



VCE INDUCTION PACKAGE 2022

UNITS 3 AND 4

Applied Computing: Software Development



<http://www.eqsoft.com/images/SoftwareDevelopment.jpg>

Welcome letter

Dear students

Welcome to VCE Software Development Units 3 and 4.

If you are well organized, motivated and have a good work ethic, you will have an enjoyable and successful year in VCE Software Development.

In order to get the most out of this course, there are a number of things that we strongly suggest that you do over the summer and continue throughout the year:

1. Complete the holiday homework tasks by the due date
2. Familiarize yourself with the detailed course outline provided in this package
3. Develop a good working relationship with me and maintain regular communication throughout the year, ie **arranging suitable time to discuss issues with teacher outside class time, eg Wednesdays after periods 1 & 2, mutual agreed period**
4. Develop a study timetable that will assist you in meeting the work deadlines and revision, eg outcomes due dates, reading textbook chapters, chapter questions
5. Ensure that you become familiar with the resources (prescribed textbook, websites, notes, other textbooks) eg glossary
6. Become familiar with the school's VCE compliance policy by reading the [VCE handbook](https://www.vermontsc.vic.edu.au/curriculum/year-12-curriculum/) <<https://www.vermontsc.vic.edu.au/curriculum/year-12-curriculum/>>
7. Communicate with students who have studied the subject in previous years to get their perspective and suggestions for success.
8. Ensure that you have a balanced life that consists of schoolwork, exercise, sport, leisure, rest and a healthy diet.

On behalf of the Computing faculty, we wish you all the best for your studies next year.

Regards

Donald Hew
VCE Software Development teacher

NAME OF TEACHER	EMAIL ADDRESS	LOCATION
Mr Donald Hew	hewd@vermontsc.vic.edu.au	Library

OUTLINE OF STUDY

Unit 3: Software Development

Area of Study 1 – Software Development: Programming

- examine the features and purposes of different design tools to accurately interpret the requirements and designs for developing working software modules
- use a programming language and undertake the problem-solving activities of manipulation programming, validation, testing and documentation in the development stage
- apply computational thinking skills when interpreting given solution requirements and designs, and when developing them into working modules

Outcome 1

Student to interpret teacher-provided solution requirements and designs and apply a range of functions and techniques using a programming language to develop and test working software modules.

Area of Study 2 – Software Development: Analysis and Design

- construct the framework for the development of a software solution that meets a student-identified need or opportunity - the first part of the School-assessed Task (SAT), involving analysis and design
- prepare a project plan that includes student-determined and teacher-provided milestones that take into account all stages of the problem-solving methodology covered
- justify the selection of an appropriate development model and monitor and modify their project plans
- a range of methods is used to collect data for analysis - analysis tools and techniques are used to depict relationships between data, users and digital systems and to document the solution requirements, constraints and scope as a software requirements specification (SRS)
- generate and document two or three design ideas for creating their solution eg annotations to indicate key functions and appearance
- evaluation criteria are developed and applied to select the preferred design idea, then this is fully detailed, addressing the functionality and the user interface of the solution
- apply computational thinking skills when analysing a need or opportunity and apply design thinking skills when designing the solution

Outcome 2

Student to analyse and document a need or opportunity, justify the use of an appropriate development model, formulate a project plan, generate alternative design ideas and represent the preferred solution design for creating a software solution.

Unit 4: Software Development

Area of Study 1 – Software Development: Development and Evaluation

- develop the design prepared in Unit 3, Area of Study 2, into a software solution that meets an identified need or opportunity by applying the problem-solving stages of development and evaluation
- appropriate processing features of a programming language, including validation, are used to develop an efficient and effective software solution - testing techniques are used to ensure the software solution meets requirements
- prepare a usability test that addresses the core features of their software solution - the test must be undertaken by at least two potential 'users' and the results recorded
- monitor and record the progress of their projects using the project plan developed in Unit 3, Area of Study 2, eg include actual versus expected durations, achievement of milestones and annotations to explain progress
- evaluate the quality of their software solution using the evaluation criteria developed in Unit 3, Area of Study 2, and assess the effectiveness of their project plan and development model in developing their project
- apply computational thinking skills when developing their design ideas into a software solution

Outcome 1

Student to develop and evaluate a software solution that meets requirements, evaluate the effectiveness of the development model and assess the effectiveness of the project plan.

Area of Study 2 – Cybersecurity: Software Security

- focus on the security risks to software and data during the software development process and throughout the use of the software solution by an organization
- analyse and evaluate the security of current software development practices, examine the risks to software and data, and consider the consequences of implementing software with ineffective security strategies eg physical and software controls, security vulnerabilities, web application and third-party software risks are investigated
- recommend risk management strategies to improve current practices, taking into account the key legal requirements and ethical issues faced by an organisation
- apply systems thinking skills when analysing and evaluating software development security strategies within an organisation, and when recommending a risk management plan to improve current practices

Outcome 2

Student to respond to a teacher-provided case study to examine the current software development security strategies of an organisation, identify the risks and the consequences of ineffective strategies and recommend a risk management plan to improve current security practices.

