

# **COMPUTER APPLICATIONS SYLLABUS 7018**

**Secondary  
Normal Technical Course  
Upper Secondary  
Normal Academic Course**

Implementation starting with  
2012 Secondary One and Two Cohorts



Ministry of Education  
SINGAPORE

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# 1 COMPUTER APPLICATIONS

Computer Applications (CPA) is a compulsory subject for all Normal Technical (NT) students. The CPA curriculum spans four years, from Secondary 1 to Secondary 4, leading to national examinations at the end of Secondary 4<sup>1</sup>.

The lower secondary syllabus focuses on equipping students with fundamental ICT skills that will support learning of the other NT subjects and are useful in their personal life. These skills also form the foundation for the learning of Computer Applications (CPA) at the upper secondary levels. All students are expected to have acquired the baseline ICT skills set out at the pre-secondary education level (namely, in the primary schools). These skills are therefore assumed as entry skills of students at Secondary 1 (see [Annex A](#)).

At the upper secondary levels, the syllabus focuses on higher-order thinking skills. There is attention to problem solving and understanding basic programming concepts and skills. Basic programming concepts and skills will be learnt through simple animation and game design; and eventually, applying them to solve problems in everyday context. This will better prepare students for further studies in programming and media-related courses; as well as for the work place and future learning.

All students will be exposed to internet technologies and tools that are readily available e.g. using collaborative tools from Google Apps. Hands-on activities continue to be the main feature of this skill-based subject. Tasks that require an integrated use of office software applications and problem sets that step the learner through the learning process will feature prominently in the course of learning. Students will have opportunities to do creative work with animation and game development projects that will be part of the curriculum in Secondary 2 and Secondary 3, respectively.

There are six compulsory modules in the subject. These modules are: (1) Computer Fundamentals, (2) Media Elements, (3) Document Processing, (4) Spreadsheets, (5) Multimedia Communication, and (6) Media Computing. The

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<sup>1</sup> The subject is also offered to Normal Academic students at upper secondary.

mnemonics and descriptions of these six compulsory modules are as follows. Each module is divided into units of study, which are detailed in Chapter 3.

Module CPF      Computer Fundamentals

This module introduces students to information communication technology and equips them with a basic knowledge of computing and communication devices. There is emphasis on fundamental computing knowledge and skills, and the impact of technology on people and society. Current developments in hardware and software are included where applicable. Computer usage and applications covered will range from the use of a desktop computer to internet technologies, and will include topics on computer ethics and security.

Students study this module from Secondary 1 - 4.

Module MEL      Media Elements

This module introduces students to design and drawing with computer software. The basic concepts, tools and techniques for creating and manipulating 2D vector graphics are covered. Students also get to edit and work with bitmap graphics and learn the difference between vector and bitmap graphics. Students will learn that vector graphics (drawings in 2D) are the foundation for 3D graphics and animation. They will be introduced to the concept of frames and frame rate when they engage in creating and editing video/movie clips. Students will also learn how to create and edit sound/voice clips for different purposes.

Students study this module from Secondary 1 - 3.

Module DOP      Document Processing

This module introduces students to the design of visually effective documents through the combined use of text and graphics. Students will learn page layout, page and text format, as well as work with data in tables and merge mail. Students will also learn to embed chart (with or

without data table) from spreadsheet application software into word document, as well as use auto shapes for drawing flowcharts.

Students study this module from Secondary 1 - 4.

Module SST      Spreadsheets

The highlight of this module is the use of spreadsheets to solve problems in real-life situations and flowcharts to represent the algorithms. Students will use the spreadsheet for required calculations; and understand the use of formulas, functions and cell referencing. Students will also learn to format cells, perform what-if analysis, sort data and develop an appreciation of the use of spreadsheets in everyday decision-making. Students will learn to express problem solutions using statements, flowcharts, formulas, functions, and mathematical and conditional expressions. They will learn to apply data formatting, understand the need for data validation, check for error conditions, and run and test the solutions on a computer.

Students study this module from Secondary 1 - 4.

Module MMC      Multimedia Communication

This module introduces students to the use of application software for multimedia presentations and documents. Students will learn to communicate messages, information and ideas effectively. They will also learn to use information responsibly. Students will learn that multimedia presentations and documents may incorporate the different media elements: text, graphics, sound, animation and video. Students will recognise the importance of storyboarding, learn and apply the principles of interface design as they engage in creating multimedia documents for presentations and for publishing on the internet.

Students study this module from Secondary 1 - 2.

Module MEC Media Computing

This module introduces students to a scripting software, which has drag-and-drop program elements in a mouse-based editor that prohibits syntax errors. Students will be taught programming and problem solving through the activity of storytelling, using English-like statements, short instructions, and flowcharts. Students will learn how media elements such as text, graphics and sound may be combined into an entertaining multimedia animated story or game. The animation allows students to see the state of the program, and provides an easy-to-see relationship between the program construct and the animated action.

Students study this module from Secondary 2 - 4.

The estimated curriculum time (in percentage) per module and for the school-based course projects are as follows, in Table 1.1:

**Table 1.1: Weighting of Curriculum Time**

Code	Module Name	Weighting	S1	S2	S3	S4
CPF	Computer Fundamentals	14.5%	√	√	√	√
MEL	Media Elements	13%	√	√	√	
DOP	Document Processing	13%	√	√	√	√
SST	Spreadsheets	24%	√	√	√	√
MMC	Multimedia Communication	9.5%	√	√		
MEC	Media Computing	19%		√	√	√
	<i>Integrated Coursework Tasks</i>	2%	√			
	<i>Animation Project</i>	2.5%		√		
	<i>Game Design Project</i>	2.5%			√	
<b>Total</b>		<b>100%</b>	<b>51%</b>		<b>49%</b>	



## 2 AIMS

The Computer Applications syllabus aims to prepare our Normal Technical (NT) students to be technologically adept citizens, and to function and contribute effectively in an increasingly technologically driven world.

The syllabus emphasises fundamental knowledge and skills, and include the appreciation and use of software application packages for word processing, computer drawing and image editing, multimedia presentations and documents, spreadsheet calculations and charts, game design, programming; as well as, applications on the Internet.

The general aims of the syllabus are to enable students to:

- (1) acquire skills in using a variety of application software and associated computer hardware to accomplish tasks, communicate, and facilitate activities;
- (2) develop an awareness of how computing technology are used in the home, school, workplace and community;
- (3) appreciate the role computers play in everyday life and recognise the impact computers have on society and people;
- (4) develop critical thinking and problem-solving skills.

Figure 2.1 shows the relationship between Syllabus 7016 and the 2014 syllabus, and the changes made.

Three key changes are:

- Higher entry level of ICT skills
- Greater focus on media-related work
- Introduction to simple programming

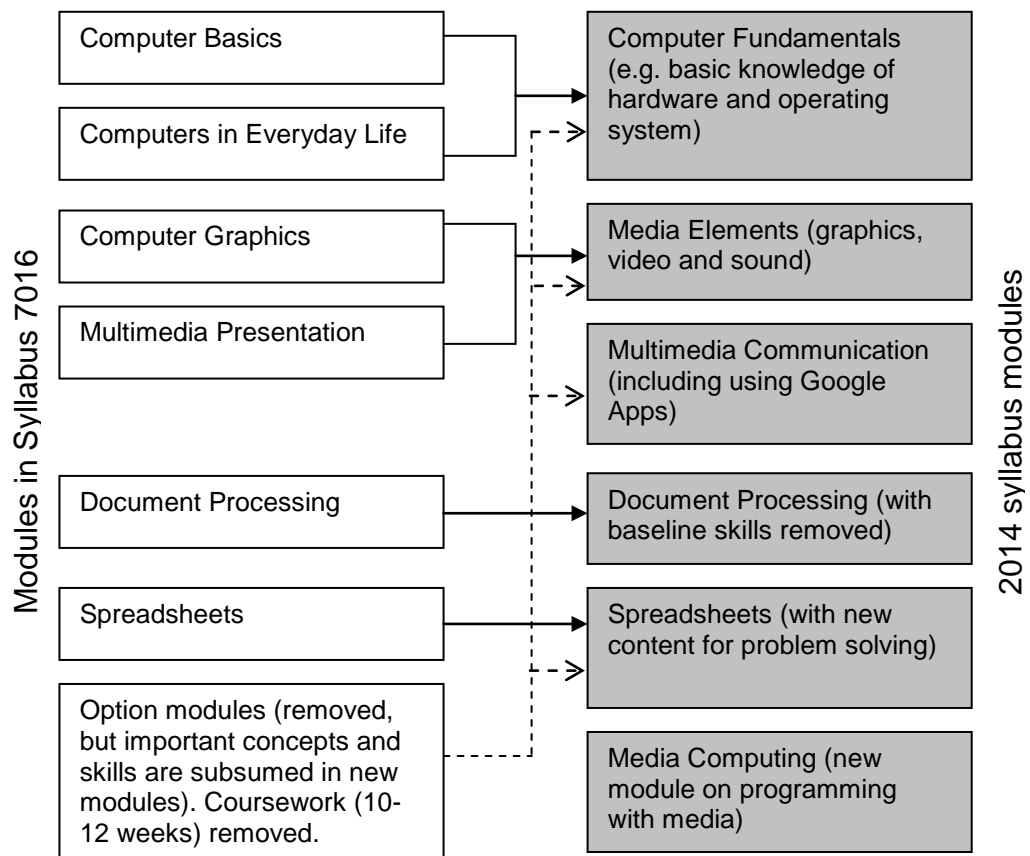


Figure 2.1: Relationship between Modules in Syllabus 7016 and 2014 Syllabus

At the end of the four-year course, students will be able to use software for word processing, multimedia presentations and spreadsheet calculations and charts. They will also be able to use application software to share resources and publish web pages on the internet, communicate via email and chat facility, solve problems in everyday context, and represent their problem solutions via data tables, flowcharts and programming statements. Students will also demonstrate their skills in interface design, computer drawing and image editing through their blogs, web pages and tasks like animated stories and games. Students will be able to use information responsibly. They will be able to understand and appreciate the range and power of computer applications.

