



# **Information and Communication Technology**

## **Teachers' Guide Grade 9**

**(Effective from 2018)**

**Department of Information Technology  
National Institute of Education  
Maharagama  
Sri Lanka**

**[www.nie.lk](http://www.nie.lk)**

**Information and Communication Technology  
Grade 9 – Teacher’s Guide**

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## **Message from the Director General**

With the primary objective of realizing the National Educational Goals recommended by the National Education Commission, the then prevalent content based curriculum was modernized, and the first phase of the new competency based curriculum was introduced to the eight year curriculum cycle of the primary and secondary education in Sri Lanka in the year 2007

The second phase of the curriculum cycle thus initiated was introduced to the education system in the year 2015 as a result of a curriculum rationalization process based on research findings and various proposals made by stake holders.

Within this rationalization process the concepts of vertical and horizontal integration have been employed in order to build up competencies of students, from foundation level to higher levels, and to avoid repetition of subject content in various subjects respectively and furthermore, to develop a curriculum that is implementable and student friendly.

The new Teachers' Guides have been introduced with the aim of providing the teachers with necessary guidance for planning lessons, engaging students effectively in the learning teaching process, and to make Teachers' Guides will help teachers to be more effective within the classroom. Further, the present Teachers' Guides have given the necessary freedom for the teachers to select quality inputs and activities in order to improve student competencies. Since the Teachers' Guides do not place greater emphasis on the subject content prescribed for the relevant grades, it is very much necessary to use these guides along with the text books compiled by the Educational Publications Department if, Guides are to be made more effective.

The primary objective of this rationalized new curriculum, the new Teachers' Guides, and the new prescribed texts is to transform the student population into a human resource replete with the skills and competencies required for the world of work, through embarking upon a pattern of education which is more student centered and activity based.

I wish to make use of this opportunity to thank and express my appreciation to the members of the Council and the Academic Affairs Board of the NIE the resource persons who contributed to the compiling of these Teachers' Guides and other parties for their dedication in this matter.

Dr. (Mrs.) Jayanthi Gunasekara

Director General

National Institute of Education

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## **Introduction**

Information and Communication Technology has been identified worldwide as a tool that can be used to improve productivity, efficiency and effectiveness of organizational work and the daily activities of individuals. Therefore, providing an adequate level of ICT knowledge and skills, at different levels of education, is important for the students to progress and contribute towards national development.

The current Sri Lankan Secondary Education System has been substantially exposed to ICT through various programs including CAL, ICT for GCE (O/L), GIT at grade 12 and ICT as a component in A/L Technology stream. Consequently, to maintain the progression in competencies, the need has arisen now for implementation of learning ICT subject from grade 6 to 9.

As grade 6 to 9 is a formative study period, it is desirable to arouse curiosity and motivation by teaching students more practical areas than theoretical aspects of computing. Therefore, a balance between theory and practical areas is achieved. To achieve this balance, the latest technologies have been included in the content.

It has been the focus of the curriculum committee to make this balance of competencies in theory and practice in order to lay a foundation for higher studies in ICT, to apply the competencies of day to day practical situation, to improve ICT literacy and to expose them to international standards.

## **National Goals**

1. Based on the concept of respecting human values and understanding the differences between the Sri Lankan multi-cultural society, building up the nation and confirming the identity of Sri Lanka by promoting national integrity, national unity, national coherence and peace
2. While responding to the challenges of the dynamic world, identifying and conserving the National heritage.
3. Creating an environment which comprises of the conventions of social justice and the democratic life to promote the characteristics of respecting the human rights, being aware of the responsibilities, concerning each other with affectionate relationships.
4. Promoting a sustainable life style based on the people's mental and physical well-being and the concept of human values
5. Promoting the positive feelings needed for balanced personality with the qualities of creative skills, initiative, critical thinking and being responsible
6. Through education, developing the human resources, needed for the progress of the well-being of an individual, the nation as well as the economic growth of Sri Lanka.
7. Preparing the people for the changes that occur in a rapidly changing world by adapting to it and controlling them; developing abilities and potentialities of people to face the complex and unexpected occasions.
8. Sustaining the skills and attitudes based on justice, equality, mutual respect which is essential to achieve a respectable place in the international community.

National Education Commission Report (2003).

## Basic Competencies

The competencies promoted through the education mentioned below might help to achieve the above mentioned National Goals.

### 1. Competencies in Communication

This first set of competencies is made up of four subsets - Literacy, Numeracy, Graphics and information communication skills:

**Literacy:** Carefully listening, speaking clearly, and Reading for comprehension, writing clearly and accurately.

**Numeracy:** Using numbers to count, calculate, code and to measure, matter, space and time

**Graphics:** Making sense of line and form, expressing and recording essential data, instructions and ideas with line, form, colour, two and three-dimensional configurations, graphic symbols and icons

#### ICT Competencies:

Knowledge on computers, and the ability to use the information communication skills learning or work as well as in the private life

### 2. Competencies relating to the Personality Development

- Generic skills such as creativity, divergent thinking, initiative, decision making, problem-solving, critical and analytical thinking, team work, inter-personal relationships, discovering and exploring
- Values such as integrity, tolerance and respect for human dignity
- Cognition

### 3. Competencies relating to the Environment

This is the second set of competencies related to the Social, Biological and Physical Environments.

**Social Environment:** Awareness, sensitivity and skills linked to being a member of society, social relationship, personal conduct, general and legal conventions, rights, responsibilities, duties and obligations.

**Biological Environment:** Awareness, sensitivity and skills linked to the living world, man and the ecosystem, the trees, forests, seas, water, air and plant -life, animal and human life.

**Physical Environment:** Awareness, sensitivity and skills relating to space, energy, fuels, matter, materials and their links with human living, food, clothing, shelter, health, comfort, respiration, sleep, relaxation, rest, wastes and excretion, media of communication and transport. Included here are the skills in using tools to shape and for materials for living and learning

#### **4. Competencies relating to preparation for the world of work**

Employment related skills to maximize their potential and to enhance their capacity to contribute to economic development; to discover their vocational interests and aptitudes; to choose a job that suits their abilities and to engage in a rewarding and sustainable livelihood.

#### **5. Competencies relating to religion and ethics**

This fourth set of competencies laden with values and attitudes. It is essential for individuals to assimilate values, so that they may function in a manner consistent with the ethical, moral and religious modes of conduct, rituals, practices in everyday living, selecting the most appropriate.

#### **6. Competencies in play and use of leisure**

Competencies that link up with pleasure, joy, emotions and such human motivations. These find expression in play, sports, athletics and leisure pursuit of many types. These also link up with such values as cooperation, team work, healthy competition in life and work. Here are included such activities as are involved in aesthetics, arts, drama, literature, exploratory research and other creative modes in human living.

