Student Name: _____
or affix label here

COMPUTING: SOFTWARE DEVELOPMENT

Unit 3 & 4 Practice written examination

Reading time: 15 minutes
Writing time: 2 hours

QUESTION AND ANSWER BOOK

Structure of book

Section	Number of questions	Number of questions to be answered	Number of marks
A	20	20	20
B	7	7	20
C	15	15	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 liquid/tape.

Materials supplied
- Question and answer book of 20 pages
- Detachable insert at end of booklet.
- Answer sheet for multiple choice questions.

Instructions
- Remove the insert containing the case study during reading time.
- Write your **name** on the space provided above on this page **and** on the answer sheet for multiple-choice questions.
- All written responses must be in 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 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

Which of the following is **not** a data type?

A. array

B. Boolean

C. number

D. character

Question 2

Which of the following tools would best show the design of a user interface?

A. data dictionary

B. mock-up

C. use case diagram

D. pseudocode

Question 3

Johan wants to evaluate the efficiency of a new information system.
He should

A. time how long it takes to complete a task with the new system.

B. check system logs for an increase in the number of completed tasks.

C. check the user manual to see how long the new system should take.

D. check the error logs to see if the new system has crashed.

Question 4

 Which of the following statements is true about a Software Requirements Specification?

A. A SRS is required by law for all government projects.

B. A SRS provides the basis for design work.

C. A SRS contains a complete set of evaluation criteria.

D. A SRS contains all the design notes for the developer.

Question 5

Internal documentation

A.   should tell other developers how to write the code.

B.   makes a program much larger.

C.   should be non-trivial.

D.   need only be used when working in teams.

Question 6

Which of the following tools could be used to help generate ideas?

A.   Use Case Diagram

B.   Mind Map

C.   Data Flow Diagram

D.   Flowchart

Question 7

Which of the following statements is correct about context diagrams?

A.   A rectangle represents external entities.

B.   A circle represents external entities.

C.   Data flows should be labelled with actions.

D.   You should not use the same label more than once.

Question 8

Sahir wrote a procedure to ensure that data was entered into mandatory fields before allowing the user to continue to the next step in a process.

This type of validation is called

A.   reasonableness checking.

B.   type checking.

C.   range checking.

D.   existence checking.

Question 9

A website designed for teenagers wants to allow access to users who are 13 or older but younger than 20 years old. Which of the following statements meets their criteria?

A.   Age < 13 AND Age > 19

B.   Age > 13 AND Age < 19

C.   Age >= 13 OR Age <= 19

D.   Age >= 13 AND Age <= 19

Use the following information to answer Questions 10-11.

Jason is a tennis coach who wants a mailing list program to send information about upcoming specials and clinics to his current clients. He asks Charlotte to write the program for him.

Question 10

Charlotte needs to do some analysis before she can design the new system. The most appropriate way for her to collect data for her analysis would be to

A. create a simple survey to send to Jason's clients about his coaching techniques.

B. interview Jason to understand what he wants.

C. ask Jason's clients if they received the emails.

D. look at other mail-out systems to see if she can copy some code.

Question 11

In order to avoid getting into trouble because of the Spam Act 2003, Jason should

A. provide a simple way for clients to unsubscribe from the mail-out.

B. ensure he is not identified in the emails.

C. not send the emails out, as it would be breaking the law.

D. use a Spam filter on his email program.

Question 12

To test her understanding of sorting algorithms, Sara wants to write a procedure to sort a series of ten names.
She should

A. use a selection sort because the list is short.

B. use a quicksort because the list is short.

C. use a quicksort because it is always easier to code.

D. use a selection sort as it is always faster.

Question 13

When evaluating the effectiveness of different design ideas, it is important to

A. see which design would allow a faster output.

B. determine if any alternatives reduce the cost of the solution.

C. perform useability testing to find the best alternative.

D. compare the alternatives for clarity.

Question 14

XML stands for

A.   eXtensible Markup Language

B.   eXtendable Markup Language

C.   eXtensive Markup Language

D.   eXtinguishable Markup Language

Question 15

Adrian wishes to write a procedure to find a given number in a large list of numbers.