Key Dates/Timelines of Topics, Outcomes and Activities - Assessment dates 2022

School-Assessed Coursework	Date
<p>Unit 3 Outcome 1 – 10% contribution to the study score Student to interpret teacher-provided solution requirements and designs, and apply a range of functions and techniques using a programming language to develop and test working software modules.</p>	<p>Term 1 Folio 1 week 2 Folio 2 week 4 Folio 3 week 6 Folio 4 week 8 Folio 5 week 10 Term 2 U3O1 week 2</p>
<p>Unit 3 Outcome 2 - 15% contribution to the study score Student to analyse and document a need or opportunity, justify the use of an appropriate development model, formulate a project plan, generate alternative design ideas and represent the preferred solution design for creating a software solution.</p>	<p>Term 2 C1 week 3 C2 week 4 C3 week 5 C4 week 6 C5 week 7</p>
<p>Unit 4 Outcome 1 - 15% contribution to the study score Student to develop and evaluate a software solution that meets requirements, evaluate the effectiveness of the development model and assess the effectiveness of the project plan.</p>	<p>Term 3 C6 week 4 C7 week 5 C8 week 6 C9 week 7 C10 week 8</p>
<p>Unit 4 Outcome 2 – 10% contribution to the study score Student to respond to a teacher-provided case study to examine the current software development security strategies of an organisation, identify the risks and the consequences of ineffective strategies and recommend a risk management plan to improve current security practices.</p>	<p>Term 3 week 10</p>

Assessment

UNIT 3 and 4

COURSEWORK AND SAC REQUIREMENTS:

In order to successfully pass a Unit, all students are required to;

- complete all set coursework.
- obtain a pass in all scheduled School Assessed Coursework (SACS).

Where a student does not pass a SAC they will be given the opportunity to redeem the task in order to reach a satisfactory standard, however where this occurs the students will retain their original mark for VCAA purposes.

All students are required to be up to date with their coursework prior to sitting a SAC.

Assessment of levels of achievement

The student's level of achievement in Unit 3 and 4 will be determined by school-assessed coursework and an end-of-year examination.

Coursework Requirements

For an outcome to be scored, complete the prescribed coursework questions **before** the date of the outcome.

Satisfactory Requirements

To obtain an S for each unit students are to;

- Attend a minimum of 90% of classes
- Complete the coursework

Obtain at least 50% on all outcomes.

Materials Required – Texts/Stationery/Resources

Required Materials to be brought to each class

Texts:

Software Development
1st Edition
Gary Bass, Selina Dennis, Therese Keane
Nelson
ISBN: 9780170440943
\$88.95

Laptop/Notebook (optional):

Windows 10 or later, min 8Gb RAM and SSD
Visual Studio 2022 Community Edition
Microsoft Office – Word, Excel, PowerPoint, Visio, Project



An Introduction To Algorithms

A program must be systematically and properly designed before coding begins. This design process results in the construction of an algorithm.

What Is An Algorithm?

An algorithm is like a recipe: it lists the steps involved in accomplishing a task. It can be defined in programming terms as a set of detailed, unambiguous and ordered instructions developed to describe the processes necessary to produce the desired output from a given input. The algorithm is written in simple English and is not a formal document. However, to be useful, there are some principles which should be adhered to. An algorithm must:

- be lucid, precise and unambiguous
- give the correct solution in all cases
- eventually end.

Pseudocode, flowcharts and Nassi-Schneiderman diagrams are all popular ways of representing algorithms.

Pseudocode

Pseudocode is really structured English. It is English that has been formalised and abbreviated to look like high-level computer languages.

There is no standard pseudocode at present but the following conventions are followed:

1. statements are written in simple English
2. each instructions is written on a separate line
3. keywords and indentations are used to signify particular control structures
4. each set of instructions is written from top to bottom, with only one entry and one exit
5. groups of statements may be formed into modules, and that group given a name.

How To Write Pseudocode

When designing a solution algorithm, you need to keep in mind that a computer will eventually perform the set of instructions written. That is, if you use words and phrases in the pseudocode which are in line with basic computer operations, the translation from the pseudocode algorithm to a specific programming language become quite simple.

There are 6 basic computer operations and introduces common words and keywords used to represent these operations in pseudocode. Each operation can be represented as a straightforward English instruction, with keywords and indentation to signify a particular control structure.

Six Basic Computer Operations

A computer can:

1. receive information

The verbs **Read** and **Get** are used in pseudocode when a computer is required to receive information or input from a particular source, whether it be a terminal, a disk or any other device. For example, typical pseudocode instructions to receive information are:

```
READ student_name
GET system_date
READ number1, number2
GET tax_code
```

2. put out information

The verbs **Print**, **Write**, **Put**, **Output** or **Display** are used in pseudocode when a computer is required to supply information or output to a device. **Print** is usually used when the output is to be sent to the printer, while **Write** is used when the output is to be written to a file. If the output is to be written to the screen, the words **Put**, **Output** or **Display** are used in pseudocode. Typical pseudocode examples are:

```
PRINT 'Program Completed'
WRITE customer record to master file
PUT name, address and postcode
OUTPUT total_tax
DISPLAY 'End of data'
```

Usually an output **Prompt** instruction is required before an input **Get** instruction. The **Prompt** verb causes a message to be sent to the screen, which required the user to respond, usually by providing input, for example:

```
PROMPT for student_mark
GET student_mark
```

3. perform arithmetic

Most programs require the computer to perform some sort of mathematical calculation, or formula, and for these, a programmer may use either actual mathematical symbols or the words for those symbols. For instance, the same pseudocode instruction can be expressed as either of the following:

```
add number to total
total = total + number
```

The symbol '=' has been used to indicate assignment of a value as a result of some processing.

To be consistent with high-level programming languages, the following symbols can be written in pseudocode:

```
+    for Add
-    for Subtract
*    for Multiple
/    for Divide
()   for Parentheses
```

Some examples to perform a calculation are:

```
Divide total_marks by student_count
Sales_tax = cost_price * 0.10
```


$$C = (F - 32) * 5/9$$

4. assign a value to a variable or memory location

There are 3 cases where you may write pseudocode to assign a value to a variable or memory location:

- i. to give data an initial value in pseudocode, the verbs **Initialise** or **Set** are used
- ii. to assign a value as a result of some processing, the symbols '=' or '<-' are written
- iii. to keep a variable for later use, the verbs **Save** or **Store** are used.

