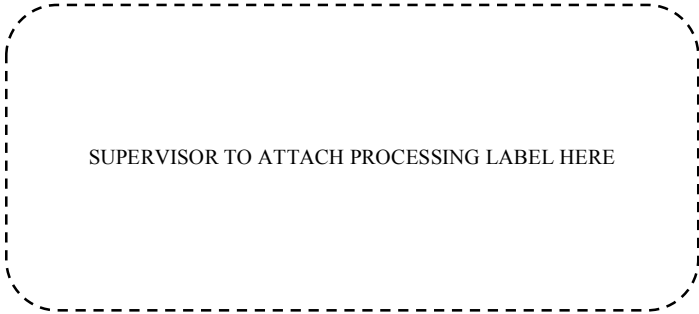




**ADRIAN  
JANSON  
PUBLISHING**



**Victorian Certificate of Education  
2018**

Letter

STUDENT NUMBER

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# COMPUTING: SOFTWARE DEVELOPMENT

## Written Examination

Sample Exam, 2018

Reading time: \*.\*.\* to \*.\*.\* (15 minutes)

Writing time: \*.\*.\* to \*.\*.\* (2 hours)

## QUESTION AND ANSWER BOOK

### Structure of book

<i>Section</i>	<i>Number of questions</i>	<i>Number of questions to be answered</i>	<i>Number of marks</i>
A	20	20	20
B	7	7	20
C	14	14	60
			Total 100

- Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners, rulers and one scientific calculator.
- Students are NOT permitted to bring into the examination room: blank sheets of paper and/or white out fluid/tape.

#### Materials supplied

- Question and answer booklet of 18 pages.
- Detachable insert containing a case study for Section C in the centrefold.
- Answer sheet for multiple choice questions.

#### Instructions

- Detach the insert from the centre of this book during reading time.
- Write your **student number** in the space provided above on this page.
- Check that your **name** and **student number** as printed on your answer sheet for multiple-choice questions are correct, **and** sign your name in the space provided to verify this.
- All written responses must be English.

#### At the end of the examination

- Place the answer sheet for multiple-choice questions inside the front cover of this book.

**Students are NOT permitted to bring mobile phones and/or any other unauthorised electronic communication devices into the examination room.**

## SECTION A – Multiple choice questions

### Instructions for Section A

Answer **all** questions in pencil on the answer sheet provided for multiple-choice questions.

Choose the response that is **correct** or that **best answers** the question.

A correct answer scores 1, an incorrect answer scores 0.

Marks will **not** be deducted for incorrect answers.

No marks will be given if more than one answer is completed for any question

#### Question 1

In designing a new software product, a company was able to cut the time it took to compile a sales brochure. This could best be described as an improvement in:

- A. Wages
- B. Cost
- C. Efficiency
- D. Effectiveness

#### Question 2

‘City Tech will provide up time of 99.5%’ is a statement that could be best described as:

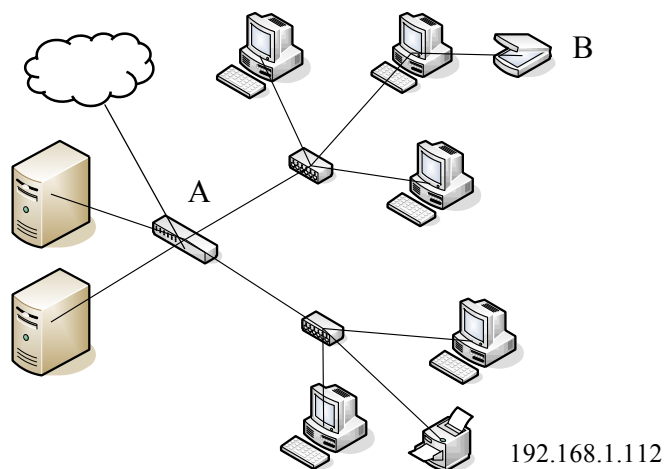
- A. An organisational goal
- B. A mission statement
- C. A banner heading for the web-site
- D. An information system objective

#### Question 3

Which of the following is **not** a benefit of writing an algorithm?