# 3 CONTENT

## 3.1. Computer Fundamentals

This module introduces students to information communication technology and equips them with a basic knowledge of computing and communication devices. There is emphasis on fundamental knowledge and skills, and the impact of technology on people and society. Current developments in hardware and software are included where applicable. Computer usage and applications covered will range from the use of a desktop computer to internet technologies, and will include topics on computer ethics and security. This module is taken over four years from Secondary 1 - Secondary 4 (S1 - S4).

### Units of study

- Computer systems
- Computer operations
- Computer software
- Impact of computer technology
- Computer abuse and misuse

Topic	Learning Outcomes	S1	S2	S3	S4
<b>[1.1] Computer systems</b>	Students should be able to				
□ Storage media	[1.1.1] List the different secondary storage media for data and programs.	•			
	[1.1.2] Recommend the storage media for files of different sizes.	•			
□ External devices	[1.1.3] Classify devices under modes of operation such as touch, pressure and optical.	•			
	[1.1.4] State what each device	•			

Topic	Learning Outcomes	S1	S2	S3	S4
	is used for in an application area.				
□ System specifications	[1.1.5] State the difference between RAM (random access memory) and ROM (read-only memory).	•			
	[1.1.6] Discuss system specifications in terms of processor speed, RAM, and price.	•			
	[1.1.7] Name the key components on a computer system board such as RAM, CPU, and hard disk drive.	•			
□ Storage capacity	[1.1.8] Distinguish between primary and secondary storage.	•			
	[1.1.9] Show awareness of storage capacity of primary storage (i.e. RAM).	•			
	[1.1.10] Know the relative size of bits, bytes, kilobytes, megabytes, gigabytes and terabytes.	•			
□ Communication	[1.1.11] Name the different types of communication devices (e.g. mobile devices, hub, router and modem).		•		
	[1.1.12] Understand the difference between wired and wireless communications.		•		
	[1.1.13] Communicate via email and web conferencing.		•		
□ Networks	[1.1.14] Name the components of a computer network.		•		
	[1.1.15] Understand the concept of a network.		•		
	[1.1.16] Understand the difference between a local			•	

Topic	Learning Outcomes	S1	S2	S3	S4
	area network (LAN) and a wide area network (WAN).				
	[1.1.17] Understand and state that computers in a network can share resources such as documents, databases and software.			•	
	[1.1.18] Understand the difference between intranet and internet.			•	
<b>[1.2] Computer operations</b>	Students should be able to				
□ Safety and troubleshooting	[1.2.1] Practise safe methods of working in the lab.	•			
	[1.2.2] Do simple troubleshooting such as reboot, end process and clear printer buffer.	•			
□ Input-Process-Output	[1.2.3] Distinguish between input, process and output operations.	•			
	[1.2.4] Understand that meaningful information can be output only after the computer has processed the correct input data.	•			
	[1.2.5] Identify the input, process and output of a computer application.	•			
□ Care and prevention	[1.2.6] State ways in which data can be lost.		•		
	[1.2.7] List measures to prevent loss of data.		•		
	[1.2.8] State the proper way to handle and care for equipment (include removing devices safely).		•		
	[1.2.9] Understand the need to make backups for possible		•		

Topic	Learning Outcomes	S1	S2	S3	S4
	recovery in case the originals are damaged.				
<b>[1.3] Computer software</b>	Students should be able to				
<ul style="list-style-type: none"> <li>□ System &amp; utility software</li> </ul>	[1.3.1] State that instructions are required to operate a computer and these instructions are contained in computer programs or software.	•			
	[1.3.2] State that an operating system is software to control the input-process-output operations in a computer system.	•			
	[1.3.3] State that file compression can be used to reduce file size but that these files may have to be expanded before use.	•			
<ul style="list-style-type: none"> <li>□ Application software</li> </ul>	[1.3.4] Understand that application software refers to programs designed for user-related tasks (i.e. may be single and multi-users).	•			
	[1.3.5] Understand that interfaces can be command-driven or graphical.	•			
<ul style="list-style-type: none"> <li>□ Copyrights and internet safety</li> </ul>	[1.3.6] Be aware of copyright issues.	•			
	[1.3.7] Understand the dangers of the Internet (Including cyber-wellness).	•			
	[1.3.8] Use safety measures when on the Internet (include firewall).	•			

Topic	Learning Outcomes	S1	S2	S3	S4
<b>[1.4] Impact of computer technology</b>	Students should be able to				
□ Role and use	[1.4.1] Identify the situations in which computers are used in society.			•	
	[1.4.2] State how the use of computers has affected the way people live and work.			•	
□ Internet applications	[1.4.3] State the various services available on the internet such as on-line news, cyber-shopping, on-line registrations, seat reservations and examinations.			•	
	[1.4.4] Work together on shared resources on the internet.				•
	[1.4.5] Create customised form for data collection over the internet.				•
	[1.4.6] Use internet tools to publish web pages.				•
<b>[1.5] Computer abuse and misuse</b>	Students should be able to				
□ Computer virus	[1.5.1] Understand the effect of computer virus.			•	
	[1.5.2] List measures to prevent computer virus.			•	
□ Computer crimes	[1.5.3] List examples of computer crimes.			•	
	[1.5.4] List measures to prevent computer crimes.			•	
□ Personal data	[1.5.5] Show awareness of data privacy.			•	

## 3.2. Media Elements

This module introduces students to design and drawing with computer software. The basic concepts, tools and techniques for creating and manipulating 2D vector graphics are covered. Students get to edit and work with bitmap graphics and learn the difference between vector and bitmap graphics. Students will learn that vector graphics (drawings in 2D) are the foundation for 3D graphics and animation. Students will also learn how to create and edit sound/movie clips for different purposes. They will be introduced to the concept of frames and frame rate when they create and edit video/movie clips. This module is taken over three years from Secondary 1 - Secondary 3 (S1 - S3) but the skills learnt will be applied in the other modules.

### Units of study

- Vector graphics
- Bitmap graphics
- Video and audio
- 3D drawing

Topic	Learning Outcomes	S1	S2	S3
<b>[2.1] Vector graphics</b>	Students should be able to			
□ Plan	[2.1.1] Understand the task requirements.	•		
	[2.1.2] Plan how a drawing could be done in terms of its component objects.	•		
□ Tools and skills	[2.1.3] Create a drawing (vector graphic) using lines, curves, circles/ovals, and rectangles/polygons.	•		
	[2.1.4] Use basic tools for drawing <sup>2</sup> .	•		
	[2.1.5] Save the drawing as vector graphic.	•		
	[2.1.6] Manipulate the nodes and control points of a vector graphic to shape it.	•		

<sup>2</sup> Examples: Copy and paste, duplicate, move and arrange, resize, flip, skew, rotate, group and ungroup, shape, trim, and weld.



Topic	Learning Outcomes	S1	S2	S3
	[2.1.7] Save drawings as bitmap graphics.	•		
□ Colours and design	[2.1.8] Fill a drawing with colours.	•		
	[2.1.9] Understand open and closed objects (and able to close open objects).	•		
	[2.1.10] Use the text tool and fonts as part of a graphic design (e.g. <i>fit text to path and envelope effects</i> ).	•		
	[2.1.11] Apply effects to drawing <sup>3</sup> .		•	
	[2.1.12] State that vector graphics can be resized without loss of details.		•	
<b>[2.2] Bitmap graphics</b>	Students should be able to			
□ Nature	[2.2.1] Understand that an image is composed of individually coloured pixels.		•	
	[2.2.2] Understand the purpose of different file formats for bitmap graphics.		•	
	[2.2.3] State that resizing bitmap graphics can result in a loss of quality.		•	
	[2.2.4] Understand concept of dots per inch.		•	
□ Skills	[2.2.5] Join images to compose a picture (e.g. <i>making a collage</i> ).		•	
	[2.2.6] Animate bitmap graphics.		•	
	[2.2.7] Add special effects.		•	
<b>[2.3] Video and audio</b>	Students should be able to			
□ Moving images	[2.3.1] Create a video or movie clip.		•	
	[2.3.2] Understand concept of frames and frame rate.		•	
□ Sound and voice	[2.3.3] Extract parts of a sound clip/track.			•
	[2.3.4] Edit sound clip/track for a purpose.			•

<sup>3</sup> Examples: Blend/morph, combine, intersect, and transparency.

Topic	Learning Outcomes	S1	S2	S3
	[2.3.5] Record and store digital voice.			•
<b>[2.4] 3D drawing</b>	Students should be able to			
□ Models	[2.4.1] Understand concepts of planes.			•
	[2.4.2] Understand concepts of views.			•
□ Tools	[2.4.3] Create a 3D drawing.			•
	[2.4.4] Orientate a 3D drawing.			•
	[2.4.5] Edit a 3D drawing.			•

### 3.3. Document Processing

This module introduces students to the design of visually effective documents through the combined use of text and graphics. Students will learn page layout, page and text format, as well as work with data in tables and merge mail. Students will also learn to embed chart (with or without data table) from spreadsheet application software into word document, as well as use auto shapes for drawing flowcharts. This module is taken over four years from Secondary 1 - Secondary 4 (S1 - S4). At Secondary 4, students learn to integrate the use of the word processor and spreadsheet.