Some typical pseudocode examples are:

```
initialise total_price to zero
set student_count to 0
total_price = cost_price + sales_tax
total_price <- cost_price + sales_tax
store customer_num in last_customer_num
```

5. compare two variables and select one of two alternate actions

An important computer operation available to the programmer is the ability to compare two variables and then, as a result of the comparison, select one of two alternate actions. To represent this operation in pseudocode, special keywords are used: **IF**, **THEN** and **ELSE**. A typical pseudocode example to illustrate this operation is:

```
IF student_attendance_status is part_time THEN
    Add 1 to part_time_count
ELSE
    Add 1 to full_time_count
ENDIF
```

6. repeat a group of actions

When there is a sequence of processing steps that need to be repeated, two special keywords, **DOWHILE** and **ENDDO**, are used in pseudocode. The condition for the repetition of a group of actions to be repeated is listed beneath it. For example,

```
DOWHILE student_total < 50
    Read student record
    Print student_name, address to report
    Add 1 to student_total
ENDDO
```

Trace table <https://en.wikipedia.org/wiki/Trace_table>

A **trace table** is a technique used to test algorithms, in order to make sure that no logical errors occur whilst the [algorithm](#) is being processed. The table usually takes the form of a multi-column, multi-row table; With each column showing a [variable](#), and each row showing each number input into the algorithm and the subsequent values of the variables.

Trace tables are typically used in schools and colleges when teaching students how to program. They can be an essential tool in teaching students how a certain algorithm works and the systematic process that is occurring when the algorithm is executed. They can also be useful for debugging applications, helping the [programmer](#) to easily detect what error is occurring, and why it may be occurring.

Example

```
x = 0
FOR i = 1 TO 10
  x = i * 2
NEXT i
```

i	X
?	0
1	2
2	4
3	6
4	8
5	10
6	12
7	14
8	16
9	18
10	20

Software Development: Core Techniques and Principles
(3rdEd) – Adrian Janson page 112

ID_Number	Surname	Tax_Rate	Done	Discount	Temp
001	Phillips	35	False	0	220
			True		300
002	Jones	42	False	32	15
				16	200
			True		220

Output (screen):

```
Customer: Phillips. Total Amount: $534.20
Customer: Jones. Total Amount: $320.50
```

Figure 71: Trace table example

This example shows the systematic process that takes place whilst the algorithm is processed. The initial value of x is zero, but i , although defined, has not been assigned a value. Thus, its initial value is unknown. As we execute the program, line by line, the values of i and x change, reflecting each statement of the source code in execution. Their new values are recorded in the trace table. As we also reached the end of the program, the trace table also ends.

Holiday Tasks to be completed in preparation for the beginning of the 2022 school year

Task 1: Algorithm Exercises – complete the questions in IPO chart (Q1-3) before pseudocode, then go through the pseudocode and if possible a trace table

1. A program is required to read three numbers, add them together and print their total.
2. A program is required to prompt the terminal operator for the maximum and minimum temperature readings on a particular day, accept those readings as integers, and calculate and display to the screen the average temperature.
3. A program is required to read from the screen the length and width of a rectangular house block, and the length and width of the rectangular house that has been built on the block. The algorithm should then compute and display the mowing time required to cut the grass around the house, at the rate of two square meters per minute.
4. Every day, a weather station receives 15 temperatures expressed in degrees Fahrenheit. A program is to be written that will accept each Fahrenheit temperature, convert it to Celsius and display the converted temperature to the screen. After 15 temperatures have been processed, the words “All temperatures processed’ are to be displayed on the screen.
5. A program is required to read and print a series of names and exam scores for students enrolled in a mathematics course. The class average is to be computed and printed at the end of the report. Scores can range from 0 to 100. The last record contains a blank name and a score of 999 and is not to be included in the calculations.

Task 2: Complete Folio #1: AFL Scoring

<<https://moodle.vermontsc.vic.edu.au/mod/assign/view.php?id=30985>> using Visual Studio 2019/2022 Community Edition - Visual Basic

In Australian rules football, teams score 6 points for a goal and one point for a behind. Plan (using IPO chart then pseudo-code) and write a VB program to calculate the number of points for any score. Your program should NOT accept any invalid data, ie use Val, IsNumeric, Int & [MessageBox](#) functions in VB (see "Programming with Visual Basic" by Graeme Summers p63 & p79). Submission (word processing document):

- IPO chart
- pseudo-code
- VB code
- test table (5 columns consisting of type, test data, expected results, actual results & note) including screenshots in the "actual result" column

You are expected to:

- center your form using StartLocation property
- rename all your objects & files appropriately eg btnShow
- resize/position all your objects nicely

Task 3: Multiple Choice and Short Answers Questions Booklet

Task 4: SAT Draft Proposal

Software Development SAT (Unit 3 Outcome 2 & Unit 4 Outcome 1)

The project needs to cover

1. **Identification of need or opportunity** (Proposal)
2. **Preparation of project plan** (Microsoft Project or GanttProject)
3. **Data collection** (Interview, Questionnaire, Observation)
4. **Development of software requirements specification** (SRS which consists of Functional & Non-Functional Requirements, Constraints, Scope, Use Case diagrams, Context Diagrams and Data Flow Diagrams)
5. **Folio of alternative solutions/designs**
6. **Progressive development of software solution** including detailed internal documentation (comments), use coding conventions etc
7. Preparation and conduct of **testing**
8. **Evaluation**

The complexity of the solution should include:

- Data entry
- Deletion
- Editing
- Storage (CSV, XML or database)
- Retrieval
- Validation
- Security/Accessibility
- Searching
- Sorting

Some SAT Inspiration/Ideas

Some of these are ideas, while others are existing products already. Some may be achievable while others are too large to develop within the timeframe. Use these ideas to kickstart your imagination and idea search.