A.   He should use a linear search if he knows the list is sorted.

B.   He should use a binary search if he knows the list is sorted.

C.   He should use a binary search if he knows the list is not sorted.

D.   He should sort the list, then use a linear search.

Question 16

When creating a Gantt chart

A.   milestones are used to identify key points in the project.

B.   only the end of the project needs to be a milestone.

C.   milestones are only required on large projects.

D.   milestones must take at least one day.

Question 17

Data is said to be authentic if

A.   it comes from a trusted source.

B.   it contains no errors.

C.   it is saved in XML format.

D.   it is collected on time.

Question 18

In computer networking, switches

A.   connect devices across the internet.

B.   connect devices on the same network together.

C.   broadcast data to all connected nodes.

D.   connect networks together.

Question 19

Which of the following statements is true?

A.   An information system goal works towards an information system objective.

B.   An organisational goal works towards an information system objective.

C.   An organisational objective works towards an information system goal.

D.   An information system goal works towards an organisational goal.

Question 20

Simpson Sales want to ensure the security of sensitive data as it is transferred from their central server across the internet to their salespeople using their web portal.

They should

A.   ensure only authorised personnel can unlock the server room.

B.   encrypt the data when it is sent to prevent unauthorised access.

C.   only send the data via email as it is safer.

D.   backup the data before it is sent, in case it gets lost or corrupted on the way.

END OF SECTION A

SECTION B – Short-answer questions

Instructions for Section B

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

Question 1 (2 marks)

Describe **two** differences between the lines drawn on a data flow diagram and the lines drawn on a use case diagram.

_____

_____

_____

_____

_____

Question 2 (2 marks)

A project manager creates a Gantt chart to assist in keeping track of a project. Give a definition of a project.

_____

_____

_____

Question 3 (2 marks)

Samuel copied all his critical data files to an external hard drive, which he stored in a separate location to his computer. Lisa said this was an example of archiving his data, but Samuel disagreed. He said there was an additional step required to make it "archiving".

a. What is the name given to the process that Samuel completed? 1 mark

_____

_____

b. What additional step would Samuel complete to archive his data? 1 mark

_____

_____

Question 4 (3 marks)

At Mont Park College, students who are late to school go to the main reception and use their student card to automatically sign in for the day. The system then sends a message to the student's Home Room teacher to notify them that the student has arrived.

