scribble* code, simply write the words used to identify each individual code block on a separate line. Any sprites, costumes, lists or other variables used should be listed and described in the answer space provided. It is a good idea to show parameters passed to code blocks inside brackets () The beginning and ending of control code blocks, such as a branch of an if-then code block or a looping code block should be visually shown in the manner used in the example below.

**Example Scribble Code**

![Scribble Code Diagram](image)

**Handwritten equivalent**

```
when green flag clicked
pen down
set (steps) to (1)
set (angle) to (pick random (146) to (172))
repeat (200)
if (draw) = (true)
move (steps) steps
turn (-angle) degrees
if on edge, bounce
change (steps) by (1)
change pen color by (pick random (3) to (10))
change pen shade by (pick random (3) to (10))
else
say (I'm not ready)
```

```
when / clicked
pen down
set steps to (1)
set angle to (pick random (146) to (172))
repeat (200)
if (draw) = (true)
move (steps) steps
turn (-angle) degrees
if on edge, bounce
change (steps) by (1)
change pen color by (pick random (3) to (10))
change pen shade by (pick random (3) to (10))
else
say (I'm not ready)
```
Part A  Multiple Choice Questions  20\times 1 = 20 \text{ marks}

Marking Scheme for Part A, Multiple Choice Questions:

- 1 mark for a correct answer
- 0 marks for a wrong or more than one answer
- 0 marks for no answer

Answer every question by circling the letter corresponding to the ONE best answer.

Examples:

QUESTION XX:

I learned in FIT1040 that:

A. The assignment can be done one day before the submission date
B. If the day is too cold, I can excuse myself from going to lectures
C. FIT1040 is a common core unit at the Faculty of Education at Monash
D. FIT1040 is a common core unit at the Faculty of IT at Monash
E. None of the above

If you change your mind about an answer, place a line through the circle you have drawn around the incorrect answer and circle the correct answer. Example:

QUESTION XX:

I learned in FIT1040 that:

\boxed{\text{X}} The assignment can be done one day before the submission date
B. If the day is too cold, I can excuse myself from going to lectures
C. FIT1040 is a common core unit at the Faculty of Education at Monash
\boxed{\text{X}} FIT1040 is a common core unit at the Faculty of IT at Monash
E. None of the above
QUESTION A.1:
When testing a Scribble application, a unit test is a test of …

A. the input of a data item.
B. the operation of an application.
C. system requirements.
D. the interaction between sprites.
E. an individual script or sprite.

QUESTION A.2:
When testing a Scribble application, an integration test is a test of …

A. the integration of data inputs with a script.
B. the operation of an application.
C. system requirements.
D. the interaction between sprites.
E. an individual script or sprite.

QUESTION A.3:
A(n) ________ loop has no way of ending and repeats until the program is interrupted.

A. indeterminate
B. interminable
C. infinite
D. timeless
QUESTION A.4:
A _________ is a diagram that graphically depicts the steps that take place in a program.

A. program graph  
B. code graph  
C. flow chart  
D. step chart  
E. desk check

QUESTION A.5:
A(n) ________ is a set of well-defined logical steps that must be taken to perform a task.

A. plan of action  
B. logarithm  
C. logic schedule  
D. algorithm

QUESTION A.6:
Consider the following Scribble script.

The output will be:

A. 0  
B. blank  
C. true  
D. false
QUESTION A.7:
Consider the following Scribble script.

The output will be:

A. 0
B. blank
C. true
D. false

QUESTION A.8:
Consider the following Scribble script.

The output will be:

A. 0
B. blank
C. true
D. false
QUESTION A.9:
Read the following code segment. Assume that x is an integer variable that has been correctly defined and has been given a legal value.

Which option is true?

A. The "say" command will execute so long as x is greater than 10 and less than 20.
B. The "say" command will always execute.
C. The "say" command will execute so long as x is less than 10 and greater than 20.
D. The "say" command will never execute.

QUESTION A.10:
What will happen once the following Scribble script has run?

A. Result in j having a value of 3.
B. Compile but result in a run-time error when executed.
C. Result in j having a value of 2.
D. Result in j having an unpredictable value.
QUESTION A.11:
Consider the following Scribble script.

How many times will ‘Hello!’ be printed out?

A. 4.
B. 5.
C. 6.
D. 9

QUESTION A.12:
When possible you should avoid using ________ variables in a program.

A. global
B. parameter
C. reference
D. local
QUESTION A.13:
The following *Scribble* script is expected to display all numbers of the 8 times table (*ie* 8, 16, 24, 32, *etc*) less than 100.

What will actually happen?

A. It will not display any numbers.

B. It will get stuck in an infinite loop.

C. It will display all zeros.

D. It will produce the correct output.

E. It will display one number too many.
QUESTION A.14:
Consider the following *Scribble* script.

This code is supposed to ask the user to enter a value. The value entered is then stored in the variable named value. That number (value) squared is then stored in the variable named squared. The user is then shown the original number entered and its square. For example, if a user typed 3, the program should respond with "3 squared is 9". What will actually happen when this code is run?

A. The user won't get a chance to enter a number, as the loop will never run.

B. The code will work, but will be stuck in an infinite loop.

C. The wrong answer will be displayed; the number entered won't be squared correctly.

D. The code will run correctly.

QUESTION A.15:
In *Scribble*, a variable that is visible to every sprite in the program is a ________ .

A. universal variable

B. program-wide variable

C. global variable

D. local variable
QUESTION A.16:
In a nested loop, the inner loop goes through all of its iterations for every single iteration of the outer loop.