#### Units of study

- Text and images
- Page properties
- Text formatting
- Working with tables

Topic	Learning Outcomes	S1	S2	S3	S4
<b>[3.1] Text and images</b>	Students should be able to				
□ Text	[3.1.1] Import text into a document from another document.	•			
	[3.1.2] Use fanciful text and font to improve the look of a document (e.g. WordArt and Drop Cap).	•			
□ Graphics	[3.1.3] Change the size of graphics (e.g. resize or crop).	•			
	[3.1.4] Make the graphics into a watermark.	•			
	[3.1.5] Use the zoom feature to view a document.	•			
	[3.1.6] Insert auto shape.		•		
	[3.1.7] Enter text in auto shape.		•		
□ Chart	[3.1.8] Embed a chart (with or without data table) from			•	

Topic	Learning Outcomes	S1	S2	S3	S4
	spreadsheet.				
<b>[3.2] Page properties</b>	Students should be able to				
□ Page layout	[3.2.1] Understand what each type of page orientation is used for.	•			
	[3.2.2] Show that the positions of elements should be consistent (e.g. page numbers, letterheads and logos).	•			
	[3.2.3] Use margin settings effectively for page layout.	•			
	[3.2.4] Understand that text boxes and tables may be used to lay out a document.		•		
	[3.2.5] Understand when to use layout with 2 - 3 columns.		•		
	[3.2.6] Create a multi-column (2 - 3) document using tables, text boxes and built-in columns.		•		
□ Page formatting	[3.2.7] Add page border.	•			
	[3.2.8] Understand the purpose of headers and footers.		•		
	[3.2.9] Insert footnotes.		•		
	[3.2.10] Understand the reason for using a different start number for a page.		•		
	[3.2.11] Insert/remove page break.		•		
<b>[3.3] Text formatting</b>	Students should be able to				
□ Paragraph format	[3.3.1] Understand the purpose for using each type of alignment: centralised, left justified, right justified and fully justified.	•			
	[3.3.2] Set line spacing to desired width.	•			

Topic	Learning Outcomes	S1	S2	S3	S4
	[3.3.3] Understand the concept of word wrap.		•		
	[3.3.4] Wrap text around a graphic.		•		
	[3.3.5] Use tab stops and indentations for paragraphs.		•		
□ Text flow	[3.3.6] Import text into text box (frame).			•	
	[3.3.7] Understand that text can flow from one text box (frame) to another.			•	
	[3.3.8] Control the flow of text from one text box (frame) to another.			•	
	[3.3.9] Add, remove or modify borders of a text box.			•	
	[3.3.10] Import graphics into text box (frame).			•	
	[3.3.11] Wrap text around a text box (frame).			•	
<b>[3.4] Working with tables</b>	Students should be able to				
□ Appearance and alignment	[3.4.1] Format and shade cells.	•			
	[3.4.2] Merge the cells of a table.	•			
	[3.4.3] Add or remove borders to cells of a table.	•			
	[3.4.4] Align table left, right or centre.	•			
□ Content of cell	[3.4.5] Import text and graphics into the cells of a table.	•			
	[3.4.6] Align text and graphics in cells of a table.	•			
□ Mail merge	[3.4.7] Understand the concept of mail merge.			•	

Topic	Learning Outcomes	S1	S2	S3	S4
	[3.4.8] Use the mail merge feature for documents with data from table in word processor.			•	
	[3.4.9] Use the mail merge feature for documents with data from table in spreadsheet.				•
	[3.4.10] Use the mail merge feature for documents with data from spreadsheet using conditional commands.				•

### 3.4. Spreadsheets

The highlight of this module is the use of spreadsheets to solve problems in real-life situations and flowcharts to represent the algorithms. Students will use the spreadsheet for calculations; and understand the use of formulas, functions and cell referencing. Students will also learn to format cells, perform what-if analysis, sort data and develop an appreciation of the use of spreadsheets in everyday decision-making. Students will learn to express problem solutions using statements, flowcharts, formulas, functions, and mathematical and conditional expressions. They will learn to apply data formatting, understand the need for data validation, check for error conditions; and run and test the solutions on a computer. This module is taken over four years from Secondary 1 - Secondary 4 (S1 - S4).

#### Units of study

- Data display
- Data values
- Data analysis
- Program statements

Topic	Learning Outcomes	S1	S2	S3	S4
<b>[4.1] Data display</b>	Students should be able to				
□ Formats	[4.1.1] Format numeric data in currency format with required number of decimal places.	•			
	[4.1.2] Wrap and align text (top, centre, bottom) in cell.	•			
	[4.1.3] Format numeric data in percentage format.		•		
	[4.1.4] Understand the format of date data.		•		
	[4.1.5] Format (either through shading the cell or changing the font colour of contents) by setting criteria for the data value or formula in the cell.			•	
□ Charts	[4.1.6] State the purpose of each type of		•		

Topic	Learning Outcomes	S1	S2	S3	S4
	chart (bar, pie and line).				
	[4.1.7] Create bar, pie and line charts.		•		
	[4.1.8] Understand the changes made to a chart when its data table is modified.		•		
	[4.1.9] Create bar and line charts for data <u>not</u> in adjacent columns.			•	
	[4.1.10] Create combination charts.			•	
	[4.1.11] Understand and state the purpose of a combination chart.			•	
□ Printouts	[4.1.12] Print a selected range of cells.	•			
	[4.1.13] Print formula view of a worksheet.		•		
<b>[4.2] Data values</b>	Students should be able to				
□ Input values	[4.2.1] Restrict cursor movement to input cells.			•	
	[4.2.2] Check and allow valid input data.				•
	[4.2.3] State why data needs to be validated prior to processing.				•
□ Calculated values	[4.2.4] Compute the total for columns and rows.	•			
	[4.2.5] Use mathematical operators (+ - * /) in worksheet calculations.	•			
	[4.2.6] Use functions to find min and max values, sum and average.	•			
	[4.2.7] Understand the purpose of absolute and relative cell referencing.		•		
	[4.2.8] Use absolute and relative cell referencing.		•		
	[4.2.9] Understand the automatic recalculation feature of a spreadsheet.		•		
	[4.2.10] Calculate the total number of data values.			•	
	[4.2.11] Understand that values that can				•



Topic	Learning Outcomes	S1	S2	S3	S4
	be calculated should not be input.				
□ Output values	[4.2.12] Display appropriate text message in place of error displays.				•
<b>[4.3] Data analysis</b>					
	Students should be able to				
□ Sort	[4.3.1] Sort a data table in ascending order of a particular data item.			•	
	[4.3.2] Sort a data table in descending order of a particular data item.			•	
□ What-if	[4.3.3] Understand how changes in one or more data items can affect other related data items.			•	
	[4.3.4] Use the spreadsheet to perform data analysis due to changes in data values.				•
<b>[4.4] Program elements</b>					
	Students should be able to				
□ Functions	[4.4.1] Generate random numbers below a specified value.			•	
	[4.4.2] Round (up or down) numeric data values.			•	
	[4.4.3] Express numeric data values as whole numbers.			•	
	[4.4.4] Find the remainder when one number is divided by another.			•	
	[4.4.5] Extract the day, month and year components from a date.				•
	[4.4.6] Extract a word from a line of text.				•
□ Conditions	[4.4.7] Understand and use conditional statements.			•	
	[4.4.8] Understand and use relational operators to compare data values.			•	
	[4.4.9] Understand and use nested conditional statements.				•

Topic	Learning Outcomes	S1	S2	S3	S4
	[4.4.10] Understand and use Boolean operators: AND, OR.				•
	[4.4.11] Look up data in tables or lists.				•
□ Algorithms	[4.4.12] Express problem solutions using flowcharts.			•	
	[4.4.13] Describe problem solutions in short sentences.				•

### 3.5. Multimedia Communication

This module introduces students to the use of application software for multimedia presentations and documents. Students will learn to communicate messages, information and ideas effectively. They will also learn to use information responsibly. Students will learn that multimedia presentations and documents may incorporate the different media elements: text, graphics, sound, animation and video. Students will recognise the importance of storyboarding, learn and apply the principles of interface design as they engage in creating multimedia documents for presentations and for publishing on the internet. This module is taken over two years from Secondary 1 – Secondary 2 (S1 – S2) but the concepts and skills learnt will lay the foundation for the modules on Document Processing & Media Computing.

#### Units of study

- Multimedia basics
- Storyboarding
- Navigation

Topic	Learning Outcomes	S1	S2
<b>[5.1] Multimedia</b>	Students should be able to		
□ Media elements	[5.1.1] Understand that text, graphics, animation, sound and video are media elements.	•	
	[5.1.2] Identify media elements in an application.	•	
□ Applications	[5.1.3] Give examples of common multimedia applications.	•	
	[5.1.4] Use media elements in presentations.	•	
	[5.1.5] Use media elements for internet-based documents (e.g. blog and web pages).		•

Topic	Learning Outcomes	S1	S2
<b>[5.2] Storyboarding</b>	Students should be able to		
□ Flow of content	[5.2.1] Understand that a storyboard shows the sequence or flow of content and layout of the media elements.	•	
	[5.2.2] Lay out media elements effectively so as to put the message across.	•	
	[5.2.3] Plan a storyboard for a slide presentation.	•	
	[5.2.4] Produce a slide presentation based on a storyboard.	•	
	[5.2.5] Plan a storyboard for an internet-based document (e.g. blog and web pages).		•
	[5.2.6] Produce an internet-based document based on a storyboard.		•
□ Layout design	[5.2.7] Understand that the relative sizes of media elements (e.g. text and pictures), together with white space enhance the visual appeal of a presentation or internet-based document (e.g. web pages and slides).	•	
	[5.2.8] Use appropriate fonts and colours for readability.	•	
	[5.2.9] Use appropriate font type and size to distinguish between headings and body text.	•	
	[5.2.10] Understand the purpose of using a mix of uppercase and lowercase letters for text.	•	
	[5.2.11] Put repeated media element in the same position on different screens.	•	
	[5.2.12] Use appropriate background for a slide presentation so that media elements are visible.	•	
	[5.2.13] Use appropriate background for an internet-based document so that media elements are visible.		•
<b>[5.3] Navigation</b>	Students should be able to		
□ Buttons and links	[5.3.1] Create buttons to move to the next and previous screens of a presentation.	•	
	[5.3.2] Control the flow between and within a	•	

Topic	Learning Outcomes	S1	S2
	presentation through buttons and links.		
	[5.3.3] Understand the difference between external and internal links.		•
□ Menu	[5.3.4] Understand the concept of a menu as a user interface.		•
	[5.3.5] Create a simple menu-controlled presentation.		•
	[5.3.6] Create an internet-based document (e.g. web pages).		•

### 3.6. Media Computing

This module introduces students to a scripting software that has drag-and-drop program elements that prohibit syntax errors. Students will be taught programming and problem solving through the activity of storytelling, using English-like statements, short instructions, and flowcharts. Students will learn how media elements such as text, graphics and sound may be combined into an entertaining multimedia animated story or game. The animation allows students to see the state of the program, and provides an easy-to-see relationship between the program construct and the animated action. This module is taken over two years from Secondary 2 - Secondary 4 (S2 – S4).