- A mother who runs a café and shoves all her receipts into a drawer and then has to process them all for her BAS, take online orders
- A roster for navy cadets
- A mother who runs Family Day Care and needs to track the hours and charge for each child
- Basketball competition stats recorder – to output a ladder in a format to be uploaded into the website
- Music collection (yours or a friend's)
- Friendship circle
- Something to help Student Council organise events
- Small business customers or sales
- Personal/Family Inventory eg hobbies, clothing (even theatre costumes), household possessions (eg for insurance), family share portfolio, heirlooms (items that have belonged to ancestors)
- Business Inventory (plant nursery, used car yard, craft supplies)
- Address book for family or friends
- Crop planting records
- Budgie breeding (or any other animal)
- Something like the [Fire ready app](#) (Victoria), which maps & lists nearby fires, trucks attending, status. Draws in Google map data, accesses a database offline situations in real-time. (existing example)
- Women-only taxi service booking site eg [abc news article](#) Database, map (existing example)
- Palm oil app [link](#) Identify products which are made with palm oil. Database with search

Software Development SAT (Unit 3 Outcome 2 & Unit 4 Outcome 1)

(existing example)

- Price comparison app. Scan and compare prices, or compare gas/elect/water services. Accesses a database, with search function based on your selected features. (existing example)
- Barcode nutritional info of products. Requires scanning ability, access database. (existing example)
- Landscaping app (for outdoor gardeners, painters, builders) that pulls weather data from the BOM Bureau of Meteorology's RSS feed into a calendar, to aid decision about which days to schedule outdoor work.
- Organisational needs in school, students/teachers/admin eg Homework scheduling, meetings...
- Track driving hours for Platers - start/stop times, map, weather. Would require a database, map data, optionally access the BOM RSS feed.
- Sports club (events, reminders, fees, score tables etc). Database with search
- Plant nursery app - enter type of plant, is it best in sun/shade/both... other care instructions etc to help people new to gardening to get the best from their plants. Database with search
- Data analysis/ visualisation of large amounts of aggregate data. Database, PHP to create visual graphs etc
- Booking system for borrowing multimedia equipment
- Someone who runs a home business, shoves receipts into a drawer, then has to process them for tax
- A roster for navy cadets
- [Games For Change https://form.jotform.com/60098143562960](https://form.jotform.com/60098143562960) - Social impact game: All games must fall within the broad confines of being a game for change by addressing current social issues and aiming to produce a sustainable and positive impact on society and/or individuals
- A Family Day Care home business that needs to track the hours and charge for each child
- Basketball competition stats recorder- to output a ladder in a format to be uploaded into the website
- Something to help Student Council organise events
- Small business customers or sales
- Personal/Family Inventory e.g. hobbies, clothing (even theatre costumes), household possessions (eg for insurance), family share portfolio, heirlooms (items that have belonged to ancestors)
- Inventory of theatre costumes
- Musical instrument borrowing system
- SAC due dates management
- Valedictory Dinner Years 7-12 photos
- Farm machinery maintenance (or school's computer hardware, Media equipment, art tools, sports equip...)
- Sports teams or athletes and their records at events (your own, the school teams, gymnastics club, etc)
- Golf handicap system
- Crop planting records
- Cafe ordering system (for food, drinks... customisable meals?)
- Invoice calculator for a small business
- Appointments/bookings system for a disorganised Veterinarian. Could also maintain/include a customer database.
- Hotel room booking system
- Booking for time-based services: indoor cricket pitch, laser tag, etc.
- Multipurpose attendance checker - for community sport groups, churches, youth events, etc with customisable fields. With admin & user login potentially.
- App for students attending private music lessons: teachers can set homework, student can tick off tasks...

Software Development SAT (Unit 3 Outcome 2 & Unit 4 Outcome 1)

Software Development Unit 3 SAT Project Proposal

Name: Due:/...../2021

Title of your project: _____

Brief description of the project:

Who you will contact to gather information for your project analysis? If your contact is from an organisation, please include **name of organisation, contact's job title**.

Which of the following do you think you might need to incorporate into your solution? Please **DESCRIBE**

- a set of **raw data** (ie a list of data you would need to store)

- what data needs to be **stored** (versus just **calculated**/used and disposed of?)

- when you would need to **edit the data** in this list? And which user group?

- when you would need to **add new data** to this list? And which user group?

- when would you need to **delete** data from this list? And which user group?

Software Development SAT (Unit 3 Outcome 2 & Unit 4 Outcome 1)

Are there any **extra sets of data** (other than from the contact) is needed?

how you would **search** through your data – what information would your users want?

how you would **sort** your data, based on what criteria/data?

What **output** is produced– printed or on screen eg a ticket, order form, or a sales summary, list...