A. True
B. False
C. Loops cannot be nested
D. It’s impossible to say without more information about the loops.

QUESTION A.17:
Consider the following *Scribble* script and select the correct option below.

A. Employee will be printed once to the screen and the loop will terminate.
B. The code will compile but the body of the loop will never be executed.
C. The code will result in an infinite loop.
D. The code is not in a logical sequence, and won’t run.
QUESTION A.18:
Consider the following Scribble script.

Which one of the following is true?

A. The above code will not run correctly as it doesn’t have a default option.
B. The above code will not run because employee must be a number or a string.
C. "Not employee" will be printed to the screen when the code executes.
D. "Employee" will be printed on the screen when the code executes.

QUESTION A.19:
A _______ is a Boolean variable that signals when some condition exists in the program.

A. flag
B. sentinel
C. signal
D. siren
QUESTION A.20:
Consider the following *Scribble* script. Assume that letter1, letter2 and letter3 are text variables that have been correctly defined and that letter1 has a value of "d", letter2 has the value "a", and letter3 has the value "m". After the script has run what will be the output if letter1, letter2 and letter3 are output (in that order)?

A. m, d, a  
B. d, a, m  
C. d, m, a  
D. m, a, d  
E. a, d, m  

END OF PART A
Part B  

Short Answer Questions  

5*5 = 25 marks

B.1  

Debugging  

5 marks

You are working in your first job as a programmer. It’s late in the afternoon and a you are aware of a colleague working near you who is becoming quite anxious and frustrated as they try to debug an application program that they have been working on. Your colleague is also a recent graduate – from another University. The code they are working on is largely finished but some parts of the application aren’t working correctly. You decide to help your colleague. What advice will you give them about the strategies they should be using to find and fix bugs in their program code?
Use this space to continue your answer to question B.1 (if required).

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B.2 Desk-checking code

Perform a desk check that shows the step-by-step operation of the following *Scribble* script. Assume that the list named *testScores* has global scope and contains 12 numeric items (shown below).
B.3 Program structure 5 marks

In *Scribble*, it is possible to create custom code blocks. These code blocks can be commands, reporters or operators. During the semester several custom code blocks were demonstrated. One was named the *DrunkardsWalk*. This code block was a command code block. When was used, it was given two parameters that defined the behaviour of a sprite on the stage that drew a coloured random grid pattern. Another was a reporter block that converted degrees Celsius to degrees Fahrenheit. A custom operator code block was also created to perform the logical test >= (greater than equals to).

Discuss the possible benefits of the use of custom code blocks. Make sure in your answer you discuss each of the examples cited above.
Use this space to continue your answer to question B.3 (if required).
A Scribble application asks the user to enter a distance in miles. It then converts the distance entered to kilometres and displays the result of that conversion to the user. Create a set of test data items that could be used to make sure that the program was operating correctly.
B.5  Creating a flowchart  5 marks

Draw a flowchart to represent the following *Scribble* script. The script implements a version of the Binary Search algorithm. The script runs by asking the user to enter the name of a golfer. It then searches for that name in a sorted list named *MastersWinners*. (The list contains the names of all the golfers who have won the U.S. Masters golf tournament.)
Use this space to continue your answer to question B.5 (if required).

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Use this space to continue your answer to question B.5 (if required).

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END OF PART B
A Scribble sprite (named Search) contains an unsorted list of numbers (called numberList). Write a script that runs when that sprite is clicked. The script will ask the user to enter a number. The script will search for that number in numberList. If the number is found in the list it will display a message that says that the number was found and what the index number of the entry in the list is. If the number isn’t found the script will report that the number isn’t in the list.
A Scribble sprite (named Sprite1) contains list named Numbers. Write a script that runs when the green flag is clicked. When the script runs it will first delete any data already in the list Numbers. The script will then fill the list Numbers with the numbers of the Fibonacci sequence (in order).

The Fibonacci sequence starts with the numbers 1, and 1, and then the next numbers in the list are the previous two added together. So the 3\textsuperscript{rd} item is 1+1 = 2, the 4\textsuperscript{th} item is 1+2 =3, the 4\textsuperscript{th} item 2+3 = 5, and so on.

The script will begin by asking the user to enter a value. That value will be length of the list that is to be created. For example, if the user types in 6, the script will then create a list with 6 values of the Fibonacci sequence (1, 1, 2, 3, 5, 8).
A Scribble application contains a list of names, named Names. The length of the list Names changes as the application runs. The list Names has been created with global scope. A sprite named Sort is visible on the stage. Write a script that runs when the sprite Sort is clicked. When the script runs it should use the BubbleSort algorithm to sort the items in the list Names alphabetically from A to Z.

The BubbleSort algorithm works, starting with the first pair, by comparing each pair of items in a list. If they are out of order they are swapped. It then examines the second pair of numbers in the list, and if they are out of order, they are swapped. This continues until the end of the list. This is repeated until the list is sorted. Make the script as efficient as the BubbleSort method can be made.
Write a Scribble application scripts that lets a user play the game Tic-Tac-Toe. The game should be played by two players, taking turns to mark a 3x3 game grid with a X or a O. The first player to get three of their marks in a horizontal, vertical or diagonal row wins. If the game grid is filled with marks and no player has won, the game is drawn.

Answer the question by listing the sprites required. Also, describe the variables needed. This description should include the name of each variable, it’s purpose, and it’s scope. All the assets required to implement the game (graphic images and sounds) should be sketched or described. All of the scripts required should be written.

*Use this space to describe the sprites required in the application.*
Use this space to describe the variables required in the application.
Use this space to describe the game assets required in the application.
Use this space to continue your answer to question D.1 (if required).
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SPARE SPACES FOR ANSWERS

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