- A. Find errors in logic
- B. Easier to divide a program up amongst a team for coding
- C. Test the user interface
- D. Make the code as efficient as possible

*The following information is required for Questions 4, 5 and 6*



**Question 4**

The network device shown at position A in the diagram is most likely a:

- A. Router
- B. Switch
- C. Hub
- D. Firewall

**Question 5**

The scanner shown at position B is poorly placed as:

- A. It will not work in this position.
- B. It will only be able to be used when the computer it is connected to is on.
- C. It should be connected to the server.
- D. Other users will not be able to locate it.

**Question 6**

The printer shown has an IP address of 192.168.1.112. The IP address of the gateway is most likely to be:

- A. 1.0.0.1
- B. 192.168.0.1
- C. 192.1.1.1
- D. 192.168.1.1

**Question 7**

An interface that is 'forgiving' is one that:

- A. Works reliably all of the time
- B. Is easy to understand
- C. Allows the user to undo transactions
- D. Works on a variety of platforms

**Question 8**

The presence of the logic error would most likely mean that:

- A. The program would not run at all
- B. The program would run for a time and then crash
- C. The program would not compile
- D. The program would most likely give incorrect results in response to supplied input

**Question 9**

The validation technique known as 'existence checking' is when the code:

- A. Checks to see that a value is within a specified range
- B. Prompts the user to click 'next'
- C. Checks to see that a value has been entered
- D. Checks to see that a value is of the correct type

**SECTION A – continued**  
**TURN OVER**

The following information is required for Questions 10, 11 and 12.

Consider the algorithm shown below:

```

Begin
  Index ← 0
  Read Length[Index], Width[Index], Height[Index]
  While Height[Index] <> -1 Do
    TSA ← 2 * Length[Index] * Width[Index] + 2 * Width[Index] * Height[Index] +
          2 * Height[Index] * Length[Index]
    Display TSA
    Index ← Index + 1
    Read Length[Index], Height[Index], Width[Index]
  End While
End

```

The algorithm reads from the following data file:

```

5, 6, 2
3, 4, 5
1, 10, 2
77, 88, -1

```

**Question 10**

The data structure Length[Index] is most likely to be:

- A. A one-dimensional array
- B. A two-dimensional array
- C. A reference to a hash table
- D. An integer

**Question 11**

The first number that the algorithm will display is:

- A. -1
- B. 6
- C. 562
- D. 104

**Question 12**

After reading the last line of the data set, the algorithm does not finish as it should. This is because:

- A. Height[Index] will equal 88 and not -1
- B. Index will not equal -1
- C. Height[Index] will equal -1
- D. TSA will be greater than 0

**Question 13**

Which of the following could not be used to gather data from potential users of an App that is being developed regarding their requirements?

- A. An online survey
- B. A focus group
- C. Observation
- D. Interviews

**Question 14**

An element of a DFD which transforms the data coming into it is known as a:

- A. Data flow
- B. Data store
- C. Process
- D. Entity

**Question 15**

True/False choices in a questionnaire would best be stored as which data type?

- A. Integer
- B. Character
- C. String
- D. Boolean

**Question 16**

Which of the following could be legal?

- A. A company sells the details of its clients to a marketing firm without permission
- B. A company requests medical information from customers
- C. Trying to guess someone's password so that you can access their social media accounts
- D. Inspecting the code of a competitor's software product so that it can be used in your own

**Question 17**

A set of test data that would test the boundaries of an age range that can be from 18 to 80 years would be?

- A. 17, 18, 80, 81
- B. 18, 80
- C. 18, 19, 79, 80
- D. 16, 17, 19, 78, 79, 81

**Question 18**

Data that is collected that is descriptive in nature can be categorised as:

- A. Associative
- B. Quantitative
- C. Qualitative
- D. Strings

**Question 19**

The use of a naming convention such as the Hungarian Convention ensures:

- A. Variable names will be kept to the smallest size possible
- B. Consistency of the naming of program elements
- C. Code will be easy to read for other programmers
- D. Descriptive names will not be used

**Question 20**

Which of the following should not be used as an actor in a Use Case diagram?