Year 12 Computing: Software Development – Transition Program

Questions from Year 11 Computing exams

Networking

Cloud computing involves data centres

- A that provide offsite ecommerce websites
- B that provide offsite storage and resources to users
- C that provide research in robotics and artificial intelligence
- D that provide onsite storage and computer software to users

Network technicians can use error logs to measure the

- A speed of a network
- B usability of a network
- C reliability of a network
- D maintainability of a network

Computers on a client-server network

- A rely on peripheral devices
- B rely on a LAN for resources
- C rely on a server for resources
- D rely on a WLAN for resources

Ethernet is a network standard that allows computers

- A to break up the data into packets
- B to compete for access on the network
- C to transmit point and click technology
- D to scramble the signal and then encrypt it

To review the security of a company's network, an IT technician could

- A install antivirus software
- B reset all users' passwords
- C check the network audit trails
- D ensure the network is shut down every night

The Internet is

- A A network of networks
- B A number of defence systems linked together
- C A massive computer which we can connect to
- D A network of computers linked together by telephone lines

A cable modem

- A operates over pay TV lines
- B provides very fast connection to the Internet
- C allows users to talk on the phone, send a fax and connect to the Internet simultaneously
- D operates over pay TV lines and provides very fast connection to the Internet

A disadvantage of the use of a hub connected Peer-to-Peer network is

- A Users can have unrestricted access to all computers on the network
- B Unless centralised storage is established, backup of data files would be difficult
- C It won't operate if one computer fails
- D It requires expert knowledge to administer

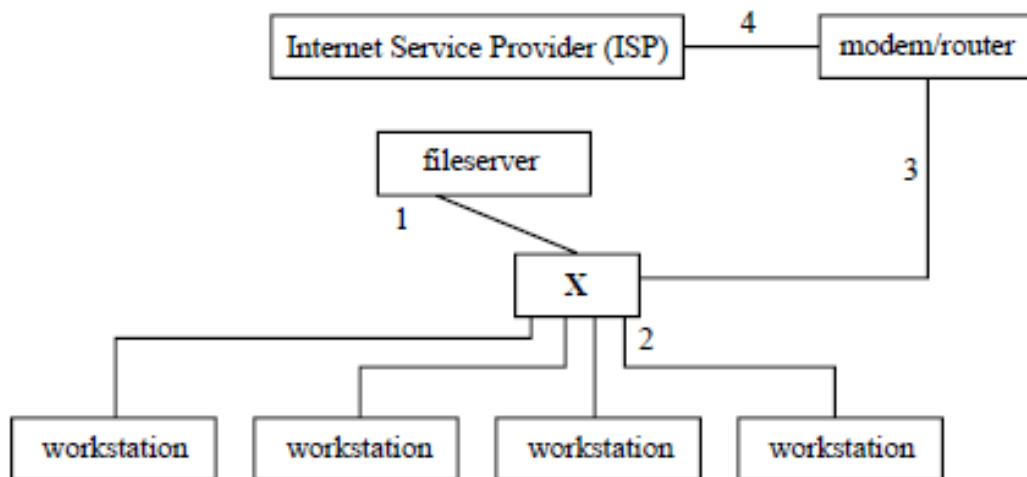
Year 12 Computing: Software Development – Transition Program

Validation is best described as checking that

- A backups are up to date
- B old files have been deleted
- C formulas produce correct answers
- D input data is accurately recorded

The following information relates to the next 2 Questions

The functional block diagram below is of a small company's local area network.



In the network shown above, what is the name of the hardware shown as X?

- A printer
- B switch
- C CAT 5 cable
- D LAN

The company, on learning that its ISP does not have a firewall, must install one on its system. Using the positions labelled 1–4, which is the best position for the firewall?

- A 1
- B 2
- C 3
- D 4

Separate campuses of a secondary school are two kilometres apart. The best transmission media to securely connect all campuses to the school intranet is

- A microwave wireless
- B fibre optic
- C USB (Universal Serial Bus)
- D UTP (Unshielded Twisted Pair)

A protocol is

- A a program which allows access to the internet
- B a device which connects a number of PC's to a network
- C the way in which people behave when meeting a dignitary
- D a set of rules and procedures for exchanging information between computers

Year 12 Computing: Software Development – Transition Program

A LAN (Local Area Network) is:

- A** a device that can receive input from the user via a keyboard
- B** a network of computer systems across different sites
- C** a combination of several stand-alone computers
- D** a network of computer systems on one site

What is the purpose of a firewall in a network?

- A** It translates data into secret code
- B** It destroys viruses
- C** It defines how two or more nodes on a computer can communicate
- D** It protects resources on the network from unauthorised users on another network

A server

- A** is a computer
- B** is the interface between the computer and the cable
- C** connects LANs together
- D** none of the above

A Wide Area Network (WAN) is

- A** a network of computers or computer systems across different sites
- B** a stand-alone computer that is not connected to the Internet
- C** a network that has a central hub to which each terminal is attached
- D** a network that consists of several computers connected so they can share files and devices such as printers

A new staff member arrives at BMG and they require a login and email account. The person who is most likely to do this task would be a

- A** Programmer
- B** Network administrator
- C** Technician
- D** Systems Analyst

System software includes

- A** a game
- B** an operating system
- C** a text editor
- D** software burnt onto CD or DVD

The information system in an organisation is performing poorly. The person you would get in to make recommendations to improve the situation would be a

- A** systems Analyst
- B** programmer
- C** technician
- D** All of the above

RAM

- A** stores programs and data between runtimes
- B** is software permanently burnt into silicon chips
- C** is stored on disk
- D** loses its data when the power is turned off

Year 12 Computing: Software Development – Transition Program

Solid state disks (SSD) are so-called because

- A** they keep their memory when power is turned off
- B** they are built in a way that prevents their read/write heads from crashing
- C** they have no moving parts
- D** they never fail

Roughly, how many kilobytes are in a gigabyte?

- A** 1 000
- B** 1 000 000
- C** 100
- D** 1 000 000 000

When storing graphic, video or audio data, it is common to reduce its storage requirement and transmission time using

- A** validation
- B** compression
- C** iteration
- D** encryption

A disadvantage of wireless networking is

- A** security
- B** the massive area it can cover
- C** the need to lay cables
- D** its flexibility

Computer systems use protocols to communicate. A protocol that allows computers to communicate with the Internet is

- A** HTTP
- B** TCP/IP
- C** BIOS
- D** IP Address

Some of the issues associated with cloud computing includes:

- A** availability, legal issues, staff, and privacy
- B** availability, legal issues, staff, and cost
- C** unavailability, storing files securely, staff, and privacy
- D** unavailability, storing files securely, staff, and cost

Amir, a business owner, is discussing the storage and computing hardware at his business with his daughter, Jamila. He says it is getting it old and he wants to replace it soon. He makes a list of the hardware and software he needs to buy. Jamila suggests that he move his business into cloud storage and cloud computing instead.

a Identify and explain the advantages and disadvantages of following Amir's plan.