#### **7. Competencies relating to ‘Learning to learn’**

These competencies flow directly from the nature of a rapidly changing, complex and interdependent and crowded world whatever one learns, that learning will need updating and review. This requires that one should be aware of, sensitive and skilful in sustained attention, and be willing to persevere and attend to details that matter in a given situation.

## **Objectives of the Subject**

This syllabus enables students to:

- Develop basic skills useful to access ICT resources.
- Inculcate basic good practices in the use of ICT resources
- Inculcate basic computer literacy and develop a base for further pursuit of Information Technology and Communication Technology studies.

**Proposed number of periods for each units**

<b>Term</b>	<b>Competency Level</b>	<b>Number of periods</b>
1 <sup>st</sup> Term	1.1, 1.2	02
	2.1, 2.2, 2.3, 2.4, 2.5	06
	3.1	02
2 <sup>nd</sup> Term	3.2, 3.3, 3.4,	10
3 <sup>rd</sup> Term	3.5,	01
	4.1,	05
	5.1, 5.2,	02
	6.1, 6.2	02
Total		30

**Grade 9 Syllabus**  
**Information and Communication Technology**

Competency	Competency Level	Contents	Learning Outcomes	Duration / Periods
1. Prepares specifications for purchasing a computer and peripherals	1.1 Identifies user needs for a computer and its peripherals	<ul style="list-style-type: none"> <li>• Specification of computer components and their meaning to users</li> </ul>	i. Describes the basic specifications of computer and its peripherals	01
	1.2 Selects Computer and its peripherals according to the user requirements.	<ul style="list-style-type: none"> <li>• Basic Specifications of computer and its peripherals               <ul style="list-style-type: none"> <li>○ Processor types and speed</li> <li>○ Hard disk capacity</li> <li>○ Monitor specifications</li> <li>○ RAM specifications</li> <li>○ VGA and sound</li> </ul> </li> <li>• Warranty</li> <li>• Included software</li> <li>• After sale services</li> </ul>	i. Identifies the user requirements in terms of technical specifications. ii. Determines the required technical specification	01
2. Uses spreadsheet software for calculations and for simple analysis of data	2.1 Describes basics of spreadsheet software	<ul style="list-style-type: none"> <li>• Introduction to spreadsheet application software IDE</li> <li>• Work Book, Worksheet</li> <li>• Inserting, renaming and deleting worksheet</li> <li>• Cell Addressing</li> </ul>	i. Uses IDE of spreadsheets software ii. Uses Cell Addressing	01
	2.2 Enters data in worksheet	<ul style="list-style-type: none"> <li>• Changing column width and row height</li> <li>• Formatting Cells:               <ul style="list-style-type: none"> <li>○ Text alignment, Font, Border, Fill</li> </ul> </li> <li>• Data types : Value, number, Currency, Date and Time</li> <li>• Saving a work book</li> </ul>	i. Determines required column width and row height ii. Formats cells iii. Explains Cell Formatting iv. Creates work book and Save	02
	2.3 Carries out Simple mathematical	<ul style="list-style-type: none"> <li>• Use of mathematical operators</li> </ul>	i. Identifies mathematical operators	01

	calculations	<ul style="list-style-type: none"> <li>○ Addition</li> <li>○ Subtraction</li> <li>○ Multiplication</li> <li>○ Division</li> </ul>	ii. Uses operators correctly	
	2.4 Uses Functions to carry out s-imple mathematical calculations and data sorting	<ul style="list-style-type: none"> <li>● Basic Function used in spreadsheets SUM, AVERAGE, MAX, MIN, COUNT, COUNTA</li> <li>● Data sorting</li> </ul>	<ul style="list-style-type: none"> <li>i. Identifies functions and its parameters for required task</li> <li>ii. Applies spread sheet software tools to carry out the task</li> <li>iii. Applies spread sheet software for data sorting</li> </ul>	01
	2.5 Uses various charts to display data	<ul style="list-style-type: none"> <li>● Basic Chart types: Column Chart, Bar Chart, Line Chart, Pie Chart</li> <li>● Chart options: Change of chart type, formatting Legend, Formatting data series and axis, Switching row and column</li> </ul>	<ul style="list-style-type: none"> <li>i. Identifies the relevant chart types</li> <li>ii. Creates the chart using relevant tools</li> <li>iii. Creates and format the suitable chart for the relevant data</li> </ul>	01
3. Uses flow charts to solve simple problem with Sequence Selection, Iteration and develop programs (using Scratch)	3.1 Uses Sequence, Selection and Iteration control structure for drawing flow charts	<ul style="list-style-type: none"> <li>● Problem solving using multiple Selections</li> <li>● Problem solving using Iterations</li> <li>● Problem solving using nested Iterations</li> </ul>	<ul style="list-style-type: none"> <li>i. Draws flow charts to solve simple problems</li> <li>ii. Identifies the problem and decide solution</li> </ul>	02
	3.2 Uses Selection and Iteration (Repetition) control structures for solving simple problems with visual support	<ul style="list-style-type: none"> <li>● Selection control structures with multiple conditions</li> <li>● Control structure with simple iteration</li> <li>● Development of simple programs (sequence, selection and iteration) using visual supports of programming language (using an Interface)</li> </ul>	<ul style="list-style-type: none"> <li>i. Applies multiple conditions in selection control structure</li> <li>ii. Identifies the difference between selection and iteration</li> <li>iii. Uses iteration control structure to solve relevant problems</li> </ul>	05
	3.3 Develops programs with visual support with nested iterations	<ul style="list-style-type: none"> <li>● Development of programs using basic iteration control structure: Repeat</li> <li>● Development of visual program with selection &amp; iteration and nested iteration control structure</li> </ul>	<ul style="list-style-type: none"> <li>● Creates animated program using repetition control</li> <li>● Explains the different usage of repetition structures</li> </ul>	03

