2014 Examination Report

VICTORIAN CURRICULUM AND ASSESSMENT AUTHORITY

State Government Victoria

2014 IT: Software Development GA 3: Examination

GENERAL COMMENTS

The 2014 VCE Information Technology: Software Development examination comprised three sections: Section A contained 20 multiple-choice questions (worth a total of 20 marks), Section B had five short-answer questions (worth a total of 20 marks) and Section C was a case study with 16 questions (worth a total of 60 marks). Teachers and students should refer to the *VCE Information Technology Study Design 2011–2015* and the 2014 written examination paper while reading this report and while preparing for the 2015 examination.

The multiple-choice questions were answered well by many students. Section B required students to demonstrate sound theoretical knowledge and to provide detailed and accurate responses. The format of Section C was consistent with that of previous years and students' responses were expected to refer to the case study. The key weakness in many responses in this section was a lack of depth and detail.

During the examination, students should:

- endeavour to use correct IT terminology
- discuss all options when asked to justify a choice or compare one option with another
- respond to key instructional terms, such as 'state', 'explain', 'justify' and 'describe'
- re-read each question and their response to ensure that the question has been answered
- remove the case study insert from the question and answer book, and refer to it when completing Section C
- read the case study and questions carefully, and underline or highlight key words
- demonstrate their knowledge of the subject and apply that knowledge to the case study as general responses often result in low or no marks; knowledgeable, clear and appropriate responses receive full marks.

SPECIFIC INFORMATION

Note: Student responses reproduced in this report have not been corrected for grammar, spelling or factual information.

This report provides sample answers or an indication of what the answers may have included. Unless otherwise stated, these are not intended to be exemplary or complete responses.

The statistics in this report may be subject to rounding errors resulting in a total less than 100 per cent.

Section A – Multiple-choice questions

The table below indicates the percentage of students who chose each option. The correct answer is indicated by shading.

Question	% A	% B	% C	% D	No answer
1	9	6	14	71	0
2	2	1	97	0	0
3	6	4	2	88	0
4	1	98	1	1	0
5	19	11	9	60	0
6	13	7	64	16	0
7	42	27	22	8	1
8	9	69	21	1	0
9	14	23	50	14	0
10	8	24	2	66	0
11	13	28	41	18	0
12	5	64	21	10	0
13	12	6	68	13	0
14	54	4	7	35	0
15	3	86	3	8	0
16	11	2	70	18	0
17	4	20	10	67	0
18	52	4	31	13	0
19	22	59	11	8	0
20	57	1	14	28	0

Section B – Short-answer questions

Question 1

Marks	0	1	2	3	Average
%	1	2	0	97	**3**

Security threat	Description
worm	a program that always self-replicates
spyware	a program where the major feature is monitoring user activity
trojan	a program that disguises itself as useful

Question 2a.

Marks	0	1	2	Average
%	46	28	26	**0.8**

Many students had difficulty clearly explaining their answer to this question. Very few students were able to provide accurate definitions and many were superficial. Reponses needed to include details of how items were swapped and that swapping is repeated in subsequent passes until all items are sorted.

Students are encouraged to keep a glossary of key terms throughout the year (in addition to the glossary in the study design) and include key programming concepts in it. Students should also ensure that they use the allocated marks as a guide to the depth of response required.

The following is an example of a high-scoring response.

> *With each iteration of the sort, the biggest value is 'bubbled' to the top of the list. This is done by comparing adjacent values, and if the leftmost value is bigger, a swap is made. This repeats until the largest value is at the top of the list, and repeats until all values have been placed in the right place.*

Question 2b.

Marks	0	1	2	Average
%	63	20	17	**0.6**

As with part a., most students struggled to provide a complete and detailed response, with many missing the second part of the question – 'how this differs from a bubble sort'.

The following are examples of high-scoring responses.