(2 marks)

b Identify and explain the advantages and disadvantages of following Jamila's plan.

(2 marks)

Year 12 Computing: Software Development – Transition Program

Marcy has never wanted a computer. But increasingly she is frustrated at the number of references made to websites while watching TV. Marcy bought a notebook computer.

- a. Given that Marcy has one computer at home, what type of internet connection would you recommend?

_____ (1 mark)

- b. Time has passed and now Marcy wants a computer upstairs and 2 computers downstairs. She also wants a printer. List the networking hardware that Marcy should purchase.

_____ (2 marks)

- c. Describe 5 significant advantages of a networked solution.

Advantage 1 _____

Advantage 2 _____

Advantage 3 _____

Advantage 4 _____

Advantage 5 _____

(5 marks)

- d. Describe two aspects of an internet connection that Marcy needs to investigate before signing up to an ISP.

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(2 marks)

Jed Bartlett’s small business, “Presidential Accountancy” has three staff members, two accountants and one support/admin staff. Each staff member has their own notebook computer, which is networked to a printer and the internet. As Jed is very comfortable with how his business is operating, he does not see the need to purchase backup solutions or data servers. In fact, he has been reading up on using the “cloud” to his benefit.

a. Define the term “cloud computing” and provide one example.

(2 marks)

b. Describe three advantages of using cloud computing for his business.

Advantage 1

Advantage 2

Advantage 3

(1½ marks)

c. Abby Bartlett, wife and accounting partner of Jed, has raised some of the problems associated with the use of cloud computing for the business. Describe 3 of these issues.

Issue 1

Issue 2

Issue 3

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(1½ marks)

- d. How can Jed minimise some of the risks involved with cloud computing? Describe 3 ways to reduce the risks involved.

Risk reduction 1

Risk reduction 2

Risk reduction 3

(3 marks)

- e. Jed has been investigating the use of Google Docs word processor, spreadsheet and presentation software instead of updating to the latest version of MS Office. Jed does not think there are any issues with moving to Google Docs instead of MS Office. List one advantage and one disadvantage to this move.

Advantage

Disadvantage

(2 marks)

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Problem Solving Methodology

A list of tasks typical to the creation of a solution appears in the left-hand column of Table 1.1. In the right hand column of Table below, **identify** the stage of the problem-solving methodology (PSM) in which each of the tasks would be undertaken.

TASK	PSM stage
List evaluation criteria	
Write user documentation	
Interview users about the ease of use of the new system that has been recently installed	
Conduct user acceptance testing	

(4 marks)

Phishing is an attempt to fraudulently acquire

- A extra bandwidth
- B confidential information
- C information that is publicly available
- D a collection of computers and control them by a bot master

Examples of secondary sources are

- A questionnaires, The Age and Wikipedia
- B questionnaires, observations and interviews
- C Wikipedia, The Herald Sun and observation
- D Wikipedia, Encyclopedia Britannica, and 3AW

Which of the following types of diagrams or charts can be used to help manage projects?

- A Gantt chart
- B PDA network diagramming
- C Collaborative ICT chart
- D Interdependent efficiency chart

Examples of primary sources include

- A internet, TV, and radio
- B internet, newspapers and observation
- C questionnaires, newspapers and interviews
- D questionnaires, observations and interviews

Interviews are mainly used to collect

- A personal and sensitive information
- B opinions and reactions
- C quantitative data
- D secondary data

In project management, a milestone

- A measures how long a project has been running
- B is a point of major progress
- C marks the end of the project
- D is inserted at the beginning of every task

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A contingency plan in a project

- A** sets out how each task will be undertaken
- B** is a data disaster recovery plan
- C** is a pre-prepared response to something going wrong
- D** should be prepared as soon as disaster strikes

Efficiency is

- A** a measure of quality
- B** the same as effectiveness
- C** a measure of how much time, money and effort are needed
- D** being fast

The stages of the problem-solving methodology are

- A** analysis, design, document, report
- B** analysis, design, development, report
- C** analysis, design, development, evaluation
- D** analysis, solution, development, evaluation

Qualitative data is composed of

- A** opinions
- B** measurable facts
- C** primary data
- D** data obtained from observation

How are data and information related?

- A** Information is processed into data
- B** Only quantitative data can be turned into information
- C** Data is processed into information
- D** Information is harder than data for humans to understand

A tool which can be used to determine user satisfaction with a program I wrote could be

- A** survey
- B** interview
- C** SMS feedback form
- D** All of the above

The design stage of the Problem Solving Methodology

- A** builds the solution
- B** states what is required of the solution
- C** looks at what has to be done to achieve the solution
- D** determines whether the solution has met the objectives

The Problem Solving Methodology consists of four stages:

- A** analysis, design, testing and evaluation
- B** analysis, design, development and evaluation
- C** analysis, implementation, testing and validation
- D** analysis, implementation, testing and evaluation

Testing is a necessary step within the Problem Solving Methodology as it checks

- A** to see that the product is free of errors
- B** to see that the layout designs are visually represented
- C** to see that the required screen dimensions are documented
- D** to see that the solution meets the criteria stated in the analysis stage

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A constraint is any factor that may influence

- A** the analysis stage
- B** the testing process
- C** the nature of the solution
- D** the problem solving methodology