	3.4 Develops programs with array variables	<ul style="list-style-type: none"> <li>• Declaration of array variable</li> <li>• Applying of array variables to solve problems</li> </ul>	<ul style="list-style-type: none"> <li>i. Describes the use of array variables</li> <li>ii. Uses array variables in programs to solve simple problems</li> </ul>	02
	3.5 Evaluates the solution to ensure that it properly satisfies the problem	<ul style="list-style-type: none"> <li>• Proper decomposition of the problem</li> <li>• Ensuring all aspects are covered in decomposition</li> <li>• Designing and writing a program with correct decomposition</li> </ul>	<ul style="list-style-type: none"> <li>i. Evaluates whether the solution to ensure the problem is created accurately and efficiently</li> </ul>	01
4. Improves skills in Physical Computing	4.1 Programs simple digital systems (Micro controller based kit)	<ul style="list-style-type: none"> <li>• Development of programs for detecting the inputs from sensors</li> <li>• Development of programs for controlling actuators</li> </ul>	<ul style="list-style-type: none"> <li>i. Develops programs for detecting the inputs from sensors</li> <li>ii. Develops programs for controlling actuators of simple sense detector</li> </ul>	05
5. Investigates computer network for communication and resource sharing	5.1 Explores the main components of the network in the school computer lab	<ul style="list-style-type: none"> <li>• Main components of computer network (Computers, Network Interface Card (NIC), Switches and etc.)</li> </ul>	<ul style="list-style-type: none"> <li>i. Describes main components of the computer network</li> </ul>	01
	5.2 Utilizes computer network in resource sharing and communication	<ul style="list-style-type: none"> <li>• Sending messages through a computer network</li> <li>• Sharing resources (Software, Folder, File, CD Drive, Printer etc.)</li> </ul>	<ul style="list-style-type: none"> <li>i. Sends messages through computer network</li> <li>ii. Shares the resources though a computer network</li> </ul>	01
6. Explores the impact of ICT on society and career opportunities	6.1 Describes impact of ICT on society	<p>Applications of ICT</p> <ul style="list-style-type: none"> <li>• Office automation</li> <li>• e-Learning</li> <li>• e-Commerce, m-Commerce</li> <li>• e-Health</li> <li>• e-Government</li> </ul>	<ul style="list-style-type: none"> <li>i. Describes the benefits in use of ICT in society</li> <li>ii. Describes the negative aspects arise in using ICT</li> </ul>	01

		<ul style="list-style-type: none"> <li>• Digital Divide</li> <li>• Safe disposal of electronic waste</li> </ul>		
	6.2 Explains career opportunities in computing	<ul style="list-style-type: none"> <li>• Career Opportunities <ul style="list-style-type: none"> <li>○ Software Quality Assurance Engineer</li> <li>○ Software Engineer</li> <li>○ Database Administrator</li> <li>○ Software Architect</li> <li>○ Programmer</li> <li>○ System Analyst</li> <li>○ Web Application Developer</li> <li>○ Graphic Designer</li> <li>○ Network Administrator</li> <li>○ Business Analyst</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>i. Explains the career opportunities in the present society</li> <li>ii. Explains the job role of different careers in computing</li> </ul>	01
			Total	30

## **Learning Teaching process**

Information and Communication Technology is rapidly changing subject and student eager to use latest technology. Provide actual hand on experience for each student using practical exercises. Allow them to convince theoretical basis through practical exercises.

It is essential that the proposed method of teaching should be student-centered as this subject is essentially practice-oriented. There is need for special attention to be paid to the encouragement of the student for self-study. Guide the student to apply achieved ICT competencies to improve the learning process of other subjects.

Primitive social values and legal constraints related to the subject carry with them the imperatives of a sense and spirit of self-discipline. It is essential that the learning-teaching evaluation process is so organized as to highlight the importance of computer use.

Students should be motivated and inspired to attend group activities to learn new things and collaborative activities to share and convince their findings with others through ICT and manual mediums.

**Competency 1:** Prepares specifications for purchasing a computer and peripherals

**Competency Level 1.1:** Identifies user needs for a computer and its peripherals

**Time:** 01 period

**Learning Outcomes:**

- Describes the basic specifications of computer and its peripherals

**Contents:**

- Specification of computer components and their meaning to users

**Concepts and terms to be highlighted:**

- Computer and its peripherals
- basic specifications of computer and its peripherals

**Guidance for lesson plans:**

- Search the computer peripheral devices through web browser and discuss with students
- Identify the searched Devices in the computers and other devices in the laboratory
- Discuss with students Specification of computer components and their meaning to users

**Guidance for assessments and evaluations:**

- Identify a device as input or output or etc.
- Explain the functions of the CPU's consist main components

**Quality inputs:**

- Internet facility with Computers
- Presentations
- [https://pc.net/helpcenter/answers/peripheral\\_device\\_examples](https://pc.net/helpcenter/answers/peripheral_device_examples)
- <https://www.computernetworkingnotes.com/networking-tutorials/computer-peripheral-devices-and-their-functions-explained.html>
- <https://schoolworkhelper.net/computer-components-and-specifications/>

**Reading Material**

**Computer peripherals**

A computer peripheral is a device that is connected to a computer but is not part of the core computer architecture.

## Types of Peripheral Devices

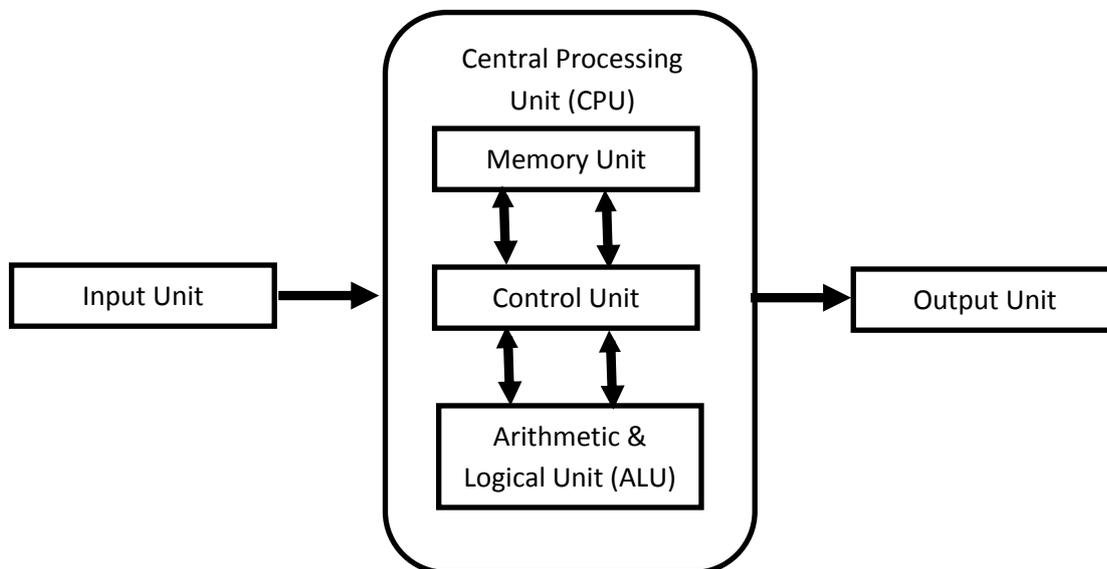
There are many different peripheral devices, but they fall into three general categories:

1. Input devices, such as a mouse and a keyboard
2. Output devices, such as a monitor and a printer
3. Storage devices, such as a hard drive or flash drive

Some devices fall into more than one category. Consider a CD-ROM drive; you can use it to read data or music (input), and you can use it to write data to a CD (output).