Complete the Use Case Diagram to indicate this scenario.
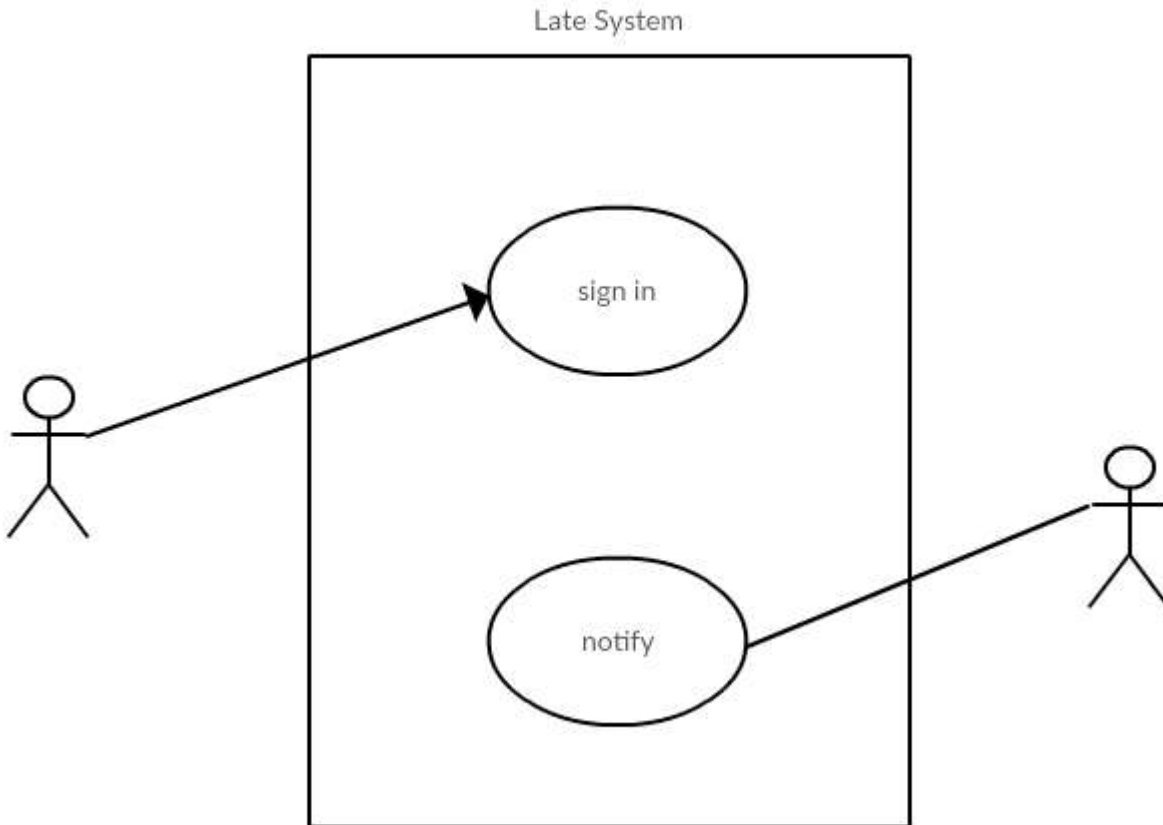
Question 5 (1 mark)

Jenny wants to present each of the girls from her soccer team with a small USB drive with all the images she has taken throughout the season on it. Each image is approximately 1.7 MB and the drives she has bought have a capacity of 8 GB. How many images can she expect to put on each drive?

_____

_____

_____

_____

_____

Question 6 (6 marks)

Using pseudocode, write an algorithm for a function that accepts an array of numbers as input, and outputs the highest element of the array.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Question 7 (4 mark)

Farah was working on the design of a new sign up system for a client's mobile app and he developed the two mock-ups below. In trying to determine the most appropriate design, he created some criteria for evaluating the efficiency and effectiveness of the designs. Ultimately, he selected Design 2 as his preferred design. Suggest two criteria that Farah may have used to reach his decision.