#### Units of study

- Animation
- Storytelling
- Scripting
- Interaction
- Game development

Topic	Learning Outcomes	S2	S3
<b>[6.1] Animation</b>	Students should be able to		
□ Characters / Objects	[6.1.1] Understand the purpose of each character or object.	•	
	[6.1.2] Understand the need/purpose to switch between characters or objects.	•	
	[6.1.3] Understand that a character or object can have an action.	•	
	[6.1.4] Understand that scripts are instructions to a character or object for action.	•	
□ Background	[6.1.5] Select and use suitable digitised pictures for backgrounds.	•	
	[6.1.6] Understand the need/purpose to switch between backgrounds.	•	
	[6.1.7] Understand that the background is an object.	•	

Topic	Learning Outcomes	S2	S3
<b>[6.2] Storytelling</b>			
	Students should be able to		
□ Flow chart	[6.2.1] Understand and use the flowchart symbols for start/end, input/output, process and decision.	•	
	[6.2.2] Express the behaviour of a character or object through a flow chart.	•	
□ Prose	[6.2.3] Describe what the animation is about, in short paragraphs.	•	
	[6.2.4] Explain the sequence of events in the animation.	•	
<b>[6.3] Scripting</b>			
	Students should be able to		
□ Output	[6.3.1] Output typed text.	•	
	[6.3.2] Output sound.	•	
□ Actions	[6.3.3] Switch between characters or objects.	•	
	[6.3.4] Move each character or object in the desired direction.	•	
	[6.3.5] Position each character or object at the desired location.	•	
□ Control	[6.3.6] Start and stop the running/execution of instructions.	•	
	[6.3.7] Determine the duration (in seconds) of an instruction.	•	
	[6.3.8] Understand and use a conditional statement <sup>4</sup> .	•	
	[6.3.9] Understand and use a conditional loop.	•	
<b>[6.4] Interaction</b>			
	Students should be able to		
□ Operators	[6.4.1] Understand and use mathematical operators.		•
	[6.4.2] Understand and use relational		•

<sup>4</sup> Examples: IF statements and statements to coordinate actions of characters.

Topic	Learning Outcomes	S2	S3
	operators.		
	[6.4.3] Understand and use random number generator.		•
□ Events	[6.4.4] Read a key press.		•
	[6.4.5] Read a response from the mouse <sup>5</sup> .		•
□ Variables	[6.4.6] Understand use of a variable.		•
	[6.4.7] Change the value of a variable.		•
	[6.4.8] Output the value of a variable.		•
<b>[6.5] Game development</b>	Students should be able to		
□ Purpose	[6.5.1] Describe what the game is about, in short paragraphs.		•
□ Creation	[6.5.2] Determine the characters or objects for the game.		•
	[6.5.3] Create the scripts for the game.		•
□ Documentation	[6.5.4] Explain how the game is played.		•
	[6.5.5] Draw flowchart for the game algorithm.		•

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<sup>5</sup> This includes knowing the position of the mouse pointer.



# 4 PEDAGOGY

As Computer Applications (CPA) is a skill-based subject with lots of hands-on and lab-based work, two teachers are designated to teach the subject at each level so as to better address the needs of the students.

The active participation of the two teachers will enable students' work and progress to be effectively monitored and assistance to be rendered to students in a timely manner. The recommendation is for the two teachers to take turns to teach parts of the syllabus and to help each other out in the computer laboratory.

## 4.1. Problem Sets

A set of carefully designed tasks are developed for teachers to take the students through the learning objectives of the syllabus from Secondary One to Secondary Four. The tasks are organised as problem sets to cover the learning outcomes of two or more modules. The tasks in the problem sets will also allow students to acquire and develop 21<sup>st</sup> Century competencies such as (a) thinking critically and making judgement, (b) solving complex, multi-disciplinary and non-routine problems, (c) creative and innovative thinking, (d) communicating and collaborating, and (e) taking charge of financial and civic responsibility. The list of problem sets, the learning objectives covered by the problem sets and teaching strategies are in the Teacher's Manual. There is a separate Teacher's Manual for Secondary One to Secondary Four. There are also separate Student Workbooks for Secondary One to Secondary Four.

## **4.2. Projects**

Students in Secondary Two and Secondary Three will engage in media computing projects to create animated stories and games, respectively. These projects will provide outlets for students' creativity besides reinforcing their learning.

Schools may submit their best students' work as entries in the annual media computing competition. The intention of the media computing competition is to

- show case students' best efforts,
- provide a platform for students to learn from their peers, and
- provide opportunities for more students to get to know about the latest trends and state-of-the-art technology through talks by invited speakers, exhibitions and learning journeys.

# 5 SCHOOL ASSESSMENT

The purpose of school assessment is to find out how well students have learnt and are able to perform the various tasks expected of them and to identify gaps in content and skills. The emphasis in Computer Applications is more on skills and thus, the assessment is more task-oriented and lab-based in nature.

The greater importance accorded to the lab-based component of the Computer Applications syllabus is also necessary to ensure that students achieved the desired ICT outcomes and are able to use ICT effectively in the study of the other NT subjects and for activities outside the classroom.

## 5.1 School-Based Assessment

School-based assessment may vary from school to school but should generally comprise written, lab-based and course project components.

### Written Paper

The written paper may comprise multiple-choice questions and/or short-structured questions of variable mark values. Short-structured questions could be of fill-in-the-blank type of questions, questions that require matching and those that require TRUE-FALSE responses. As far as possible, the questions set should test students' knowledge (30%), understanding (40%) and application (30%) of concepts and skills learnt. Questions set should also cover all the six modules of the syllabus, where applicable. The duration of the written paper may be from 45 minutes to 1 hour 30 minutes.

### Lab-Based Paper

The lab-based paper or assignments may comprise individual tasks from the MEL, DOP, SST, and MMC modules; or tasks that require the integration of DOP with MEL or DOP

with SST and MEL, or just DOP and SST, or MEL and MMC. A wide variety of tasks could be used to cover the range of skills and the fundamental concepts.

For sample lab-based questions, teachers may refer to the following MOE publications and companion resource CDs:

- School-based assessments of practical work in computer applications (2006)
- Word processing and spreadsheets: a resource book (2009)

### Course Projects

The course project is a summative assessment of the skills learnt in the MMC, MEL, MEC, DOP and SST modules. The Secondary One course project should preferably be conducted in Term 4. This lower secondary course project requires students to work on a certain number of tasks. Secondary One students may source for some of the media elements with teachers providing other media elements to get the project started. Two weeks of curriculum time is allocated for the course project at Secondary One. The emphasis is on using a variety of software to organise, analyse and communicate information effectively and responsibly.

At Secondary Two, the students will be creating an animated story as their course project. The students are expected to create or source for their own media elements for the animation. Three weeks of curriculum time is thus allocated for the course project. The course project is scheduled for Term 3 so that the best students' work could be submitted for participation in the annual Media Computing competition for the Normal Technical students.

At Secondary Three, the students will be designing and developing an animated game as their course project in Term 3. Three weeks of curriculum time is allocated for the course project. The best students' work may also be submitted for participation in the annual Media Computing competition for the Normal Technical students.

All the course projects will provide a creative outlet for the students and allow them to reinforce and/or apply their knowledge and skills in a meaningful endeavour.

## 5.2 Assessment Format and Weighting

Table 5.1a and Table 5.1b show the suggested modes and formats for school-based assessment from Secondary One - Four. While flexibility in the weightings for both the Continual Assessment (CA) and Semestral Assessment (SA) is allowed, it is preferred that the ratio of written work to lab-based work be maintained at about 3:7 where possible. This is in line with the recommendation of a weighting of 30% for written work and 70% for lab-based work for this skill-based subject. Secondary Four students will also sit for the Normal Level ("N" Level) examinations. Details of these examinations are in Chapter 6.

**Table 5.1a: Assessment Format and Weighting for Lower Secondary**

Type	Mode	Format	Duration	Weighting	Modules
CA1	Written test	MCQ and/or Short-structured questions	45 min	5%	CPF MEL DOP MMC
	Lab-based work	Selected variety of class assignments	---	25%	
SA1	Written test	MCQ and/or Short-structured questions	45 min – 1 h	10%	
CA2	Written test	MCQ and/or Short-structured questions	45 min	5%	CPF MEL DOP MMC SST
	Lab-based work	Selected variety of class assignments	---	10%	
SA2	Written test	MCQ and/or Short-structured questions	1 h	10%	CPF MEL DOP MMC SST
	Lab-based test	1 – 2 questions	1 h – 1 h 30 min	15%	MEL DOP SST
	Course project	1 context-based question	2 weeks (in Sec 1)	20%	MMC MEL DOP SST
		Animation	3 weeks (in Sec 2)	20%	MEC MEL DOP

**Table 5.1b: Assessment Format and Weighting for Upper Secondary**

Type	Mode	Format	Duration	Weighting	Modules
CA1	Lab-based	Selected variety of class assignments	---	25%	MEL MMC SST DOP
SA1	Written	MCQ and/or Short-structured questions	45 min – 1 h	5%	CPF DOP MEL MEC SST
CA2	Written	MCQ and/or Short-structured questions	45 min	10%	CPF MEL MMC MEC DOP SST
	Lab-based	Selected variety of class assignments	---	10%	
SA2	Written	MCQ and/or Short-structured questions	1 h	15%	DOP SST
	Lab-based	Game development course project (in Sec 3)	3 weeks	20%	MEL MEC DOP
		Questions with sub-tasks on game development (in Sec 4)	1 h – 1 h 30 min	20%	DOP MEC
	Lab-based	Questions with sub-tasks on one problem scenario	1 h – 1 h 30 min	15%	SST DOP

### 5.3 Assessment Criteria for Lab-Based Assessment

Table 5.2 shows the suggested assessment criteria for a Media Elements (MEL) task - Drawing. Annex B shows a generic standard measure for scoring computer drawing.