Peripheral devices can be external or internal. For example, a printer is an external device that you connect using a cable, while an optical disc drive is typically located inside the computer case. Internal peripheral devices are also referred to as integrated peripherals. When most people refer to peripherals, they typically mean external ones.

## Computer components



*Fig 1.1.1 Computer components*

### 1. Input Unit

This unit contains devices with the help of which we enter data into the computer. This unit creates a link between the user and the computer. The input devices translate the information into a form understandable by the computer.

### 2. CPU (Central Processing Unit)

CPU is considered as the brain of the computer. CPU performs all types of data processing operations. It stores data, intermediate results, and instructions (program). It controls the operation of all parts of the computer.

CPU consists on following three components:

- ALU (Arithmetic Logic Unit)
- Memory Unit
- Control Unit

Arithmetic and Logical Unit (ALU)	Perform all mathematical and logical functions.
Memory Unit	Positioned in the Central Processing Unit. Temporarily stores data needed for the function of ALU.
Control Unit	Controls all devices of a computer system.

### 3. Output Unit

The output unit consists of devices with the help of which we get the information from the computer. This unit is a link between the computer and the users. Output devices translate the computer's output into a form understandable by the users.

**Competency 1:** Prepares specifications for purchasing a computer and peripherals

**Competency Level 1.2:** Translates user requirements to computer and its peripherals

**Time:** 01 period

**Learning Outcomes:**

- Identifies the user requirements in terms of technical specifications.
- Determines the required technical specification

**Contents:**

- Basic Specifications of computer and its peripherals
  - Processor types and speed
  - Hard disk capacity
  - Monitor specifications
  - RAM specifications
  - VGA and sound
- Warranty
- Included software
- After sale services

**Concepts and terms to be highlighted:**

- Processor types and speed
- Hard disk capacity
- Monitor specifications
- RAM specifications
- VGA and sound
- Warranty
- Included software
- After sale services

**Guidance for lesson plans:**

- Search the Basic Specifications of computer and its peripherals through web browser and discuss with students

**Guidance for assessments and evaluations:**

- Identifies the user requirements in terms of technical specifications.
- Explain the required technical specification

**Quality inputs:**

- Internet facility with Computers
- Presentations
- <https://www2.clarku.edu/offices/its/purchasing/recommendations.cfm>

## Reading Materials:

- **Basic Specifications of computer and its peripherals**

- **Processor types and speed**

Every PC has a Central Processing Unit (CPU) this acts as the brain of your system. It connects to the Motherboard and works alongside the other components processing many instructions at the same time between the different hardware and memory systems.

Advancements in CPU technology now mean systems typically come at least Dual Core, Quad Core or more processors (on one single chip) instead of the traditional one core per chip. Now the total number of Cores can slot into a socket as before and a single heat sink and fan can keep everything to the right temperature

There are multiple ways of determining the speed of the computer processor. Below is a listing of the methods of determining the speed.

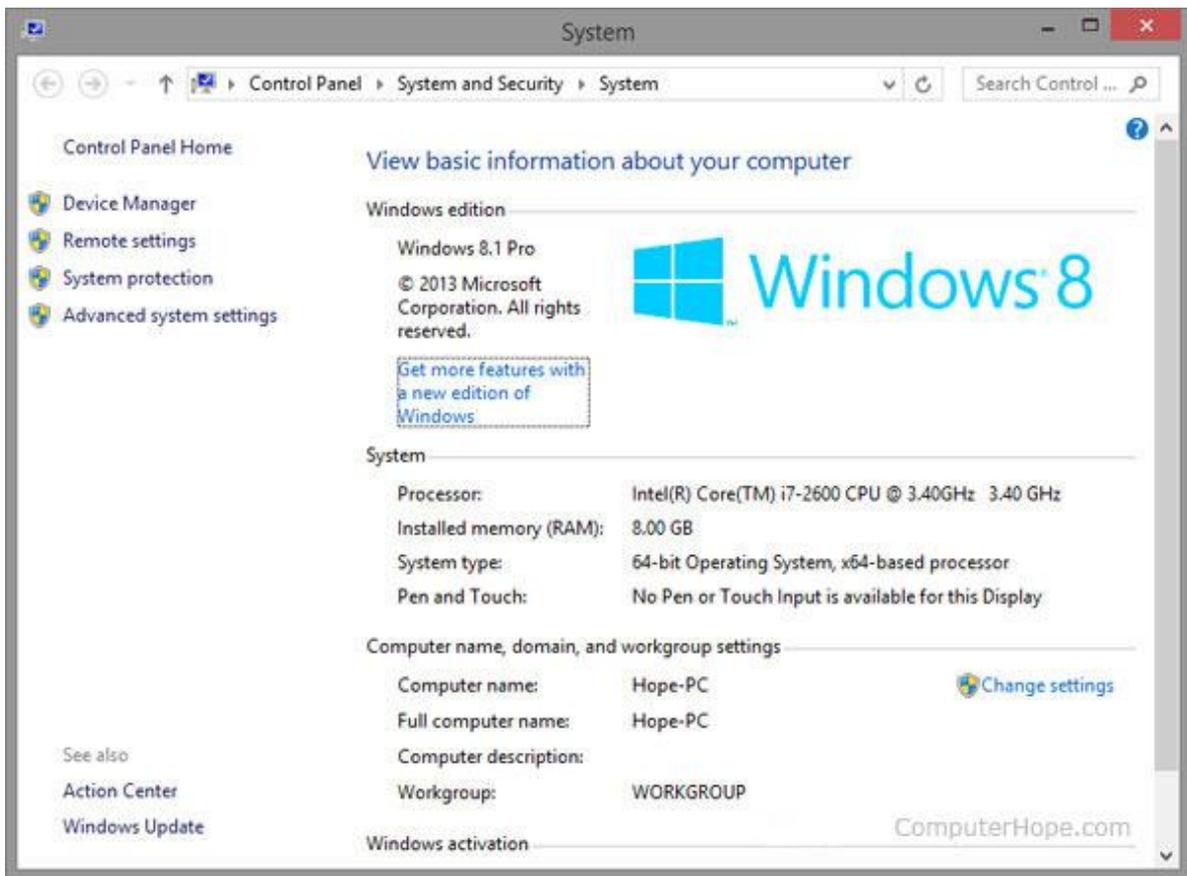
The **clock speed** measures how fast a processor completes operations, usually measured in megahertz(MHz) and gigahertz(GHz).

### **For Windows users**

If you are running Microsoft Windows, you can determine the processor type and speed by following the steps below.

1. Press the **Windows Key** and **Pause key** at the same time. Or
2. Right-click on the My Computer or Computer icon on the Desktop or in the Start Menu.
3. Select Properties in the pop-up menu.