- A. Maxwell Smith
- B. System Administrator
- C. Accounting Department
- D. Time sheet software

**END OF SECTION A**

**SECTION B – Short-answer questions****Instructions for Section B**

Answer **all** questions in the spaces provided.

**Question 1**

With reference to the stages of the Problem Solving Methodology, the stage that involves writing software to be used within the solution is called the \_\_\_\_\_ stage.

1 mark

**Question 2**

Ben is discussing the pros and cons of agile development with Tiffany. While Ben favours using agile development as the finished product is more reflective of the needs of the client, Tiffany argues that the costs can spiral out of control.

- a. Explain how agile development results in a more finished product.

---

1 mark

- b. In reference to the point Tiffany is making, discuss how this could occur and how it could be prevented.

---



---

2 marks

**Question 3**

- a. In relation to project management, explain what a milestone is.

---

1 mark

- b. Describe **two** strategies that can be used to ensure that a project does not miss its scheduled milestones.

1. \_\_\_\_\_

2. \_\_\_\_\_

2 marks

**SECTION B – continued  
TURN OVER**

**Question 4**

Consider the algorithm shown below:

```

Begin
  Input A
  Input B
  Input C
  While A <> 0 Do
    D ← (A+B+C) / 3
    Display D
    Input A
    Input B
    Input C
  End While
End

```

- a. State a value of 'A' that would result in algorithm ending.

1 mark

- b. If the algorithm is supplied with the following input, what two values would be displayed?  
10, 12, 11, 3, 9, 9, 0, 562, -10

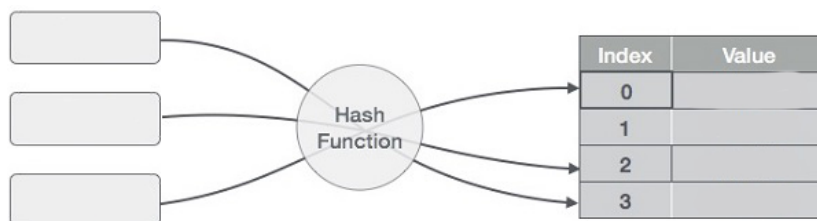
Value 1: \_\_\_\_\_

Value 2: \_\_\_\_\_

2 marks

**Question 5**

The diagram below shows how a hash table works conceptually.



- a. Explain what a hash function does.

1 mark

- b. What is the main advantage that a hash table has over a one-dimensional array?

1 mark

**SECTION B – continued  
TURN OVER**

**Question 6**

The array of data shown below is to be sorted using a quick sort algorithm.

<b>Index</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
<b>Value</b>	<b>25</b>	<b>16</b>	<b>5</b>	<b>2</b>	<b>34</b>	<b>32</b>	<b>26</b>	<b>14</b>	<b>12</b>	<b>1</b>

a. At the beginning of the sort, what are the values of 'up' and 'down'?

'up': \_\_\_\_\_

'down': \_\_\_\_\_

2 marks

b. Complete the first pass, and fill out what the array looks like below.

<b>Index</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
<b>Value</b>										

1 mark

c. During the first pass, what was the value of the 'pivot'?

'pivot': \_\_\_\_\_

1 mark

**Question 7**

Most organisations employ both logical and physical security controls to protect their information systems. Describe **two** common logical security measures and **two** common physical security measures that can be used.

Logical measure 1: \_\_\_\_\_

Logical measure 2: \_\_\_\_\_

Physical measure 1: \_\_\_\_\_

Physical measure 2: \_\_\_\_\_

4 marks

**END OF SECTION B**



**SECTION C – Case Study****Instructions for Section C**

Please remove the insert from the centre of this book during reading time.  
 Use the case study provided in the insert to answer the questions in this section.  
 Answer **all** questions in the spaces provided.