**Table 5.2: Assessment Criteria for Drawing**

Assessment Criteria	Marks	Percentage	Description
Design	6	30%	This refers to the way objects in the drawing are positioned, the relative proportions of objects or quality of drawing.
Skills	14	70%	This refers to the use of tools and skills to create the drawing.
TOTAL	20	100%	

Table 5.3 shows the suggested assessment criteria for a Document Processing (DOP) task while Table 5.4 shows the suggested assessment criteria for a Spreadsheet (SST) task.

**Table 5.3: Assessment Criteria for Document Processing**

Assessment Criteria	Marks	Percentage	Description
Design	9	30%	This refers to the layout of the media elements and grouping of content.
Skills	21	70%	This refers to the use of tools and skills for formatting and editing the document.
TOTAL	30	100%	

**Table 5.4: Assessment Criteria for Spreadsheets**

<b>Assessment Criteria</b>	<b>Marks</b>	<b>Percentage</b>	<b>Description</b>
Data entry and format	12	40%	This refers to the entry of different types of data, format of data values and cells, and printing.
Charting	9	30%	This refers to the plotting and labelling of chart.
Calculations	9	30%	This refers to the use of mathematical operators, formulas and functions.
TOTAL	30	100%	

Finally, Table 5.5 shows the suggested assessment criteria for a Multimedia Presentation task. The teacher will have to design a detailed mark scheme to show the allocation of marks for each assessment criterion. Annex C shows a suggested measure for scoring multimedia presentation. Multimedia presentation may be in the form of presentation slides or web pages.

**Table 5.5: Assessment Criteria for Multimedia Presentation**

<b>Assessment Criteria</b>	<b>Marks</b>	<b>Percentage</b>	<b>Description</b>
Storyboarding	3	15%	This refers to the organisation of content (clarity and flow) and is marked based on the hardcopy plan.
Design	7	35%	This refers to the layout of media elements, and interface design.
Skills	10	50%	This refers to the use of tools and skills to create the presentation.
TOTAL	20	100%	



## 5.4 Assessment Criteria for Course Projects

Assessment for the course project is based on the criteria of Design, Skills and Media elements. Table 5.6a shows the assessment criteria for the context-based project for Secondary One students, using application software for computer graphic drawing, word processing and multimedia slide presentation.

**Table 5.6a: Assessment Criteria for Context-Based Project (Sec 1)**

Assessment Criteria	Marks	Percentage	Description
Design	10	25%	This refers to the layout of the media elements and grouping of content.
Skills	24	60%	This refers to the use of tools and skills to complete the stipulated tasks.
Media elements	6	15%	This refers to the ability to prepare own resources for the project.
TOTAL	40	100%	

Tables 5.6b and 5.6c show the mark distribution and description of each criterion for coursework projects for Secondary Two and Three students, respectively. The teacher will need to prepare a detailed mark scheme to indicate how the marks are being allocated for specific tasks meeting the assessment criteria and problem situations. Annex D shows a suggested measure for scoring 2D animation and Annex E shows a suggested measure for scoring the computer game project.

**Table 5.6b: Assessment Criteria for Animation Project (Sec 2)**

Assessment Criteria	Marks	Percentage	Description
Design	10	25%	This refers to the storyline (the screen shots depicting the scenes, the flow of the story indicated in the flowchart and explanation of the animation in short sentences).
Skills	24	60%	This refers to the programming skills and use of program statements.

Assessment Criteria	Marks	Percentage	Description
Media elements	6	15%	This refers to the ability to prepare own resources for the project.
TOTAL	40	100%	

**Table 5.6c: Assessment Criteria for Computer Game Project (Sec 3)**

Assessment Criteria	Marks	Percentage	Description
Design	10	25%	This refers to the purpose and complexity of the game (including screen layout).
Skills	24	60%	This refers to the programming skills and use of program statements.
Media elements	6	15%	This refers to the ability to prepare own resources for the project.
TOTAL	40	100%	

## 5.5 Sample Tasks for Lower Secondary

Sample coursework and project tasks for Secondary 1 and 2 students are shown in Annex F-1, Annex F-2 and Annex G. Teachers may modify these tasks to meet the needs of students, available curriculum time, and purpose; where applicable.

## 5.6 Sample Tasks for Upper Secondary

Sample project tasks for Upper Secondary are shown in Annex H. Teachers may modify these tasks to meet the needs of students, available curriculum time, and purpose; where applicable.

# 6 NATIONAL EXAMINATIONS

The students will sit for two separate lab-based examinations in September and a written examination in October in the fourth year of their study.

## 6.1 Assessment Objectives

The examinations will assess candidates' ability to:

- (a) use software application packages and associated computer hardware to complete a series of designated tasks and sub-tasks;
- (b) solve problems for different problem scenarios and document the problem solutions;
- (c) understand fundamental computer terminology, systems and operations; and
- (d) understand the role and impact of computer technology in everyday use.

## 6.2 Scheme of Examinations

Candidates will sit for three papers in the examination year.

### **Paper 1** (written, 1 hour 15 minutes, 60 marks)

This paper contains two sections. Questions are set to assess candidates' knowledge, understanding and application of concepts and skills in all the six modules, according to the Table of Specification. Section A (20 marks) contains 20 multiple-choice questions with 4 choices per question. Section B (40 marks) contains a variable number of short-structured questions of variable mark values. The paper carries 30% of the total marks for the examination.

### **Paper 2** (lab-based, 1 hour 30 minutes, 70 marks)

This paper assesses candidates' skills to use word processing facilities to edit and format a given document, computer graphics software to create a drawing; and presentation

software to create a multimedia slide presentation with given media elements. Three related tasks are set to cover the concepts and skills learnt in the modules on Media Elements (MEL), Document Processing (DOP), and Multimedia Communication (MMC). The allotted time includes time for printing the hardcopy and saving the softcopy of work for submission. This paper carries 35% of the total marks for the examination.

**Paper 3** (lab-based, 1 hour 30 minutes, 70 marks)

This paper consists of a series of tasks to assess candidates' knowledge, understanding and application of concepts and skills through 2 problem scenarios to be presented in the question paper. Tasks are set to cover the modules on Spreadsheets (SST) and Media Computing (MEC), and candidates are expected to use the word processor to create a flowchart. The allotted time includes time for printing the hardcopy and saving the softcopy of work for submission. This paper carries 35% of the total marks for the examination.

### 6.3 Weighting of Examinations

The details for each paper are summarised in Table 6.1.

**Table 6.1: Weighting for Normal Level Examinations**

Paper	Mode	Duration	Weighting	Marks	No of Questions	Modules Assessed
1	Written	1 h 15 min	30%	20	Section A: 20 MCQ	ALL
				40	Section B: Variable no of Short-Structured Questions (SSQ)	
2	Lab-based	1 h 30 min	35%	70	3 related tasks	MEL DOP MMC
3	Lab-based	1 h 30 min	35%	70	Tasks on 2 problem scenarios	SST MEC

## 6.4 Written Examination

The written paper (Paper 1) tests students' knowledge (30%), understanding (40%) and application (30%) of concepts and skills learnt in all the six modules. Table 6.2 is the Table of Specification for Paper 1.

Section A (20 marks) contains 20 multiple-choice questions with four options per question. Section B (40 marks) contains a variable number of short-structured questions of variable mark values. All the questions are to be attempted.

**Table 6.2: Table of Specification for Paper 1**

Name of Module	Percentage of Paper	Marks			TOTAL
		Knowledge	Understanding	Application	
Section A (20 Multiple-Choice Questions) - 20 marks					
Computer Fundamentals	~ 8%	3	2	--	5
Media Elements	~ 5%	1	2	--	3
Document Processing	~ 5%	2	1	--	3
Spreadsheets	~ 5%	2	1	--	3
Multimedia Communication	~ 5%	1	2	--	3
Media Computing	~ 5%	2	1	--	3
Section B (Variable number of Short-Structured Questions) - 40 marks					
Computer Fundamentals	~ 33%	4	7	9	20
Media Elements	~ 7%	--	2	2	4
Document Processing	~ 7%	--	2	2	4
Spreadsheets	~ 7%	--	--	4	4
Multimedia Communication	~ 7%	1	2	1	4
Media Computing	~ 7%	2	2	--	4
<b>TOTAL</b>		<b>18</b>	<b>24</b>	<b>18</b>	<b>60</b>
		<b>30%</b>	<b>40%</b>	<b>30%</b>	<b>100%</b>

The total weighting for each module reflects the time spent in teaching the content of the module, and takes into consideration the respective weighting in the lab-based examinations (Papers 2 and 3).

## 6.5 Lab-Based Examinations

The lab-based examinations (Papers 2 and 3) test candidates' ability to carry out a series of tasks using appropriate application software; adopt an integrated approach to the use of application software; and provide solutions to problem scenarios. These lab-based examinations will be conducted in the school under the supervision of teachers. Marking is based on the submitted hard and soft copies.