Doing either of the above options opens a System Properties window similar to one of the examples below. In the System Properties window, you should see the manufacturer of the processor (e.g., Intel or AMD), the model of the processor (e.g., Core 2), and the speed (e.g., 1.86 GHz). For new versions of Windows, it also shows you the System type, which in the Windows 8 example below shows a 64-bit operating system on an x64 processor.



Windows 8 System Properties



Windows 7 System Properties Window

In the Windows 8 computer, it has an "Intel(R) Core(TM) i7-2600 CPU @ 3.40 GHz 3.40 GHz." Intel is the brand and company of the processor, Core i7-2600 is the model of the processor, and 3.40 GHz is the speed of the processor.

### **Factors to Consider When Buying a new processor**

- Number of cores
- Clock Speed

### **Hard disk capacity**

A hard disk drive (HDD), hard disk, hard drive or fixed disk is a data storage device that uses magnetic storage to store and retrieve digital information using one or more rigid rapidly rotating disks (platters) coated with magnetic material. The platters are paired with magnetic heads, usually arranged on a moving actuator arm, which read and write data to the platter surfaces. Data is accessed in a random-access manner, meaning that individual blocks of data can be stored or retrieved in any order and not only sequentially. HDDs are a type of non-volatile storage, retaining stored data even when powered off.

Introduced by IBM in 1956, HDDs became the dominant secondary storage device for general-purpose computers by the early 1960s. Continuously improved, HDDs have maintained this position into the modern era of servers and personal computers.



*Fig 1.2. 1 A hard disk drive (HDD)*

The capacity of a hard disk drive, as reported by an operating system to the end user, is smaller than the amount stated by the manufacturer for several reasons: the operating system using some space, use of some space for data redundancy, and space use for file system structures.

Data storage capacity is measured by units such as bits, bytes, kilobytes, Megabytes, Gigabytes, Terabytes and Petabytes.

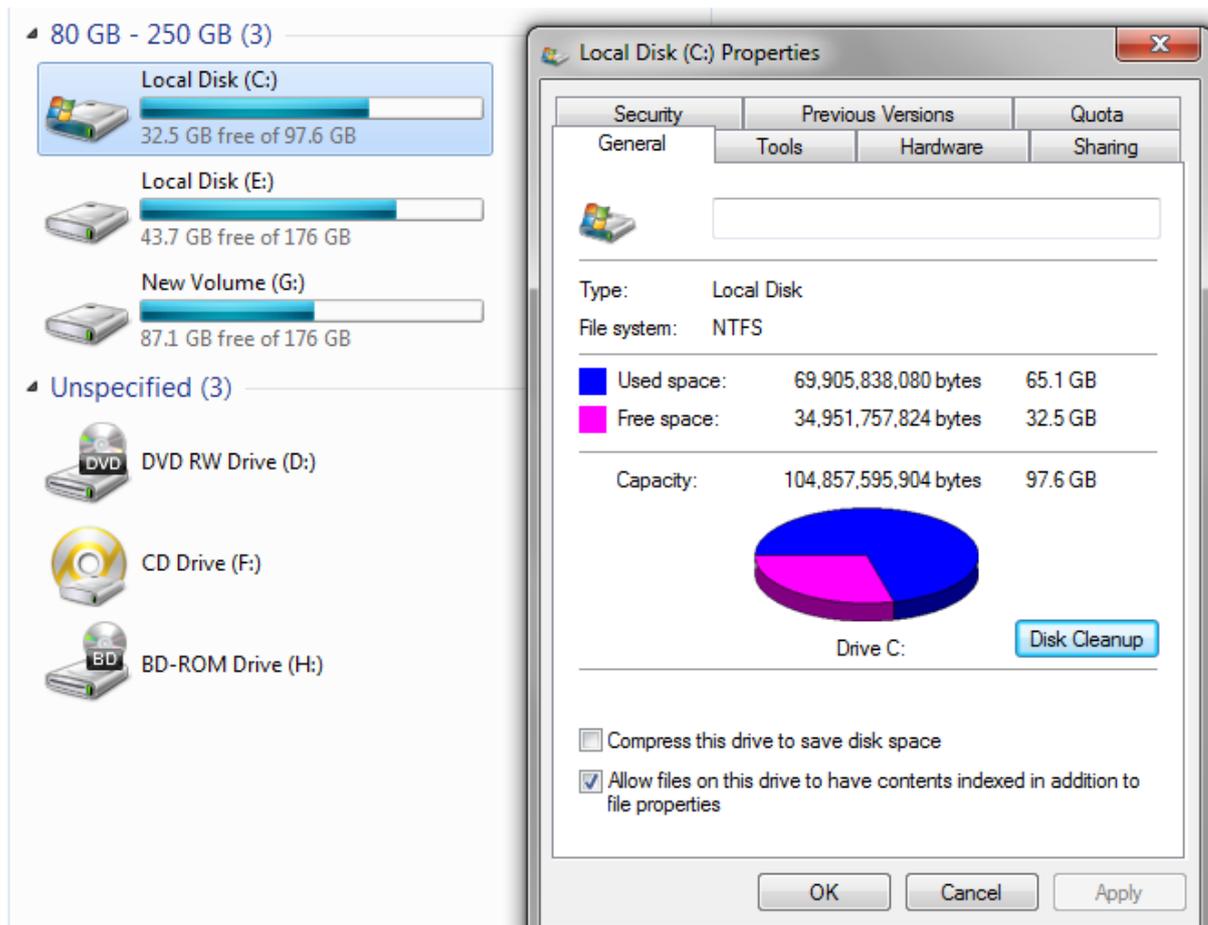


Fig 1.2. 2 Storages in a Computer and Properties of Local Disk (C:)

Here's the list of things to be considered when purchasing an external hard-disk based storage device.

- Storage
- Size
- Connectivity
- Budget
- Speed
- Software
- Warranty
- Platform
- Sturdiness
- Security

- **Monitor specifications**



Most people use computer monitors daily at work and at home. And while these come in a variety of shapes, designs, and colors, they can also be broadly categorized into three types.

### **1. CRT (cathode ray tube) monitors**

These monitors employ CRT technology, which was used most commonly in the manufacturing of television screens. With these monitors, a stream of intense high energy electrons is used to form images on a fluorescent screen. A cathode ray tube is basically a vacuum tube containing an electron gun at one end and a fluorescent screen at another end.

While CRT monitors can still be found in some organizations, many offices have stopped using them largely because they are heavy, bulky, and costly to replace should they break. While they are still in use, it would be a good idea to phase these monitors out for cheaper, lighter, and more reliable monitors.

### **2. LCD (liquid crystal display) monitors**

The LCD monitor incorporates one of the most advanced technologies available today. Typically, it consists of a layer of color or monochrome pixels arranged schematically between a couple of transparent electrodes and two polarizing filters. Optical effect is made possible by polarizing the light in varied amounts and making it pass through the liquid crystal layer.