> *With each iteration, a value called a pivot is chosen from the list. For each other value, if it is greater than pivot it places it to the right, if it is less than, it places to left. The pivot is in the right place and on the two side lists. This differs from bubble sort as it is a divide and conquer algorithm, whereas bubble sort goes through one by one. Quick sort as a result is much faster.*

> *A quick sort chooses a random pivot item and compared other items to that element until it has two subsets of elements higher and lower than the pivot. It then does the same to the sublists and so on till it's all sorted. The difference to the bubble sort is the creation of sublists rather than looping over one list.*

Question 3

Marks	0	1	2	3	4	5	Average
%	43	15	12	10	13	8	**1.6**

A majority of students attempted this question, but most struggled to construct a clear and accurate algorithm. In particular, students had difficulty with correctly representing the array data structure and a loop control structure (For, While or Repeat could have been used). Students are expected to use the variables identified and include appropriate indentation. Students are encouraged to develop a set of basic algorithms and practise these throughout the year.

The following is an example of a possible response.

```
For position ← 1 to NoOfStudents
        If Age[position] => 18 Then
                Print Names[position]
                Print Ages[position]
        EndIf
EndFor
```

Question 4a.

Marks	0	1	2	Average
%	10	20	70	**1.6**

Most students were able to identify copyright and privacy issues associated with the development of the software.

The following is an example of a high-scoring response.

Legal issue 1
As Andrew's program looks very similar to a commercially available program, Liana should be concerned that Andrew may have broken copyright by using other companies code.

Legal issue 2
As Andrew's program retains user details, Liana should be concerned that Andrew's program collects users private information without consent breaching the Privacy Act.

Question 4b.

Marks	0	1	2	Average
%	20	43	37	**1.2**

Most students assumed that Andrew had indeed 'copied' the code; however, the stem of the question stated that it 'looks very much like a commercial program'. This assumption resulted in many students stating that if he removed the code, this would resolve the legal issue. The more appropriate response was to prove that that code was his intellectual property. With regard to the copyright issue, communicating with users and seeking permission within the software would resolve the issue.

Question 4c.

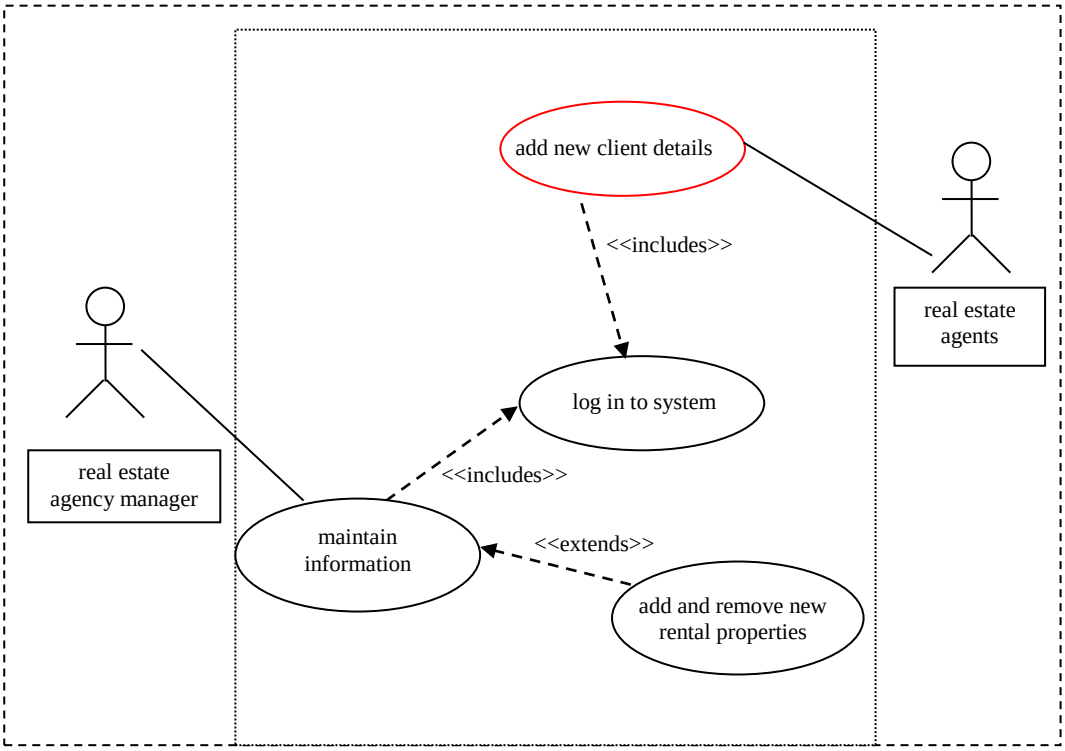
Marks	0	1	Average
%	58	42	**0.4**

Many students simply rewrote responses that they had used in part b., that is, how to resolve the issue rather than how this could be prevented in the future. Appropriate responses included developing a code of ethics, training programmers about the code of ethics or training programmers about legal issues in a programming environment.