**Question 1**

During their initial meeting, Chloe from OHOOM suggests that they make a list of functional requirements for the new App. In the context of how the App will be used, describe **four** functional requirements.

<b>Requirements of the software solution</b>	<b>Description</b>
Functional	1.  2.  3.  4.

4 marks

**Question 2**

For the following list of features or concerns, **circle** whether they are a scope or constraint.

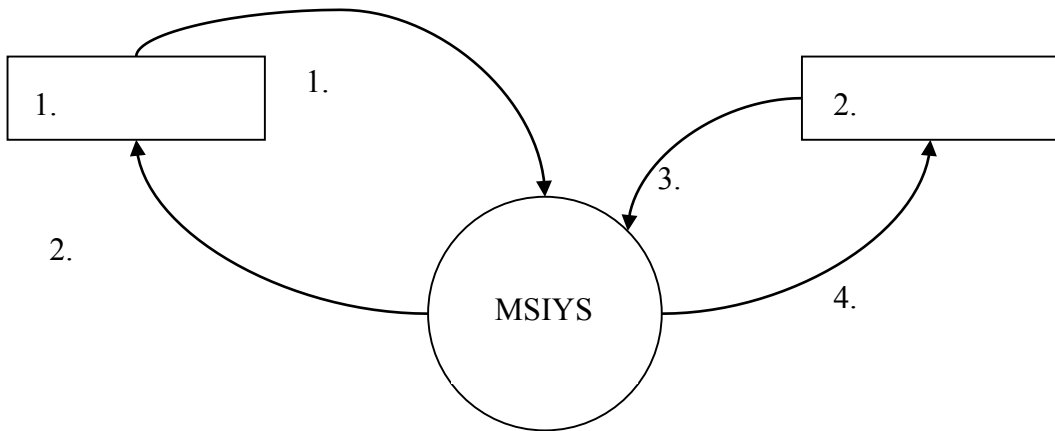
- No technical staff on site Scope      Constraint
- Place orders with (effectively) zero wait time \_\_\_\_\_ Scope      Constraint
- App to work with iOS, Android and Windows Scope      Constraint
- Orders to be tracked with feedback to the user Scope      Constraint
- App to include accessibility features \_\_\_\_\_ Scope      Constraint
- \$5,000 budget to develop the App \_\_\_\_\_ Scope      Constraint

6 marks

**SECTION C – continued**  
**TURN OVER**

**Question 3**

Chloe would like to create a context diagram to describe the key information that will be flowing in and out of MSIYS (some of which will be handled by the App). Label the entities and data flows in the diagram below:



6 marks

**Question 4**

Chloe raises some concerns she has about authentication. Most of the small business clients of MSIYS have 1 or 2 employees and these clients will likely be able to order food and drinks freely through the App. However, some clients of MSIYS have 5 or more employees. Being an open environment, people often leave their phones on their desks while they talk to others, visit the bathroom or collect a print job.

- a. List **two** ways the functioning of the App could be abused if there is no authentication in place?

1:

---

2:

---

2 marks

- b. Describe an authentication method that could be build into the App to prevent either of these abuses.

---



---



---

2 marks

**Question 5**

At present, Phillip has the SSID and network password displayed at various places in the office space. He feels that this is adequate, as people entering the office space need to use their swipe cards to gain access anyway.

List **three** ways this system could be abused and propose a more secure method that could be put into place.

1: \_\_\_\_\_

\_\_\_\_\_

2:

\_\_\_\_\_

3:

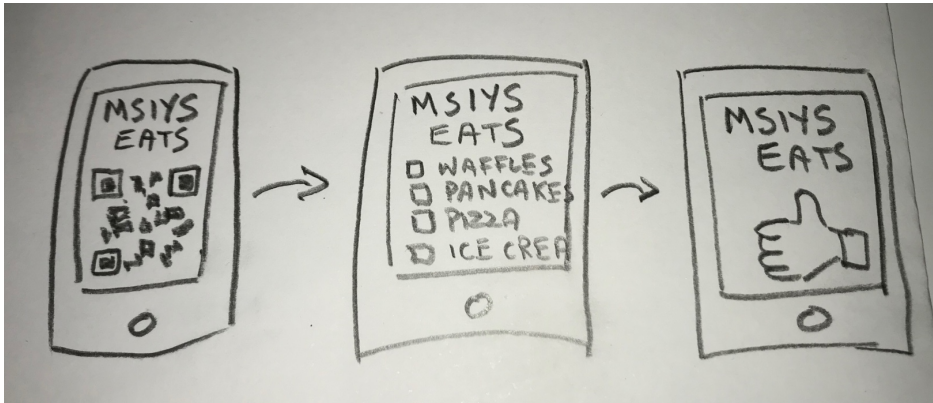
\_\_\_\_\_

Proposal: \_\_\_\_\_

4 marks

**Questio**  
Phillip s  
would h

ou



1: \_\_\_\_\_

\_\_\_\_\_

2:

\_\_\_\_\_

2 marks

**Question 7**

Menu data sourced via the Ooba Eats API is in the form of an XML file. A sample of this file is shown below.

```
<?xml version="1.0" encoding="UTF-8"?>
  <pablos-crepe-barn>
    <breakfast>
      <food-item>
        <id>12085</id>
        <name>Belgian Waffles</name>
        <description>Two of our incredible Belgian waffles with our world
        famous maple syrup!</description>
        <price>$8.99</price>
        <valid-till>"29/12/18"</valid-till>
      </food-item>
```

Chloe intends to import this data and have the storage occur in the App as a collection of arrays of records. There would be an array for breakfast, lunch, dinner and snack menu items.

- a. What is the advantage of using a record data structure to store the contents of the XML file as opposed to a number of 1D arrays?

---



---

1 mark

- b. For each of the following variables, **select** whether it should be a Boolean, Integer, Character, Floating Point, Date, Char or String variable type and **justify** your choice.

Variable Name	Type	Justification
msiys-breakfast(1).name		
msiys-breakfast(1).price		
msiys-lunch(5).description		
msiys-dinner(10).id		

8 marks

**Question 8**

Kelly, one of the programmers at OHOOM, is writing an algorithm for the new App. Under Phillip's direction, the prices that are read in via the Ooba Eats API will have a \$0.10 surcharge added to them to cover the ongoing costs of maintaining the App. Kelly has written an algorithm for this process shown below.

```

Def Calculate_Adjusted_Prices
  index ← 0
  While not end of breakfast list
    index ← index + 1
    msiys-breakfast(index).price ← msiys-breakfast(index).price + 0.10
  End While
  While not end of lunch list
    index ← index + 1
    msiys-lunch(index).price ← msiys-lunch(index).price + 0.10
  End While
  While not end of dinner list
    index ← index + 1
    msiys-dinner(index).price ← msiys-dinner(index).price + 0.10
  End While
  While not end of snack list
    index ← index + 1
    msiys-snack(index).price ← msiys-snack(index).price + 0.10
  End While

```

- a. When Kelly first tests the logic of the algorithm using a trace table, she finds that the breakfast items are adjusted correctly but the rest of the menu items are left untouched. Locate the source of the error and suggest a correction that can be applied to fix this issue.

Error:

Correction: \_\_\_\_\_

2 marks

- b. Kelly, Chloe and Phillip have a discussion about this process. Chloe raises the issue of a large surcharge being applied if the client orders a large number of separate items. Phillip agrees to limit the maximum surcharge to \$0.50. If a variable were added called 'surcharge' describe what could be done to implement what has been described.

\_\_\_\_\_

\_\_\_\_\_ 2 marks

- c. Write a line that could be added to Kelly's algorithm that will ensure that the maximum surcharge will be \$0.50.

\_\_\_\_\_ 1 mark

**Question 9**

Phillip has an idea that he feels can be implemented for the benefit of all of MSIYS’s clients. Since clients will be installing an App on their phone, tablet or notebook, the App could also be used to gather browsing data from clients with the view to directing targeted advertising to them.