The advantages of LCD monitors include their compact size which makes them lightweight. They also don't consume much electricity as CRT monitors, and can be run off of batteries which makes them ideal for laptops.

Images transmitted by these monitors don't get geometrically distorted and have little flicker. However, this type of monitor does have disadvantages, such as its relatively high price, an image quality which is not constant when viewed from different angles, and a monitor resolution that is not always constant, meaning any alterations can result in reduced performance.

### **3. LED (light-emitting diodes) monitors**

LED monitors are the latest types of monitors on the market today. These are flat panel, or slightly curved displays which make use of light-emitting diodes for back-lighting, instead of cold cathode fluorescent (CCFL) back-lighting used in LCDs. LED monitors are said to use much lesser power than CRT and LCD and are considered far more environmentally friendly.

The advantages of LED monitors are that they produce images with higher contrast, have less negative environmental impact when disposed, are more durable than CRT or LCD monitors, and features a very thin design. They also don't produce much heat while running. The only downside is that they can be more expensive, especially for the high-end monitors like the new curved displays that are being released.

### **Factors to Consider When Buying a Computer Monitor**

- Size - The diagonal measurement of the screen
- Resolution - The number of pixels a monitor has to display an image.
- Aspect Ratio - ratio between the display area's width and height.
- Backlighting - LED backlighting has become more commonplace with today's computer monitors.
- Video input - This really depends on the age of your computer. If it's older, you'll need an analog, or VGA. Newer computer models use a digital connection for the monitor (e.g. DVI, HDMI or Display Port). Most monitors come with one analog and one digital video input.
- Ergonomic flexibility - The stand the monitor sits on is almost as important as the technical aspects described above.

- **RAM specifications**

RAM (Random Access Memory) is the internal memory of the CPU for storing data, program, and program result. It is a read/write memory which stores data until the machine is working. As soon as the machine is switched off, data is erased.

RAM is volatile, i.e. data stored in it is lost when we switch off the computer or if there is a power failure. Hence, a backup Uninterruptible Power System (UPS) is often used with computers. RAM is small, both in terms of its physical size and in the amount of data it can hold.

RAM is of two types

- Static RAM (SRAM)
- Dynamic RAM (DRAM)

#### **Static RAM (SRAM)**

The word **static** indicates that the memory retains its contents as long as power is being supplied. However, data is lost when the power gets down due to volatile nature. SRAM chips use a matrix of 6-transistors and no capacitors. Transistors do not require power to prevent leakage, so SRAM need not be refreshed on a regular basis.

There is extra space in the matrix, hence SRAM uses more chips than DRAM for the same amount of storage space, making the manufacturing costs higher. SRAM is thus used as cache memory and has very fast access.

#### **Characteristic of Static RAM**

- Long life
- No need to refresh
- Faster
- Used as cache memory
- Large size
- Expensive
- High power consumption



Fig 1.2. 3 Static RAM

## Dynamic RAM (DRAM)

DRAM, unlike SRAM, must be continually **refreshed** in order to maintain the data. This is done by placing the memory on a refresh circuit that rewrites the data several hundred times per second. DRAM is used for most system memory as it is cheap and small. All DRAMs are made up of memory cells, which are composed of one capacitor and one transistor.

### Characteristic of Dynamic RAM

- Short data lifetime
- Needs to be refreshed continuously
- Slower as compared to SRAM
- Used as RAM
- Smaller in size
- Less expensive
- Less power consumption

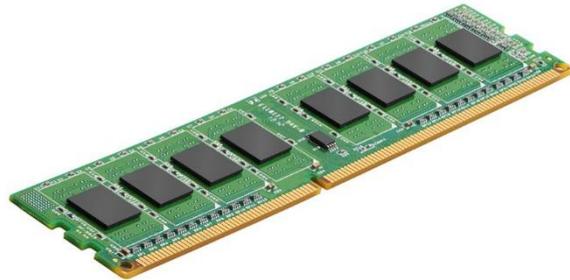


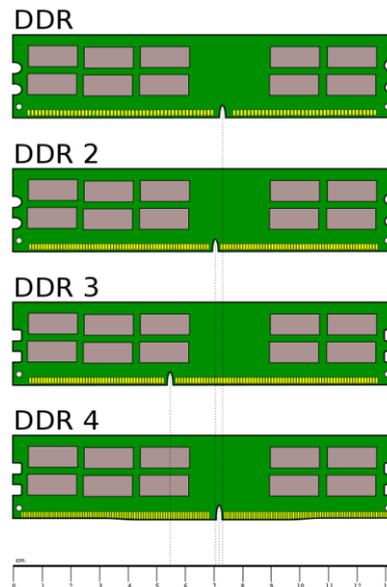
Fig 1.2. 4 Dynamic RAM

There are multiple factors to take into consideration whenever you're buying RAM. Namely, these factors are:

- type of RAM
- RAM capacity
- RAM frequency

### Double data rate (DDR) SDRAM specification

- DDR1
- DDR2
- DDR3
- DDR4



DDR SDRAM standard	Release year	Bus clock (MHz)	Internal memory clock (MHz)	Prefetch (min burst)	Transfer rate (MT/s)	Voltage (V)	DIMM pins	SO-DIMM pins	MicroDIMM pins
DDR1	2000	100–200	100–200	2n	200–400	2.5/2.6	184	200	172
DDR2	2003	200–533.33	100–266.67	4n	400–1066.67	1.8	240	200	214
DDR3	2007	400–1066.67	100–266.67	8n	800–2133.33	1.5/1.35	240	204	214
DDR4	2014	1066.67–2133.33	133.33–266.67	8n	2133.33–4266.67	1.05/1.2	288	256	—