Design #1

Design #2
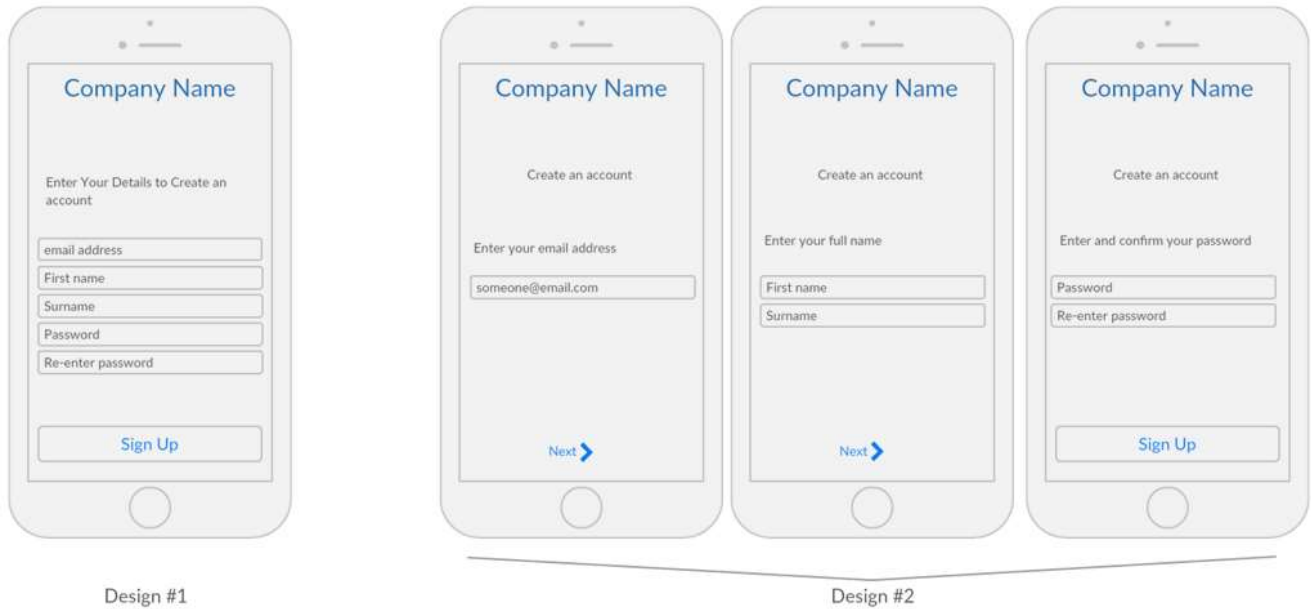
Criteria 1 _____

_____

_____

Criteria 2 _____

_____

_____

SECTION C – Case study

Instructions for Section C

Answer **all** questions in the spaces provided. Remove the case study insert and read **all** the information provided before you answer these questions. Answers must apply to the case study.

Question 1 (5 marks)

Sarah decided that an interview with Mr Wiltshire would be the best way to collect data about the project.

a. Give one advantage and one disadvantage of this technique. 2 marks

Advantage_____

_____

_____

Disadvantage _____

_____

_____

b. Identify an alternative data collection strategy Sarah could have chosen. 1 mark

_____

c. Give **two** reasons why Sarah might have chosen to interview Mr Wiltshire in preference to the method you identified. 2 marks

_____

_____

_____

_____

_____

_____

_____

Question 2 (6 marks)

The school is keen to use the Student Position Voting System (SPVS) to manage the House Captain election during the end of Term 4. That gives Sarah a total of 11 weeks for the project. She anticipates her fact-finding will take approximately a week, after which she is confident of being able to establish the software requirements specification (SRS) in another week. She thinks 2 weeks will be required to fully design the system, including getting feedback from Mr Wiltshire on the designs. Sarah believes the development of the system, including testing, should take about 6 weeks. Mr Wiltshire has agreed to organise a couple of teachers and students to help provide feedback on the interface and functionality once it is nearly ready. That should take a couple of days, giving her the remainder of that week to make final adjustments to her solution. The school's IT department will assist with installation and access to the system via the school's portal and have asked for a week to setup and test the system once it is installed.