The maximum mark for lab-based examination paper 2 is 70 and the paper contributes to 35% of the whole examination for Computer Applications (CPA). The examination assesses the learning objectives of the three modules on Media Elements, Document Processing, and Multimedia Communication; and tests candidates' ability to use software application packages for drawing, word processing and multimedia presentation by working on 3 related tasks. Table 6.3 shows the weighting and description for each task.

**Table 6.3: Table of Specification for Paper 2**

Module	Description of Task	Weighting	Marks
Media Elements	Candidates will use computer graphics software to create a given drawing according to specifications given in the question paper; fill the drawing with colours, and then save and print the drawing. The drawing will be used for the 2 <sup>nd</sup> or 3 <sup>rd</sup> task.	30%	21
Document Processing	Candidates will use word-processing software to format and edit a given document according to specifications given in the question paper. Candidates are expected to demonstrate skills like importing text and images; page layout with columns, tables and/or textboxes; adding headers, footers and footnotes; as well as saving and printing the work done.	40%	28
Multimedia	Candidates will use presentation	30%	21

<b>Module</b>	<b>Description of Task</b>	<b>Weighting</b>	<b>Marks</b>
Communication	software to create a multimedia slide presentation with given media elements, and according to specifications described in the question paper.		
<b>TOTAL</b>		<b>100%</b>	<b>70</b>

The maximum mark for lab-based examination paper 3 is also 70 and the paper will contribute to 35% of the whole examination for Computer Applications (CPA). The examination assesses the learning objectives of the modules on Spreadsheets and Media Computing. The paper tests candidates' ability to perform a series of tasks for two problem scenarios. Both problem scenarios are described in the paper and the word processing software is used to create a flowchart to represent the algorithm for one of the problem scenarios. Table 6.4 shows the weighting and description for each problem scenario.

**Table 6.4: Table of Specification for Paper 3**

<b>Module</b>	<b>Description of Task</b>	<b>Weighting</b>	<b>Marks</b>
<b>Task 1 (first problem scenario)</b>			
Spreadsheets	<p>Candidates will use spreadsheet software to work on a given data table by creating and completing columns in the data table and performing specified tasks like</p> <ul style="list-style-type: none"> <li>• using operators, formulas and functions for calculations;</li> <li>• plotting and labeling charts;</li> <li>• data validation;</li> <li>• conditional formatting;</li> <li>• sorting and manipulating data;</li> </ul> <p>as well as saving and printing the work done.</p>	40%	28
<b>Task 2 (second problem scenario)</b>			
Media Computing	<p>Candidates will use programming software to work on a given game scenario to demonstrate skills in selecting suitable background pictures and characters, creating scripts to animate characters, allowing user interaction through keyboard and/or mouse, as well as saving and printing the work done.</p>	40%	28
<b>Algorithm</b>			
<b>(for one of the problem scenarios – to be specified in the question paper)</b>			
	<p>Candidates will use word processing software to create a flowchart to represent the algorithm for the problem solution of either the 1<sup>st</sup> or 2<sup>nd</sup> task (the task will be specified in the question paper) and describe the method of solution in short sentences; as well as save and print the work done.</p>	20%	14
<b>TOTAL</b>		<b>100%</b>	<b>70</b>



# 7 INFRASTRUCTURE

Computer Applications (CPA) is a skill-based subject that requires a lot of hands-on and practical work. Most of the modules require the frequent use of the computer and application software packages. A deliverable, either as a printout or a softcopy file, is often required for CPA tasks.

## 7.1. Hardware

Every school is equipped with at least two computer laboratories containing at least 40 computers, each with internet access, for the conduct of the CPA course. Thus, the school should ensure that every student has a computer to work on and that every two students share a printer, or have access to a network printer.

As the software application packages may take up significant memory space, it is advisable that the school ensures that the software applications will run in the computer laboratories for the smooth delivery of the curriculum.

## 7.2. Software

While the school may determine the choice of the application software packages, Table 5.1 shows the main application software recommended for the modules indicated.

**Table 7.1: Software for Teaching and Learning**

<b>Module</b>	<b>Recommended Software</b>
Computer Fundamentals (CPF)	Internet Explorer Google Apps
Media Elements (MEL)	Corel Draw Corel PhotoPaint Movie Maker

<b>Module</b>	<b>Recommended Software</b>
	Sound Recorder
Document Processing (DOP)	Word
Spreadsheets (SST)	Excel
Multimedia Communication (MMC)	PowerPoint Internet Explorer
Media Computing (MEC)	Scratch <sup>6</sup>

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<sup>6</sup>The Lifelong Kindergarten Group developed Scratch at the MIT Media Lab, with financial support from the National Science Foundation, Microsoft, Intel Foundation, Nokia, and the MIT Media Lab research consortia.

# ANNEXES

- A - Entry Skills
- B - Standard Measure for Computer Drawing
- C - Suggested Measure for Multimedia Presentation
- D - Suggested Measure for 2D Animation
- E - Suggested Measure for Computer Game
- F-1 - Coursework Sample A for Secondary One
- F-2 - Coursework Sample B for Secondary One
- F-3 - Coursework Sample C for Secondary One
- G - Animation Projects for Secondary Two
- H - Computer Game Projects for Secondary Three



## **ANNEX A: Entry Skills**

Students should have the following skills upon entry into Secondary 1.

### Learning with Text

- Start and exit a word processor
- Create and save a new document
- Open an existing document
- Preview and print a document
- Enter text into a document
- Type capital and small letters
- Change font type, style, colour and size
- Copy and paste text
- Insert symbols and special characters
- Insert blank lines
- Enter text and numbers
- Highlight text with colours
- Add, delete and change numbering or bullets
- Create and navigate a table
- Insert and delete rows and column
- Hide/show gridlines of a table

### Learning with Multimedia

- Start and exit a presentation
- Create and save a new presentation
- Preview and print a presentation
- Add a new slide
- Enter text
- Add and remove numbering or bullets
- Draw an object and fill it with colour
- Apply fill effects
- Draw and format a line

- Insert/Resize/Move a graphic or clip art
- Insert video and sound files

### Learning with Spreadsheets

- Start and exit spreadsheet
- Create and save a new spreadsheet
- Preview and print a worksheet
- Enter text and numbers into cells
- Edit and format cell entries (currency, date and decimal)
- Change the width and height of columns and rows
- Hide/unhide column and row
- Insert/delete column and row
- Use the merge and centre buttons
- Draw cell borders
- Use fill colour button
- Enter formula with basic operations (+ - \* /)

### Learning with Data Collection Tools

- Take pictures
- Scan text or pictures
- Start/stop a recording device for sound and video
- Use dataloggers

## ANNEX B: Standard Measure for Computer Drawing

This is a standard measure for scoring computer drawing using any application software. The total marks for a computer drawing task will vary from task to task and is dependent on the number of objects for the skill component in (a). The marks for the design component in (b) remain unchanged for each task.

Performance criteria	Marks	Explanation
<u>Skill (per object in drawing)</u> (a) Tools <ul style="list-style-type: none"> <li>• circle</li> <li>• polygon</li> <li>• shape (freehand)</li> </ul> <ul style="list-style-type: none"> <li>• front and back order</li> <li>• Fill</li> </ul>	0 – 1 0 – 1 0 – 3  0 – 1  0 – 1	This is a difficult skill, as it requires more user control and manipulation. <u>In general</u> 0 – no work done 1 – little resemblance 2 – some resemblance 3 – resemblance  These refer to objects or parts of objects.  <u>In general</u> 0 – incomplete or object is open. 1 – complete
<u>Design (Drawing as a whole)</u> (b) Alignment <ul style="list-style-type: none"> <li>• orientation / direction</li> <li>• placement / position</li> </ul> (c) Proportion <ul style="list-style-type: none"> <li>• relative size</li> </ul> (d) Quality <ul style="list-style-type: none"> <li>• types of fill</li> <li>• outline</li> </ul>	0 – 2  0 – 2  0 – 1  0 – 1	These may refer to the objects or parts of objects.  Refer to relative sizes of parts of object or of objects in the drawing as a whole.  Solid, gradient, transparent, pattern, where appropriate.  Make the outline thicker or remove the outline, where appropriate.

## ANNEX C: Suggested Measure for Multimedia Presentation

Multimedia presentation may be in the form of slides or web pages. The suggested measure for scoring student's work is as follows:

Category	Marks	Description
Storyboarding (3m)	3	Organisation of content <ul style="list-style-type: none"><li>▪ flow is clear (0 – 2)</li><li>▪ satisfies number of slides/pages (0 – 1)</li></ul>
Design (7m)	7	Media elements <ul style="list-style-type: none"><li>▪ relevant sound file (0 – 1)</li><li>▪ relevant video file (0 – 1)</li><li>▪ relevant picture files (0 – 2)</li><li>▪ text is readable (0 – 2)</li><li>▪ layout is not cluttered (0 – 1)</li></ul>
Skills (10m)	10	Presentation slides/web pages <ul style="list-style-type: none"><li>▪ navigational aids (0 – 2)</li><li>▪ internal/external links (0 – 2)</li><li>▪ working sound/video/picture files (0 – 2)</li><li>▪ insert/type text (0 – 2)</li><li>▪ proficiency with software (0 – 2)</li></ul>
<b>Total</b>	<b>20</b>	



## ANNEX D: Suggested Measure for 2D Animation

This is a suggested scoring rubric for projects in 2D Animation.