Question 5

Marks	0	1	2	3	Average
%	29	26	14	30	**1.5**

Many students struggled to interpret the scenario and included a range of irrelevant items on the use case diagram. Students are encouraged to highlight key text (such as functional requirements in the scenario) as they are working through each question.



Section C – Case study

Question 1

Marks	0	1	2	3	4	Average
%	10	12	27	42	9	**2.3**

Most students handled the first three stated techniques well; however, many students misinterpreted 'Reviews'. The stem of the question stated one of the techniques that could be used to help with the analysis was 'reviews of Wide Hill's software documentation', that is, the technique would review the current documentation, not the software. Many students assumed the reviews had already been conducted and this was incorrect.
It is important that students remember that responses in Section C must apply to the case study. So when describing the strength of a technique, it was expected that the strength would be applicable to Wide Hill.

The following is an example of a high-scoring response.

- Observation
  Can see the current system at work and detect problems that the cattle station's staff may not see
- Interviews
  Able to directly know what Mike and the station workers are having trouble with, and discuss their options with Nicole
- Questionnaires
  Allows Nicole to quickly obtain information about the cattle station's staff's problems
- Reviews
  Allows Nicole to very carefully examine the current system, outlining flaws that observation cannot

Question 2

Marks	0	1	2	3	4	Average
%	25	28	27	17	3	**1.5**

A = manager/Mike
B = cattle
C = cattle_condition
D = tag_ID + cattle_destination

Responses to this question were quite poor. Students should be encouraged to use the data flow diagram to assist in formulating accurate responses, particularly with respect to labelling conventions. Further emphasis should be given to the teaching and learning of this topic.

Question 3a.

Marks	0	1	Average
%	45	55	**0.6**

The correct validation type was range check.

Question 3b.

Marks	0	1	2	3	4	Average
%	5	8	15	20	52	**3.1**

Test no.	Cattle weight	Expected output
1	*49.5 kg*	*confirmation required*
2	50 kg	no output, or something similar to 'weight accepted'
3	any value greater than 50 kg and less than 500 kg	no output, or something similar to 'weight accepted'
4	500 kg	no output, or something similar to 'weight accepted'
5	501 kg	confirmation required

Students are reminded that when testing a specific range, it is important to test the boundaries and not to test the same thing multiple times.

Question 4

Marks	0	1	2	3	4	Average
%	4	7	14	41	34	**3**

Field name	Description	Type
ACISMother	holds the ACIS code of the mother or is left blank if not known	*string*
ACISNo	holds the ACIS code and is a 16-digit number with the fourth digit blank	string
Weight	holds the last weight known for that animal in kilograms	floating point
Gender	C for cow, B for bull and S for steer	character
BreedingDefects	T if a defect exists that would prevent it from being used for breeding and F if a defect does not exist	Boolean

Students generally answered this question well; however, many overlooked the description of ACISNo. The description indicated that it was a 16-digit number with the fourth digit blank. With this condition, it could not be an integer.

Question 5

Marks	0	1	Average
%	49	51	**0.5**

The correct validation type was existence check.

Many students were unable to identify the types of validation occurring in this question and in Question 3a. It is important that students apply validation during school-assessed coursework. It is also recommended that they include an algorithm for each of the three types of validation listed in the study design, in their glossary.

Question 6a.

Marks	0	1	2	3	4	5	6	Average
%	11	5	8	16	44	3	12	**3.4**

Test no.	Date of birth	Expected output	Actual output
1	14/8/2012	*message 'Cattle over 24 months'*	*message 'Cattle over 24 months'*
2	14/1/2013	message 'AgeGroup = 3'	message 'AgeGroup = 3'
3	14/1/2014	message 'AgeGroup = 1'	message 'AgeGroup = 1' **and** message 'Cattle over 24 months'
4	14/8/2014	message 'Cattle Too Young'	message 'Cattle Too Young' **and** message 'Cattle over 24 months'

Students were able to identify expected output, but many students assumed that the message 'Cattle over 24 months' would overwrite the age group message rather than two messages being displayed. Also, many students confused display the text 'AgeGroup = 1' with the variable 'AgeGroup' and so assumed the output would be '1 = 1'.