a.   Using the information above, complete the Gantt chart.   5 marks

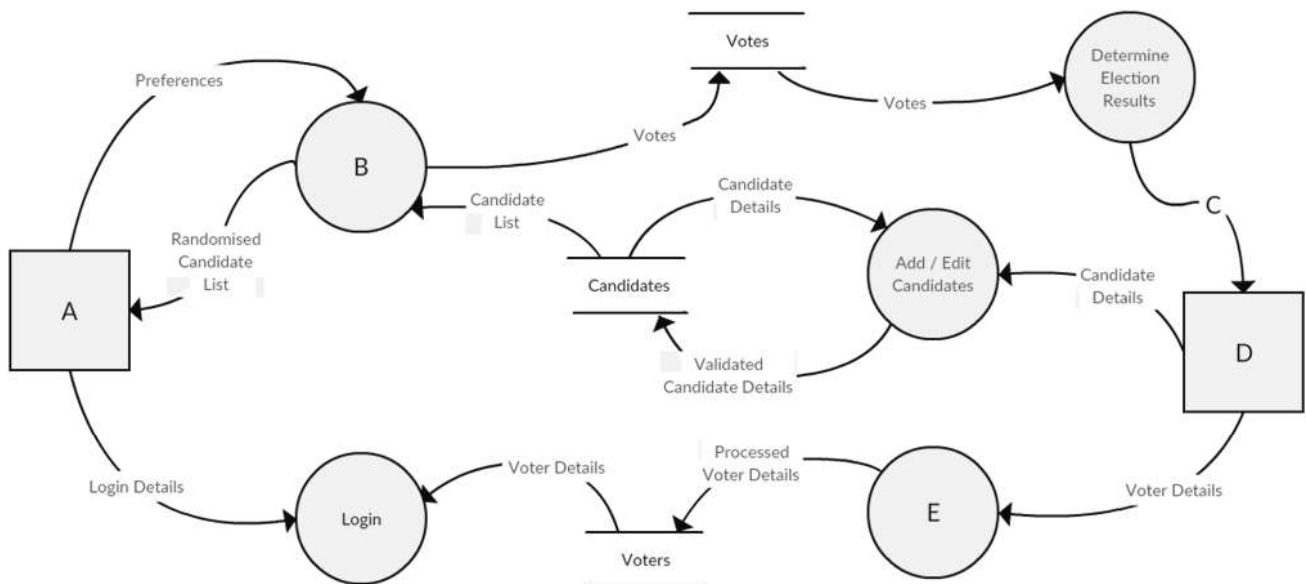|												
Fact finding												
Complete SRS												
System design												
Development												
Testing												
Additional Testing												
Finalise solution												
Installation												

b.   This year, Term 3 goes for 10 weeks. Mr Wiltshire wants the election held in the 4th week of Term 4 and there are 2 weeks of school holidays at the end of Term 3. Assuming there are no delays, when is the latest date Sarah could start the project?   1 mark

_____

Question 3 (5 marks)

As part of her analysis, Sarah created the following Context diagram.
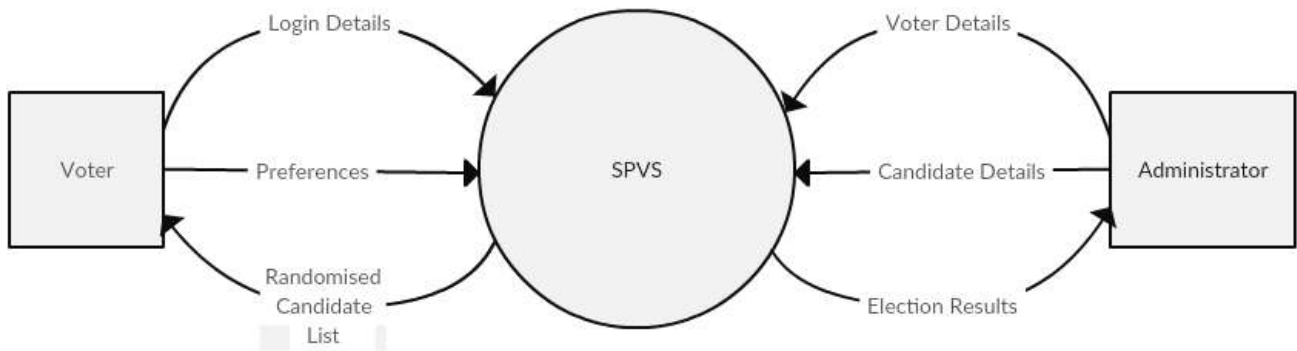
Use this information to provide the correct labels for the items marked A to D in the Data flow diagram below.

Label for:

A _____

B _____

C _____

D _____

E _____

SECTION C – continued
                                                                                         TURN OVER

Question 4 (2 marks)

According to the Use Case Diagram, which users of the system will be able to see a list of candidates?

_____

_____

_____

Question 5 (5 marks)

Sarah collated all her notes and thinking and created a software requirements specification to make an agreement with Mr Wiltshire about the new system. Describe the function of each of the following sections Sarah included in her SRS.