The development of a solution involves

- A** processing the data into a solution
- B** processing the data into information
- C** processing the data into a convention
- D** processing the data into a programming language

Timely data

- A** is produced quickly
- B** relates to a time of day
- C** is current and available when needed
- D** is stored in a field with a time/date data type

The difference between data and information is that

- A** data is processed to create information
- B** information is processed to create data
- C** data is more complex than information
- D** information is more reliable than data

A researcher wants to find out how much sugar Australian teenagers eat daily. The researcher finds a detailed study done last year about sugar consumption by teenagers in England. The researcher may choose not to use the data because it is

- A** irrelevant
- B** not timely
- C** inaccurate
- D** biased

Use the following information to answer the next 2 Questions

The manager of the SmallBank Company phoned Michelle and asked her to write a program for a mobile phone for the bank. During their short conversation, the manager specified that the program must cater for visually impaired people as well as people with normal vision. It will be available to customers via the bank's website. The manager also indicated that the bank was only trialling this idea. This means Michelle must focus on making the required functions work properly and not spend time adding extra functions to the program. Michelle agreed to write the program and was given 60 days to create a solution that would meet the bank's needs.

Before Michelle can begin designing the solution, she has to determine exactly what the program is required to do. The most appropriate method for her to collect data about what the program is required to do is to

- A** conduct a survey of the bank's customers
- B** interview the SmallBank Company's manager
- C** investigate the mobile phone's technical specifications
- D** observe another bank's customers using a similar program

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The constraint on the solution that will most influence Michelle's design is that

- A** the bank is trialling this idea
- B** she has been given 60 days to create the solution
- C** she should not spend time adding extra functions
- D** the solution must cater for visually impaired people and people with normal vision

The factor that will most limit the scope of Michelle's solution is that

- A** the bank does not want her to add extra functions
- B** the program will be made available via the bank's website
- C** the bank is only small and does not require a complex program
- D** the program must cater for visually impaired people and people with normal vision

Non-functional requirements describe

- A** functions the software should be able to carry out
- B** why software is not working properly
- C** qualities the software should have
- D** what a program is not expected to be able to do

Primary data

- A** is collected first-hand by the researcher
- B** is processed into secondary data
- C** is used by younger students
- D** is often biased

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Programming

Types of electronic validation include

- A spell checking, grammar checking, check digits
- B spell checking, type checks, proofreading
- C type checks, range checks, reading the data to locate errors
- D existence checks, spell checking, confirming the sources of secondary data

The three main types of control structures in computer programming languages are

- A Conditional, oblique and recursive
- B Iterative, sequential, and conditional
- C Modular, recursive, and iterative
- D Sequential, modular and oblique

Checking that the user has entered just numbers in the input slot for an age is an example of

- A Evaluation
- B Processing
- C Testing
- D Validation

Checking that the average score given by the computer is the correct value is an example of

- A Evaluation
- B Processing
- C Testing
- D Validation

Checking that the program solves the problem for which it was written is an example of

- A Evaluation
- B Processing
- C Testing
- D Validation

Which of these statements is not true?

- A Programming languages are generally more flexible than scripting languages
- B Programming languages are usually smaller and simpler than scripting languages
- C Programming languages usually handle complex data better than scripting languages
- D Scripting languages are designed to work within specific applications

In a programming language which of the following is not an example of branch control structure

- A If...Then
- B If...Then...Else
- C Repeat...Until
- D Select Case

Which task is NOT part of the **Development** stage when creating a Visual Basic program?

- A Producing an algorithm
- B Coding
- C Validation
- D Testing

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I write a computer program to calculate wages for the hours worked. Most people work 7.5 hours per day, but the maximum anyone can work is 16 hours and I need to validate the hours entered. The most suitable set of test data of hours to see if my validation works would be

- A** 7.5, 16, 25
- B** 15, 24, 25
- C** -16, 0, 7.5
- D** 16, 24, 100

If data has integrity, it

- A** is in one piece
- B** is accurate, timely, authentic and relevant
- C** has good character
- D** has been generated from good secondary data

Prototype software

- A** is an experimental program
- B** is used by professional programmers
- C** looks and feels like a finished program, but is incomplete
- D** does not work

Another term used to describe a variable is

- A** a constant.
- B** the Unicode
- C** the hard drive
- D** memory location

A main difference between a high-level language and a low-level language is that

- A** a high-level language lacks direct access to underlying hardware
- B** a low-level language is more powerful
- C** a high-level language is much harder to learn
- D** a low-level language is used by beginners

An advantage of using a scripting language within an application

- A** is that the programmer codes from scratch
- B** is that much of the interface does not have to be built
- C** is that the programmer has direct access to the objects
- D** is that much of what has been coded is stored on a server

An algorithm contains a set of instructions

- A** to solve a problem
- B** to prevent debugging
- C** to define a scripting language
- D** to define a programming language

The role of project managers includes

- A** managing software
- B** managing the computer
- C** managing resources, people and time
- D** managing programming, security and resources

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A radio button would be appropriate to enter data about

- A** which state or territory you live in
- B** the sort of pets you own
- C** your family name
- D** your date of birth

What is the correct output for the following algorithm?

```
Begin
    a ← 4
    b ← 2
    Repeat
        a ← a + 1
        b ← b * b
    Until b > a
    DISPLAY a, b
End
```

- A** 4, 5
- B** 5, 4
- C** 16, 6
- D** 6, 16

The algorithm below uses a function JOIN (string1, string2) to combine two strings into one.

```
Begin
    name[1] ← 'Sue'
    name[2] ← 'Bill'
    name[3] ← 'Fred'
    a ← 2
    b ← 1
    bigname ← JOIN (name[b], name[a])
    DISPLAY bigname
End
```

What is the correct output for this algorithm?