Question 6b.

Marks	0	1	2	Average
%	67	10	23	**0.6**

In all age groups other than between 18 and 24 months, the correct message is displayed along with an incorrect message saying 'Cattle over 24 months'.

Students needed to ensure that they commented on the incorrect message being displayed and when that message appeared. A small number of students said there was no condition equal to 24 months; however, this was not the major error in the algorithm.

Question 6c.

Marks	0	1	2	Average
%	66	13	20	**0.6**

There are a number of ways of fixing the error. The simplest way was to remove the 'EndIf' and add an additional 'If/Then' condition.

```
If CattleAge >= 18 And CattleAge < 24 Then
        AgeGroup ← 3
        Display 'AgeGroup = 3'
EndIf
If CattleAge >= 24 Then
    Display 'Cattle over 24 months message'
EndIf
```

Most students were unable to explain how to fix the error or write the lines of code needed. Students should practise algorithms for a range of unseen scenarios throughout the year.

Question 7

Marks	0	1	2	Average
%	52	30	18	**0.7**

Students struggled to provide clear and technically accurate responses to this question. The question had two parts and many students missed the second half of the question. Students are encouraged to read and re-read the question throughout the examination and then do the same for their response.

The following is an example of a possible response:
Primary storage is non-permanent memory used to hold temporary data and is accessed faster than secondary storage. Data in secondary storage is slower to access but data is stored permanently even after the device is turned off.

Question 8

Marks	0	1	2	Average
%	64	5	31	**0.7**

Minimum expected file size 5–6 MB
Maximum expected file size 19–20 MB

Students were asked to estimate the minimum and maximum file sizes in megabytes, but many gave their answers in bytes or kilobytes. Students are reminded to read questions carefully. Students who did answer correctly often showed their working and conversion. Either 1024 kilobytes or 1000 kilobytes could have been used.

An example of a calculation follows:
200 × 30 000 = 6 000 000 bytes
1 MB = 1000 KB = 1 000 000 bytes
6 000 000/1 000 000 = 6 MB

Question 9

This question was poorly answered by the majority of students. Most students picked up on the key words 'random access file' and 'sequential file' in the question and wrote lengthy descriptions of these file types; however, the question asked students to describe the advantage of each complete method outlined. So students should have taken on board the full description of file type, file transfer and updating data.

Question 9a.

Marks	0	1	2	Average
%	84	10	6	**0.2**

Nicole's searching method ensured that the file was always accurate and up-to-date as it accessed a record only when required.

Question 9b.

Marks	0	1	2	Average
%	70	18	12	**0.4**

Reading data (locally) from the tablet is faster than reading it over a network and continually having to read/write back. In addition, work can continue when out of wi-fi range.

Question 9c.

Marks	0	1	2	Average
%	78	12	10	**0.3**

An alternative to these methods would be one that combines elements of each to ensure ease of use and speed.

The following are examples of high-scoring responses.

Have the data stored as a random access file on the tablet itself and backup the data to the computer at the end of each day for security and transmission to the ACIS database. This method combines the efficiency of Nicole's method with the convenience of Adam's method and adds a redundancy backup.

The files could be sent to the tablet each day and then be access from a random access file while needed, keeping them secuer and improving speed. At the end of the day they would be sent back to the homestead computer.

Question 10

Marks	0	1	2	Average
%	44	25	31	**0.9**

The following is an example of a possible response:

- a linear search
  The average number of records read would double (from 16 384 to 32 768).
- a binary search
  The maximum number of times a record would need to be read would increase by one (from 15 to 16) as only the record in the middle of the list is read because the list is halved each time.

Question 11

Marks	0	1	2	Average
%	31	34	35	**1.1**

In general, students were able to identify the need to measure the file transfer time. However, it is important that students pay attention to the task word in each question. For full marks students needed to provide the procedure(s) for testing at least one file size under specific test conditions, indicating a technique for measuring transfer time. The response needed to relate to the specific details in the question.