Fig 1.2. 5 Specifications of DDR RAM



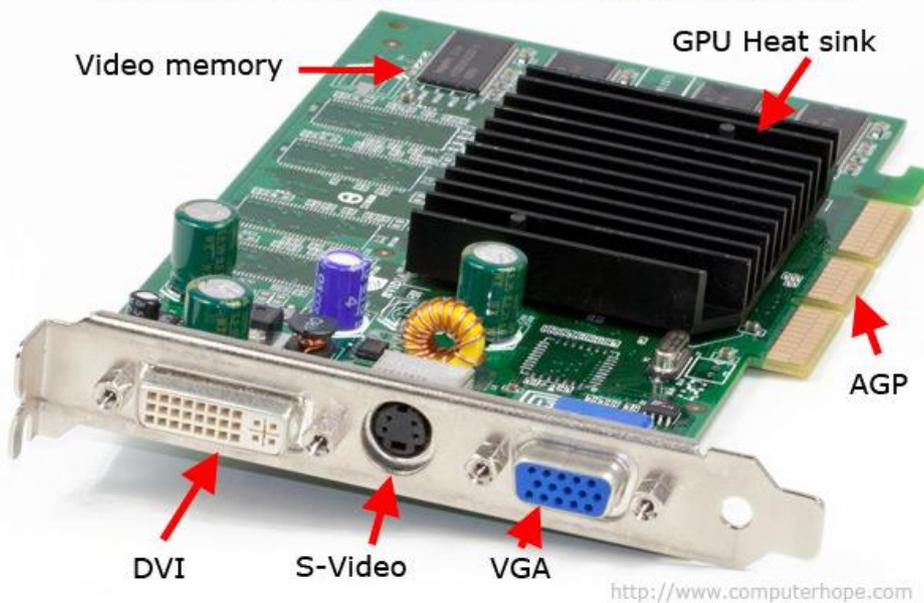
Fig 1.2.6 Basic Information about a Computer

- **VGA and sound**

## **Video card**

Alternatively known as a display adapter, graphics card, video adapter, video board, or video controller, a video card is an IC or internal board that creates a picture on a display. Without a video card, you would not be able to see this page.

### **Internal computer video expansion card**



Many versions of Microsoft Windows automatically detect and install video card. Assuming no video issues exist with the video card, can determine the video card is installed in the computer by accessing the Device Manager.

### **Computer video card buying tips**

- Connection
- Power supply
- Memory
- Price range
- Where to purchase

### **Other considerations**

- Ports
- Chipset
- Size
- Warranty
- Support

**Competency 2:** Uses spreadsheet software for calculations and for simple analysis of data

**Competency Level 2.1** Describes basics of spreadsheet software

**Time:** 01 period

**Learning Outcomes:**

- Uses IDE of spreadsheets software
- Uses Cell Addressing

**Contents:**

- Introduction to spreadsheet application software IDE
- Work Book, Worksheet
- Inserting, renaming and deleting worksheet
- Cell Addressing

**Concepts and terms to be highlighted:**

- Concept of Spreadsheet
- Workbook and Worksheet
- Cell Addressing

**Guidance for lesson plans:**

- Demonstrate a worked spreadsheet to highlight basic features.
- Provide worksheet to students to get familiarize with the GUI.
- Provide a hard copy of worksheets to enter data

**Guidance for assessments and evaluations:**

- Provide a collection of data suitable for creation of a worksheet.
- Ask students to create the worksheet using the software.

**Quality inputs:**

- Computer , spreadsheet software
- <https://teamtreehouse.com/library/spreadsheet-basics>
- <https://www.computerhope.com/jargon/e/excel.htm>

## Reading Material

### A spreadsheet

A spreadsheet (or spreadsheet program) is software that permits numerical data to be used and to perform automatic calculations on numbers contained in a table.

### Difference between workbook and worksheet

- A workbook can contain, at minimum, one worksheet, and up to a very large number of worksheets.
- Worksheets can be added, deleted or renamed within the workbook.
- Can also rename a workbook without affecting the name of any of the worksheets.
- Able to toggle between worksheets within the workbook by clicking the sheet tabs at the bottom of the window.

### Inserting, renaming and deleting worksheet

#### Inset a new worksheet

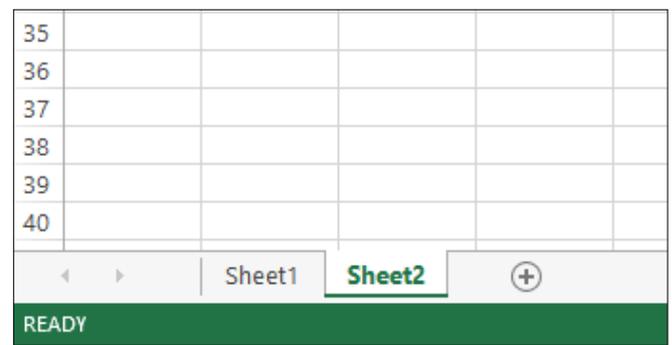


Fig 2.1. 1 the way of inserting new worksheet

#### Renaming a worksheet

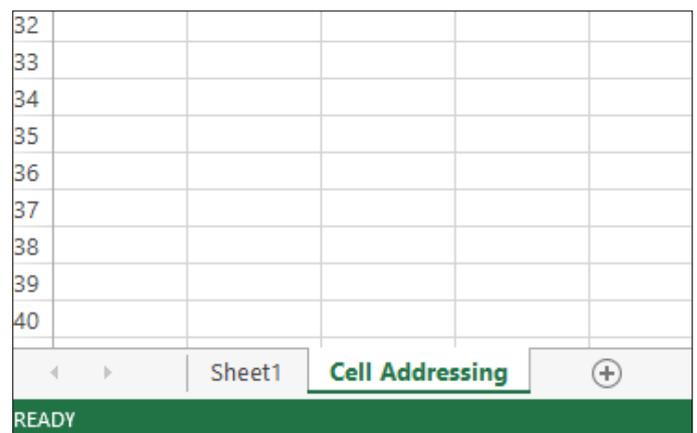
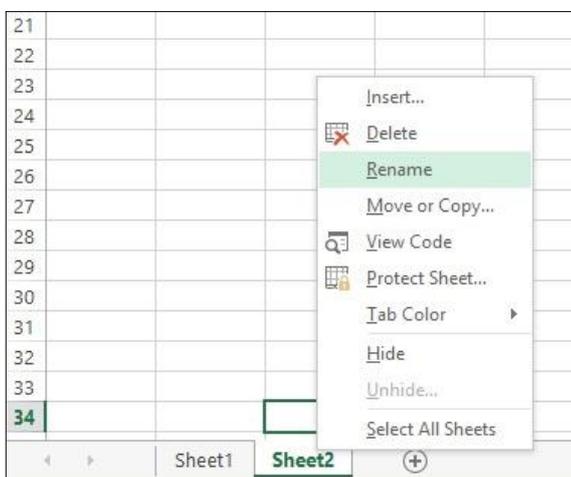