- A** SueBill
- B** FredBill
- C** Bill Sue
- D** Fred Sue

A compiler

- A** converts pseudocode into source code
- B** lets programmers edit source code
- C** ports software from one platform to another
- D** converts source code into executable code

Debugging

- A** makes programs more efficient
- B** finds and corrects programming errors
- C** ensures input data are accurate
- D** verifies that a program's output is accurate

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Wei collects data about the amount of rainfall in his backyard every day. To store a year's worth of data during processing, he should use

- A** a record
- B** an array
- C** a text file
- D** a field

Wei wants to expand his weather monitoring to store each day's maximum and minimum temperatures, UV rating, and level of cloud cover. To store this daily data on disk, he should use

- A** records
- B** arrays
- C** databases
- D** variables

A variable

- A** stores multiple values in RAM
- B** stores a record on disk
- C** has a value that is set once and cannot be changed again
- D** stores a value in RAM

A floating point value

- A** can store decimal places
- B** can change its value without intervention by the programmer
- C** can store text data
- D** can store any sort of data

The Boolean data type is used to store

- A** a single text character
- B** a pointer to a memory location
- C** a series of numbers
- D** true/false values

The most effective way to ensure a user enters a valid date of birth is to

- A** use three drop-down lists for day/month/year
- B** use a label to warn the user to enter a valid date
- C** use a calendar control
- D** email the user to confirm the date

The following algorithm has been written.

```
Begin  
    Input score  
    If score > 75 Then  
        If score >= 85 Then  
            grade = "A"  
        Else  
            grade = "B"  
        EndIf  
    Else  
        grade = "C"  
    EndIf  
    output grade  
End
```

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The algorithm needs to be tested for logic errors.

Which of the following sets of test data would provide the best test for the algorithm?

- A 0, 75, 80, 84, 100
- B 75, 76, 84, 85
- C 70, 75, 76, 80
- D 0, 74, 84, 85

Complete the missing information in the following data dictionary.

(5 marks)

Name	Data type	Example	Description
	Date	28 May 2000	Date of birth
boolMarried	Boolean		Is person married?
		(03) 1234 5678	
Salary		\$400.34	Weekly salary

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Postcode *

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Email Address *

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Order Total	AUD \$50.50

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Ship to a different address

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Check this box to see gift options. Please note that posters are not eligible for gift options.

3 SELECT SHIPPING OPTION Select Shipping Method

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Estimated Arrival
Jul 31, 2015 - Aug 4, 2015
Includes all duties & taxes.

4 SELECT PAYMENT METHOD

Credit Card

Credit Card No. *

Expiration Date * 07 (July) ▼ 2015 ▼

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You'll pay nothing if unauthorized charges are made to your credit card as a result of shopping at CafePress.com.

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a) In the data-entry form shown above, identify four different data input controls (Textbox, Listbox, Checkbox or Radiobutton) and justify their use for that item of data.

1 (a) control

(b) justification

2 (a) control

(b) justification

3 (a) control

(b) justification

4 (a) control

(b) justification

(4 marks)

b) Choose one of the controls you used in Question a above, and explain the possible consequences if a less-appropriate control had been used. (1 mark)

Consider the following algorithm:

begin

regularRate ← 45

regularHours ← 38

get totalHours

if totalHours > 38 then

overtime ← totalHours – 38

else

regularHours ← totalHours

overtime ← 0

grossPay ← (regularHours * regularRate) + (overtime * regularRate * 1.5)

display "Total Gross Pay is \$" grossPay

end

a. Explain what is happening in the algorithm given above? (4 marks)

b. What is the purpose of a variable within a program? (2 marks)

c. Identify and list 3 variables in the algorithm shown above. (3 marks)

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d. Provide 2 reasons why it is important to test programs. (2 marks)

e. Explain why naming conventions are important when naming variables and files. (2 marks)

Consider the following algorithm:

Start

 Get N

 If N > 25 then

 Display "Too many people."

 Tot \leftarrow 0

 Count \leftarrow 0

 Done \leftarrow False

 Repeat

 Get Score

 If Score < 0 then

 Done \leftarrow True

 Else

 Tot \leftarrow Tot + Score

 Count \leftarrow Count + 1

 Until Count = 25 or Done

 //This line has an error in it.

 A \leftarrow Tot / Count

 Display A

Stop

a. What does this algorithm do? (3 marks)

b. Describe how you would test the processing. (3 marks)

c. There is an error in the line which starts "Until". Write the corrected line. (1 mark)

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When the parking officers of a key regional city of Bigton arrive at the parking bays they will enter the car's number plate into their mobile phones. The software must check that each number plate entered is in the correct format. Then each number plate is sent to the dedicated computer. Kirsten, the programmer has proposed the following algorithm.

```

Procedure checkNumberPlateFormat(numberPlate)
Begin
    numberPlateValid ← true
    If length(numberplate) > 0 And length(numberplate) < 6 Then
        For position ← 1 To length(numberplate)
            If character(position) is Not (numeric Or alphabetic) Then
                numberPlateValid ← false
            Endif
        End For
    Else
        numberPlateValid ← false
    Endif
    If numberPlateValid = false Then
        Display Invalid number plate message
    Endif
End

```

- a. Kirsten desk checks this algorithm with test data for the numberplate, as shown below. Complete the test table.

Test	Test data	Expected outcome	Actual outcome
1	ABC123		
2	*ABC		
3	123AB&		

(3 marks)

- b. Describe the error that this test data show.

1 mark)

- c. Write down the line of the algorithm that has caused this error.

(1 mark)

- d. Write down the line as it should have been written.

(1 mark)