The following are examples of high-scoring responses.

Nicole could create a file with 100 000 simple records. With the tablet under the stated conditions. Nicole could send the file multiple times to the tablet recording how long each copy takes. The average copy time can then be calculated.

Setup the stated conditions. Run a program that starts a timer and begins transmitting the data from tablet to computer but alerts Nicole if it exceeds a given time. Repeat the test with different conditions and perhaps different time restrictions.

Question 12

Marks	0	1	2	3	Average
%	8	45	37	9	**1.5**

Students could have recommended either interface option but needed to provide a detailed response as to why that option was recommended. Many students provided only one reason as to why that option was recommended. Students should ensure they take note of the mark allocation as this will often give a guideline as to the depth of response required.

A possible response could have been: Option A – Mike needs a visual representation of growth. The graph will provide much clearer information that does not require interpretation or prior knowledge, and anyone could use it. It could contain the average growth tracked on one line with the animal's growth on another to determine good or poor growth. The map will allow Mike to quickly gauge the location of the animals (prior to roundup) and determine whether they should be relocated based on pasture available in each paddock and whether the animals need to put on weight or not. This information is clear and much more easily understood.

Question 13a.

Marks	0	1	2	3	4	Average
%	15	9	38	8	30	**2.3**

A range of answers was accepted, including modem, router, satellite dish, etc.

The following is an example of a high-scoring response.

Hardware item 1	*Satellite Dish*
Role	*Allows the users of the network to access the internet using satellite technology*
Hardware item 2	*Router*
Role	*To connect the local area network of Wide Hill homestead to the wide area network (WAN) that is the internet and through that connect to the ACIS database.*

Question 13b.

Marks	0	1	2	Average
%	28	30	42	**1.2**

Students are encouraged to highlight key words as it was important to recognise that the response required an explanation of the effect on Wide Hill. Simply stating 'unable to connect to the internet' was not sufficient for two marks.

The following is an example of a high-scoring response.

If the router failed the Wide Hill homestead computer will not be able to connect the network to any other network including the internet and through that the ACIS database.

Question 14

Marks	0	1	2	3	4	Average
%	55	8	25	3	9	**1.1**

Many students struggled to respond with the detail required and with technically accurate information. It was clear that many did not know a great deal about microwave transmission. The most appropriate characteristic to discuss was 'interference of signal'. Microwave signals need a line of sight between the cattle yard and the homestead and, in addition, weather conditions may interfere with the signal. A range of responses was accepted, but not cost.

Question 15a.

Marks	0	1	Average
%	64	36	**0.4**

Students tended to focus on the DVD being scratched and thus losing data. A more appropriate response would have discussed the backup method identified – storing the DVDs in a filing cabinet. Any data in a filing cabinet could be stolen or destroyed by natural disaster. This method offers little data protection.

Question 15b.

Marks	0	1	Average
%	52	48	**0.5**

When stating a method, students should have considered the storage media, type of backup method and storage location, such as cloud-based and fireproof safe. Some students also indicated who was responsible for the backup. Many suggested multiple DVDs or a hard drive, or storing off site (which was not practical in a remote location), without providing additional details.

Question 15c.

Marks	0	1	Average
%	40	60	**0.6**

Archiving

The relevant key knowledge specifically identifies security, archiving, backing up and disposing of files as procedures and techniques for handling and managing files (Unit 4, Area of Study 1).

Question 16

Marks	0	1	2	Average
%	28	42	30	**1**

Many students failed to identify the conflict that might occur, simply stating that the internet would slow down. A more appropriate response would have included the following: disgruntled employees frustrated as they can't get their jobs done, farmhands complaining to Mike about the lack of 'free internet', etc. Students, however, were able to come up with a variety of methods to minimise the conflict. A range of reasonable responses were accepted.

The following is an example of a high-scoring response.

> *The staff many complain that with all the staff accessing the internet via the Wi-Fi, that the networks bandwidth many be taken up and therefore its speed many reduce significantly. This could be fixed by setting data limits for those connecting to the network via login so no member of staff uses too much or slows the network down as much.*