- a. Discuss the legalities of this proposal from Phillip?

---

2 marks

- b. Describe how this could be implemented if Phillip decided that he did want to proceed with this idea.

---

2 marks

**Question 10**

A number of implementation models are being considered by the OHOOM Technologies team. Kelly is pushing for the App to be developed as a thin client mobile application while Chloe prefers it to be a rich client App.

- a. What is the difference between a thin client mobile application and a rich client one?

---

2 marks

- b. Which application architecture would be the best one to implement and why?

---

---

---

2 marks

**Question 11**

In an effort to keep the size of the source files as small as possible, Kelly has maintained two versions of the software. In the development version, she has included comprehensive internal documentation that describes the variables, data structure and logic of the code. In the production version, she has taken out all of these lines and simply included the line:

*For development enquiries, please contact Kelly Sutcliff, ksutcliff@gmail.com. Rates negotiable!*

Discuss the legalities of what Kelly has done.

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2 marks

**Question 12**

The café at MSIYS has been open for two weeks, but orders have been minimal as the App is still not ready to be released. Phillip is getting frustrated as food is being wasted and he is losing money in wages. Phillip instructs OHOOM Technologies to skip their final testing phase in which they intended to compare the functioning of the App to the SRS.

Describe **two** consequences that might be a result of skipping this phase.

1: \_\_\_\_\_

---

2: \_\_\_\_\_

---

2 marks

**SECTION C – continued  
TURN OVER**

**Question 13**

The App has been implemented. A server has been placed in Phillip's office and the App sources all of its data from this server. While the App is operating as expected, nothing has been done to prevent threats to the integrity of data on the server or at MSIYS. For each of the types of threat listed below, describe one potential threat that could occur and how this could be prevented.

Type of threat	Possible threat to data	How the loss could be prevented
Accidental		
Event-based		
Deliberate		

6 marks

**Question 14**

Chloe suggests that some features be added to an update of the App to allow for Phillip to more easily evaluate how the App is being used and received by clients.

Describe **two** changes that could be made to the App to allow this to be done.

1: \_\_\_\_\_

\_\_\_\_\_

2: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2 marks



**Insert for Section C – Case study**

Please remove from the centre of this book during reading time.

**TURN OVER**

## The existing system

**MSIYS (My Space Is Your Space)** is a flexible office space occupying the whole second floor of a modern office building in the Melbourne CBD. Members of MSIYS can come to the office space at any time and use any of the facilities as if it were their own office. The space consists of 20 desks (of various sizes), several meeting rooms, tea and coffee facilities, free Wi-Fi, executive bathrooms (with showers) and printing facilities. The monthly membership price covers the use of all of these facilities and the space is open 24/7 (access by swipe card). Tech support is handled via a ticketing system and is on-call (not on site). Phillip Gaines owns and manages the centre and is on site (and has his own dedicated office) during normal business hours. Some desks have monitors, keyboards and mice connected to docks that clients can plug in to.

Phillip receives many requests from clients in relation to catering. While it is easy enough for clients to take the lift down to the street and get drinks or food from local cafes, sometimes they find it inconvenient. Phillip would like to set up the Your Space Café on site and allow clients to order via an App for table service or local Ooba Eats establishments.

Phillip has employed OHOOM Technologies to design and implement the new App. In the meantime, Phillip is handling construction of the Café and employing staff.

In meeting with consultants from OHOOM, the following was decided:

- When clients download the App, they would register it using their MSIYS account, so that the food order would be able to be billed to their account.
- When placing an order, the user of the App would scan a QR code (which would be located on every desk and in every meeting room within the office area), so that the café will know where to bring the order.
- The App will allow multiple logins under the same account, to allow clients to have several people registered if need be.
- The App will have a list of café items that can be ordered (some of which may vary from day to day). The App will also be able to display menu items from local cafes and restaurants, that the App will then place orders with, via an Ooba Eats API (a code module that will be supplied by Ooba Eats that will integrate with the App seamlessly).