The purpose of the SRS _____

_____

_____

_____

Environment characteristics _____

_____

_____

_____

Non-functional requirements _____

_____

_____

_____

Constraints _____

_____

_____

_____

Use case diagrams _____

_____

_____

Question 6 (2 marks)

	Radio Buttons		Check Boxes
	⭘ Candidate Name		☐ Candidate Name
	⭘ Candidate Name		☐ Candidate Name
	⭘ Candidate Name		☐ Candidate Name
	⭘ Candidate Name		☐ Candidate Name

Having met with Mr Wiltshire and agreed on the terms of the project, Sarah begins her design work. On the main voting screen, voters will only be able to select **one** candidate from the list shown. She needs to decide between using radio buttons or check boxes for this function.

Which should she choose and why?

_____

_____

_____

_____

Question 7 (6 marks)

Sarah has been learning an object-oriented programming language at school and decided that creating and using an object called "voter" would allow her to code a better program.

a.   Describe an advantage of using objects in programming.   2 marks

_____

_____

_____

_____

_____

b.   The table below shows the part of the object description for the **voter** object. For each attribute, list the most appropriate data type from the following: character, string/text, number-integer, number-floating-point, Boolean   4 marks

Object: voter

Attribute	Data type	Sample data
voterId		394
surname		Sewell
firstName		Jason
hasVoted		false

Question 8 (4 marks)

To complete the design stage of her project, Sarah needs to develop evaluation criteria.

a.   Why is it important to create these criteria before beginning development?   2 marks

_____

_____

_____

_____

b.   Write **one** evaluation criteria to examine the effectiveness of her solution.   2 marks

_____

_____

_____

_____

Question 9 (4 marks)

Sarah decided to use comma-separated value (CSV) files to store her data, but her friend suggested that using a database would be better. Give **two** arguments that Sarah could use to justify her choice for the SPVS.

_____

_____

_____

_____

_____

_____

_____

_____

_____

Sarah writes the following pseudocode to calculate the votes.

```
BEGIN
{voteCounter}

      {votesArray has a list of all the votes cast}
      INPUT votesArray
      FOR i ← 0 TO count(votesArray) – 1

            {candidatesArray will contain a count of votes for each candidate}
            candidate ← votesArray[i]
            candidateArray[candidate] ← candidateArray[candidate] + 1

      ENDFOR

      {pass candidate array to findHighest and return result}
      winner ← CALL findHighest WITH candidateArray
      OUTPUT winner

END
```

Question 10 (3 marks)

From the algorithm, write a line that shows an example of:

Iteration _____

Assignment _____

Associative array/dictionary _____

The sub-routine called `findHighest()` is called once the votes are tallied. It returns the candidate with the largest number of votes.

```
BEGIN
{findHighest}

      INPUT candidateArray
      max ← 0
      winner ← null
      FOR EACH candidate IN candidateArray as Key/Value pair

      {missing lines of code}

      ENDFOR
      RETURN winner

END
```

Question 11 (5 marks)

a. `findHighest()` is an example of what type of sub-routine?　　1 mark

_____

b. Write the missing lines of code to complete the algorithm.　　4 marks

_____

_____

_____

_____

_____

_____

Question 12 (1 mark)

Once her solution is completed, Sarah is ready to test out her program with the students and teachers Mr Wiltshire has arranged. What is this process called?

_____

Question 13 (3 marks)

Mr Wiltshire arranges for the IT department to provide Sarah with data of the students who are to vote in the election. Outline three possible consequences for the SPVS if the data supplied contains errors or omissions?

_____

_____

_____

_____

_____

Question 14 (5 marks)

Once the election is over and the results published, Mr Wiltshire wants Sarah to evaluate her solution?

a. What should Sarah use as the basis of this discussion? 1 mark

_____

b. Outline a strategy Sarah could use to determine the success of her project. 4 marks

_____

_____

_____

_____

_____

_____

_____

Question 15 (4 marks)

Sarah also wanted to evaluate the use of her project plan and how it assisted her in completing the project. Identify **two** factors that could have reduced the effectiveness of her project plan and state what impact they might have had.