Category	Max Marks	Description
Design (10m)	2	Characters <ul style="list-style-type: none"> <li>▪ suitable number / quantity (0 – 1)</li> <li>▪ relevance (0 – 1)</li> </ul>
	3	Interface <ul style="list-style-type: none"> <li>▪ layout not cluttered (0 – 1)</li> <li>▪ clarity of character(s) against background (0 – 1)</li> <li>▪ start position(s) of character(s) well indicated (0 – 1)</li> </ul>
	5	Play mode <ul style="list-style-type: none"> <li>▪ purpose of animation (0 – 2)</li> <li>▪ suitability of screen layouts (0 – 2)</li> <li>▪ complexity of animated story (0 – 1)</li> </ul>
Skills (24m)	2	Output (1m per bullet) <ul style="list-style-type: none"> <li>▪ output text</li> <li>▪ output sound/music</li> <li>▪ output voice</li> </ul>
	10	Actions (2m per bullet) <ul style="list-style-type: none"> <li>▪ start and stop animation (0 – 2)</li> <li>▪ appropriate time delay (0 – 2)</li> <li>▪ change in position(s) of character(s) (0 – 2)</li> <li>▪ change in direction(s) of character(s) (0 – 2)</li> <li>▪ behaviour of character(s) (0 – 2)</li> <li>▪ random number generation (0 – 2)</li> </ul>
	6	Conditions (2m per bullet) <ul style="list-style-type: none"> <li>▪ initial</li> <li>▪ terminating</li> <li>▪ boundary</li> <li>▪ selection</li> <li>▪ others (to specify)</li> </ul>
	6	Quality (Good practice and expectation) <ul style="list-style-type: none"> <li>▪ animation works as intended (0 – 1)</li> <li>▪ statements are neatly arranged (0 – 1)</li> <li>▪ appropriate names for media elements (0 – 2)</li> <li>▪ flow of animation (0 – 1)</li> <li>▪ synchronisations of media elements (0 – 1)</li> </ul>
Media elements (6m)	6	Graphic (not from library) <ul style="list-style-type: none"> <li>▪ background(s) / character(s) (0 – 4)</li> </ul> Others (1m per bullet) <ul style="list-style-type: none"> <li>▪ music / sound (not from the library)</li> <li>▪ voice</li> <li>▪ text</li> <li>▪ library</li> </ul>
Total	40	

## ANNEX E: Suggested Measure for Computer Game

This is a suggested scoring rubric for computer game.

Category	Max Marks	Description
Design (10m)	2	Characters <ul style="list-style-type: none"> <li>suitable number / quantity (0 – 1)</li> <li>relevance (0 – 1)</li> </ul>
	3	Interface <ul style="list-style-type: none"> <li>layout not cluttered (0 – 1)</li> <li>clarity of character(s) against background (0 – 1)</li> <li>start position(s) of character(s) well indicated (0 – 1)</li> </ul>
	5	Play mode <ul style="list-style-type: none"> <li>clarity of purpose of game (0 – 1)</li> <li>complexity of game (0 – 2)</li> <li>clarity of displayed instructions for playing (0 – 2)</li> </ul>
Skills (24m)	4	Interaction (2m per bullet) <ul style="list-style-type: none"> <li>key press</li> <li>mouse click</li> <li>slider</li> <li>others (to specify)</li> </ul>
	6	Operands and operators (2m per bullet) <ul style="list-style-type: none"> <li>variables</li> <li>relations / equality expressions</li> <li>random number generation</li> <li>timer</li> </ul>
	10	Program statements <ul style="list-style-type: none"> <li>appropriate time delay (0 – 1)</li> <li>scoring process (0 – 2)</li> <li>game start and stop conditions (0 – 2)</li> <li>initial states (0 – 2)</li> <li>method of solution (0 – 3)</li> </ul>
	4	Quality (Good practice and expectation) <ul style="list-style-type: none"> <li>game works as intended (0 – 1)</li> <li>statements are neatly arranged (0 – 1)</li> <li>characters are named appropriately (0 – 1)</li> <li>variables are named appropriately (0 – 1)</li> </ul>
Media elements (6m)	6	Graphic (not from library) <ul style="list-style-type: none"> <li>background (0 – 1)</li> <li>characters (0 – 3)</li> </ul> Others (1m per bullet) <ul style="list-style-type: none"> <li>music / sound (not from library)</li> <li>voice</li> <li>text</li> <li>library</li> </ul>
Total	40	

## ANNEX F-1: Coursework Sample A for Secondary One

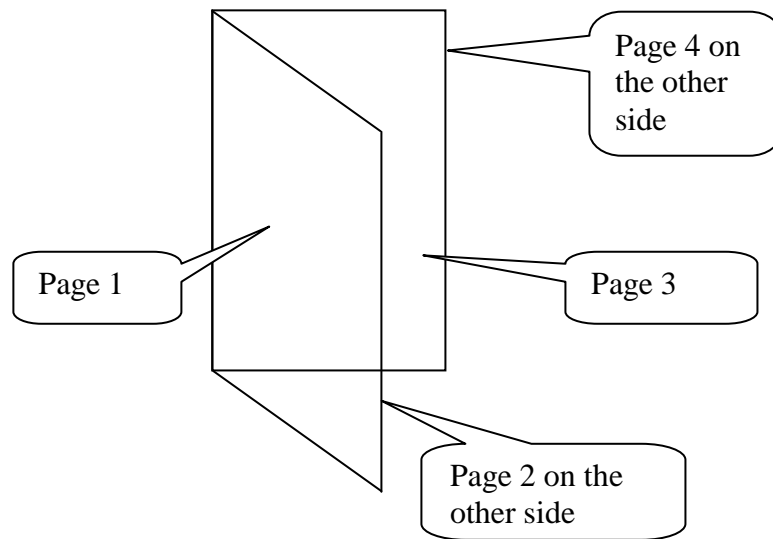
### COURSEWORK

Your school has asked you to plan a learning trail around and outside the school for the new Sec 1 students in <<year e.g. 2012>> as part of an orientation programme. You are to mark out 4 – 5 important checkpoints on the trail that the students ought to know.

1. Plan the learning trail on a blank sheet of paper. Decide on the page orientation (e.g. portrait or landscape) for your learning trail. An example is shown below:

<Teacher to create an example here>

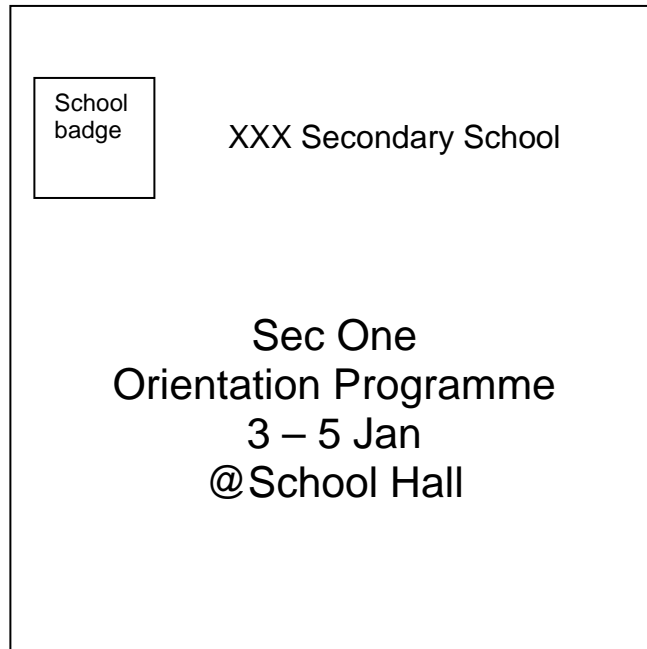
- Using computer software, create your learning trail. At each checkpoint, insert an image of things you can see at the checkpoint. You will need to look for or prepare these images yourself. Label the checkpoint (e.g. MRT station) and type a short description of the checkpoint. Save your work as “map”.
- Next, design a programme sheet for distribution to the students so that they will know the details of the orientation programme. The programme sheet consists of one A4 page folded in halves to form four pages as shown in the diagram.



The items on pages 2 - 4 are as follows:

<u>Page 2</u>	<u>Page 3</u>	<u>Page 4</u>
Day 1: 3 Jan	Day 2: 4 Jan	Day 3: 5 Jan
0800h Assembly	0800h Assembly	0800h Assembly
0830h Ice Breaker	0830h Ice Breaker	0830h Ice Breaker
0930h School Tour	0930h Slide Presentation	0930h Learning Trail (packed food provided)
1030h Recess	1030h Recess	1100h Principal's Talk
1100h Principal's Talk	1100h HODs' Talk	1145h My New Class
1145h HODs' Talk	1145h Shape Up	1230h Dismiss
1230h Dismiss	1230h Dismiss	

Add page borders for every page and format the pages and text to make them interesting and attractive. Design a layout for Page 1. An example is shown. Save your work as “details”.



4. One of the orientation programme items on 4 Jan is a slide presentation. Create 10 slides about the school, with two - three slides per topic. Save your work as "school". Think of your own topics. Some examples of topics are:
- Subjects that are new to the students e.g. CPA
  - Co-curricular activities
  - School rules

## ANNEX F-2: Coursework Sample B for Secondary One

### COURSEWORK

The Residents' Committee (RC) in your housing estate wishes to organize a food fair on Nov 13 – 14, 10 am – 7 pm. The food fair will be at the function hall at Block 406. The food stalls are:


- Kueh kueh
- Hot and cold drinks
- Cut fruits
- Buns and cakes
- Fried rice and nasi lemak
- Fruit juice
- Chicken rice
- Desserts
- Ice kacang and chendol
- Fried kway teow and beehoon

1. In order to let the residents know about the food fair, the chairman asked you to design an A4-size flyer and save your work as "flyer". The flyer must have these information on the first page:

- Date, time and venue of the food fair.
- A drawing of the icon for the food fair. An example is shown below:

<Teacher to create an example here>

- The words FREE ADMISSION.
- The title CASHEW RESIDENTS' FOOD FAIR@BLOCK 406.
- A lucky draw coupon similar to the example shown below:



and win the 1<sup>st</sup> prize of CASH \$2000 or other prizes.