Factor _____

Impact _____

_____

_____

Factor _____

Impact _____

_____

_____

END OF QUESTION AND ANSWER BOOK

Insert for Section C – Case study

Please remove from this book during reading time.

School Position Voting Solution

Surfside Secondary College is a multi-campus 7-12 school in the bayside suburbs of Melbourne. They have always included student input in the election of student roles such as School Captain, House Captains and Sports Captains.

In the past, students wrote the names of the person or people they thought would do a role best and these were all collated manually by the campus coordinator. It was a very time consuming task that caused delay and frustration during the election process. Sometimes, student votes were illegible and inappropriate comments were written on the voting slips. Usually, the results took over a week to be collated.

Surfside SC would like a comprehensive, yet easy-to-use, system that allows them to:

- List candidates in random order to avoid bias
- Record student and staff votes
- Establish a winner from the votes
- Prevent invalid votes
- Record who has voted (but not who they voted for).

Sarah, a Year 12 Software Development student, took on creation of the School Position Voting Solution (SPVS) for her SAT. While the school itself was the client, her key contact was the Head of Senior Campus, Mr James Wiltshire.

During her analysis, among other notes, Sarah created this Use Case Diagram.
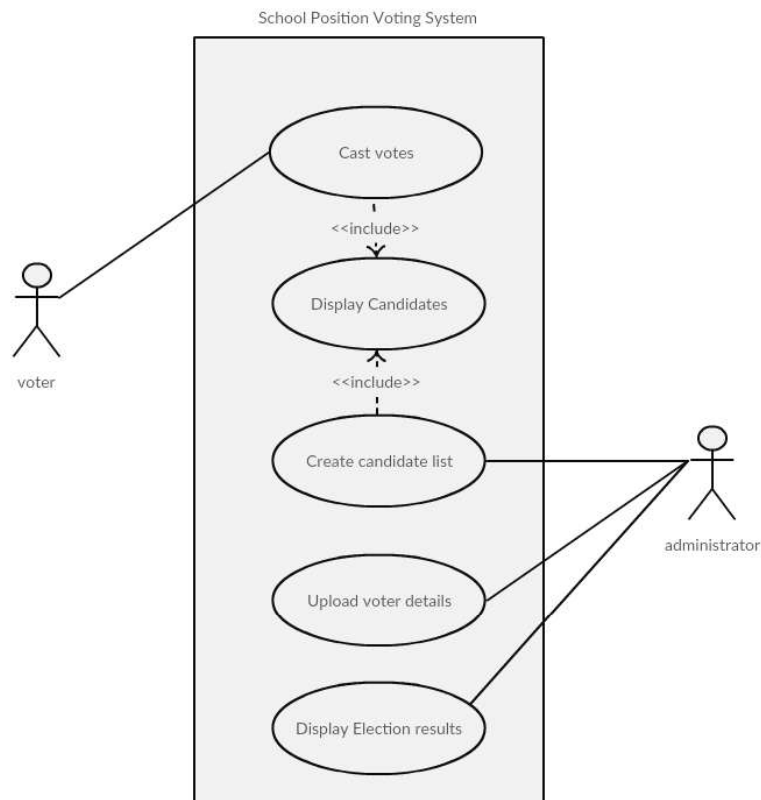
END OF CASE STUDY INSERT

VCE Computing: Software Development NAME: _____

Section A: Multiple Choice Answer Sheet

For each multiple choice question, shade letter of your choice.

Question				
1	A	B	C	D
2	A	B	C	D
3	A	B	C	D
4	A	B	C	D
5	A	B	C	D
6	A	B	C	D
7	A	B	C	D
8	A	B	C	D
9	A	B	C	D
10	A	B	C	D
11	A	B	C	D
12	A	B	C	D
13	A	B	C	D
14	A	B	C	D
15	A	B	C	D
16	A	B	C	D
17	A	B	C	D
18	A	B	C	D
19	A	B	C	D
20	A	B	C	D