**Simply cut this coupon, fill in your particulars, and drop it in the Lucky Draw Box placed on the stage.**

Put drawing of food fair icon here

Name: \_\_\_\_\_

NRIC No: \_\_\_\_\_

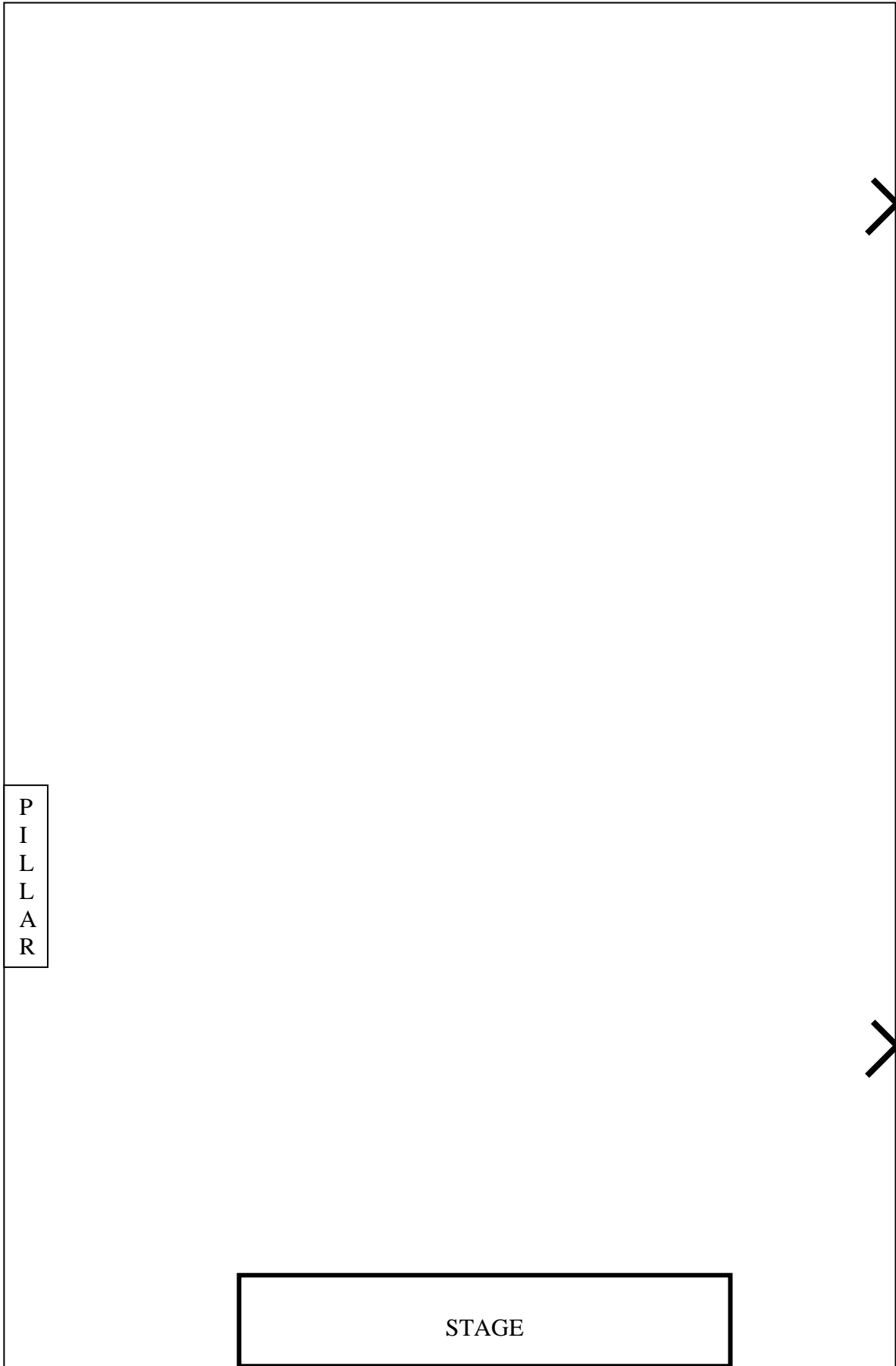
Contact No: \_\_\_\_\_

- Lucky Draw will be conducted on 14 Nov at 5pm.
- Results will be posted on [www.foodfair406.org.sg](http://www.foodfair406.org.sg) on 15 Nov.
- Prizes not collected will be donated to the President's Charity Fund.

✂

Format the text and pay attention to the layout of your flyer so that your flyer is readable and looks attractive and interesting.

- Put the layout of the function hall on the second page of your flyer. A blank sketch of the function hall is shown on the next page of this question paper. Use it to plan the locations for all the food stalls. Then, using suitable computer software, create a diagram of your plan. Use ☒ to mark the location of the lucky draw box. Use ☑ to mark the location of the computer for the slide presentation. You may also use different symbols if you wish. Save your work as "flyer".
- Some presentation slides are needed about the food on sale, the prices and simple descriptions. The slides will be shown during the food fair. Create these slides, one for each food stall, and save your work as "food". You will need to look for your own pictures or draw them for the slide presentation. Make your slide presentation interesting.





## ANNEX F-3: Coursework Sample C for Secondary One

### COURSEWORK

Your school has asked you to plan an outdoor garden in the school compound as part of a 'Clean & Green Week' programme. You are to decide 4 – 5 outdoor plants for planting.

1. Plan the layout of the outdoor garden on a blank sheet of paper. You may include water features, trails and benches as part of the garden. Decide on the page orientation (e.g. portrait or landscape) for your garden. An example is shown below:

<Teacher to create an example here>

2. Using computer software, create your outdoor garden. Insert an image of the plants you plan to plant at the various areas. You will need to look for or prepare these images yourself. Label the plants and important highlights (e.g. ponds or water features) and type a short description for each. Save your work as "Garden".
  
3. Next, design an information sheet for distribution to the students so that they will know the details of the outdoor garden project. The programme sheet consists of one double-sided A4 paper.

On one side, include the layout of the outdoor garden. On the other side, give a picture of each plant selected and a brief description of the plant. Include other highlights of the outdoor garden such as the water features.

Add page borders for every page and format the pages and text to make them interesting and attractive. Save your work as "Information".

4. As part of the 'Clean & Green Week', a slide presentation is needed to create awareness on how to protect the environment. Create 10 slides on tips about how to be clean and green, with 2 - 3 slides per topic. Save your work as "tips". Think of your own topics. Some examples of topics are:
  - Caring for the school's outdoor garden
  - Good habits for staying clean
  - 'Green' tips

Save your work as "Tips".

## ANNEX G: Animation Projects for Secondary Two

A suggested list of projects or lesson ideas:

1. Create an animation to show the life cycle of a
  - (a) butterfly
  - (b) frog
2. Create an animation to show how a spider spins its web.
3. Create an animation to show the importance of road safety.
4. Create an animation to explain the meaning of Reduce, Reuse and Recycle.
5. Create an animation on extracts from fairy tales like The Little Mermaid, Beauty and the Beast, and Cinderella. For example, you can show how the legs replace the little mermaid's tail, how the beast becomes the prince and how the pumpkin turns into a carriage for Cinderella.
6. Create an animation on teaching people how to perform a dance or do simple physical exercises.
7. Create an animation with the following:
  - Horizontal or vertical movement
  - Targeted movement
  - Fixed and random locations
  - Changes in behaviour
8. Create an animation with music/noise/sound and changing backgrounds.
9. Create an animation to illustrate any one of these messages:
  - Smoking is bad for health
  - Good personal hygiene is important

- Prevent Dengue
- Take public transport
- Keep Singapore Clean

10. Create an animation for any of these nursery rhymes:

- Hickory, Dickory, Dock
- Old Mother Hubbard
- Pussy Cat, Pussy Cat
- Humpty Dumpty
- Twinkle, Twinkle, Little Star
- Sing a Song of Sixpence

## ANNEX H: Computer Game Projects for Secondary Three

A suggested list of projects or lesson ideas:

1. Develop a computer game on Road Safety. The player scores and accumulates points if he can cross the road safely. The level of difficulty can be progressive; beginning with one car on the road, then two cars, and then three cars. Display the player's score at the top left-hand corner of the screen.
2. Develop a computer game on "Shooting Stars". The screen will display several coloured stars at random, and the player has to shoot as many stars as possible to score. The points for the coloured stars are: Red star – 5 points, Blue star – 10 points, Green star – 20 points. Display the player's score at the top left-hand corner of the screen.
3. Develop a computer game to include the use of the following skills:
  - Mouse click
  - Text bubble
  - Sound
4. Develop a computer game to include the use of the following skills:
  - Key Press
  - Sound
  - Random Movement
5. Develop a computer game to play "Scissors, Paper, Stone". The player can play against the computer or another player.
6. Develop a computer game for counting. If the correct number is entered, a new scene is presented for the next part of the game. If an incorrect number is entered, a message is displayed and the player tries again with a new test item.

7. Develop a computer game to guess the number generated by the computer. The computer will provide clues to the player to guide his guess. If the player's guess is higher or lower than the generated number, the computer displays a suitable message. If the player guesses correctly, the computer displays "You have hit the nail on the head!"
  
8. Develop a computer game on picking fruits. The player has to pick as many fruits as possible to get high scores. The point system is as follows:
  - Yellow Lemon – 50 points
  - Orange – 40 points
  - Bunch of Green Grapes – 30 points
  - Blueberries – 20 points
  - Red Apple – 10 pointsIf the player picks a stone, 5 points will be deducted. Display the player's score at the top left-hand corner of the screen.
  
9. Develop a computer game on "Reduce, Reuse, and Recycle". The player accumulates points if he can correctly classify the process shown. The screen will allow a choice of five questions, and the player can choose to answer any question first. For a start, there is no time limit but at the next stage, impose a time limit. Display the remaining time at the top right-hand corner of the screen.
  
10. Develop computer games involving mazes. For example
  - The player starts at one end of the maze and has to find his way out of the maze within a time limit.
  - The player starts at the centre of the maze and has to get out as soon as he can before time runs out.
  - The player tries to reach the centre of the maze to get a pot of gold and then he has to get out of the maze, within a time limit.