Fig 2.1. 2 the way of renaming a worksheet

## Deleting a worksheet

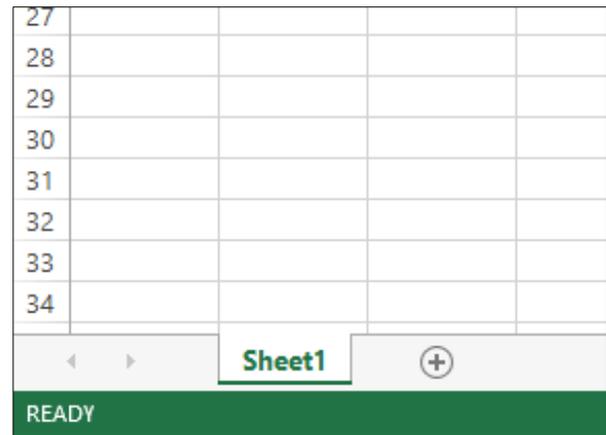
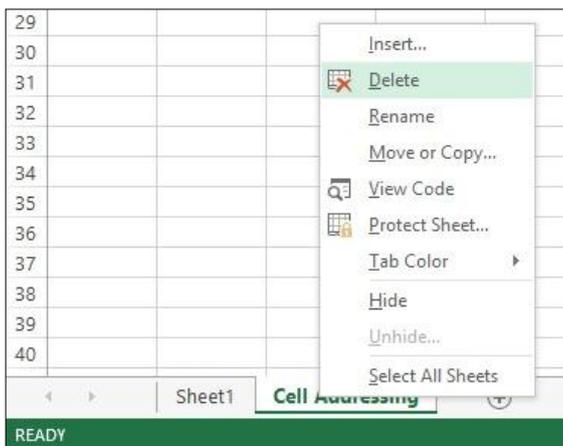


Fig 2.1. 3 the way of deleting a worksheet

## Cell Addressing

A cell address is denoted first by the column letter and secondly by the row number.

The address of the active cell is displayed in the name box.

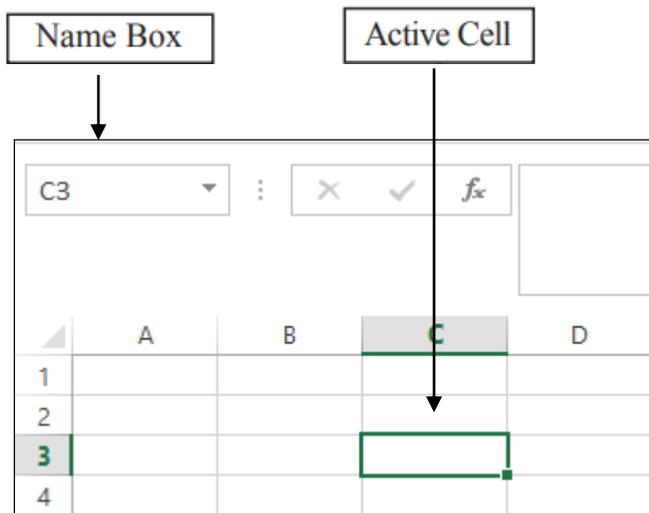


Fig 2.1. 4 Name Box and Active Cell

**Competency 2:** Uses spreadsheet software for calculations and for simple analysis of data

**Competency Level 2.2:** Enters data in worksheet

**Number of Periods:** 02 periods

**Learning Outcomes:**

- Determines required column width and row height
- Formats cells
- Explains Cell Formatting
- Creates work book and Save

**Contents:**

- Changing column width and row height
- Formatting Cells:
- Text alignment, Font, Border, Fill
- Data types: Value, number, Currency, Date and Time
- Saving a work book

**Concepts and terms to be highlighted:**

- Section of Formatting according to the need

**Guidance for lesson plans:**

Laboratory sessions

- Demonstrate the use of formatting.
- Provide worksheets to enter data and apply formatting.

**Guidance for assessments and evaluations:**

- Provide an unformatted data table.
- Ask students to create worksheet according to the given specifications.

**Quality inputs:**

- Computer , spreadsheet software
- <https://www.computerhope.com/jargon/e/excel.htm>
- <https://teamtreehouse.com/library/spreadsheet-basics>

## Reading Material

- Changing column width and row height

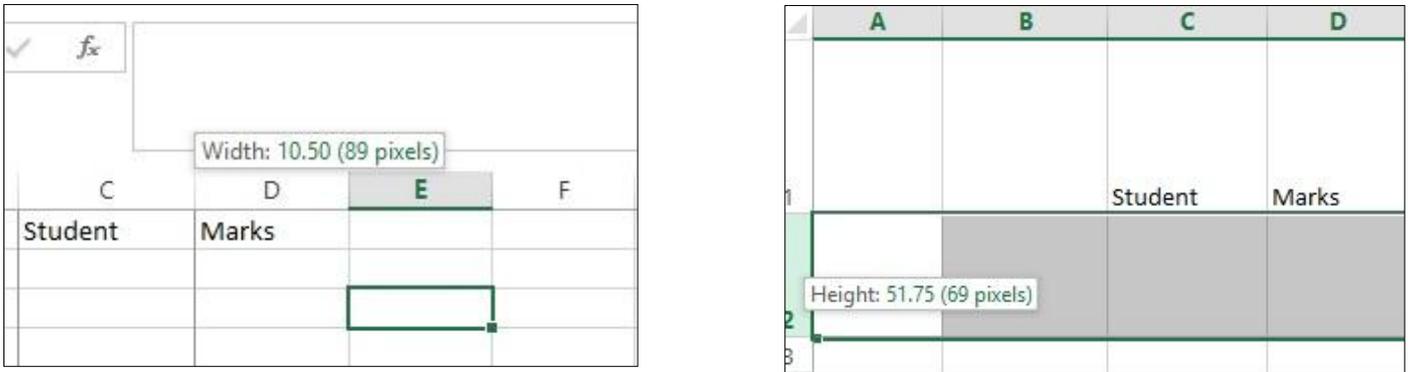


Fig 2.2. 1 the way of changing column width and height

- Formatting Cells

In order to format the labels and value in a worksheet formatting tool bar or cell formatting window can be used.

### Formatting tools in Microsoft Excel 2013

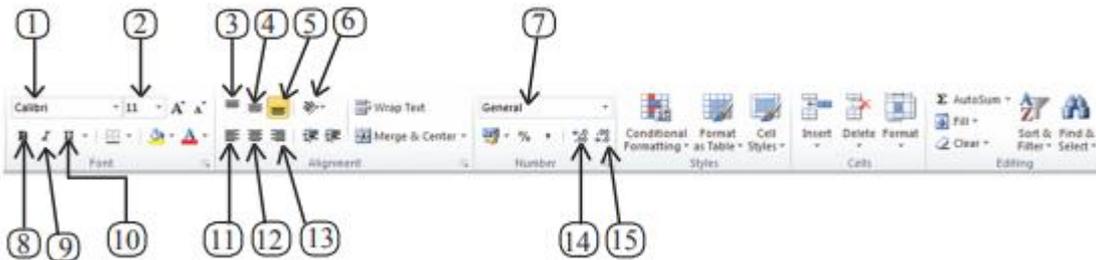


Fig 2.2. 2 Formatting tools in Microsoft Excel 2013

No	Tool	Details
1	Font	Apply different font types in a worksheet
2	Font Size	Apply different font sizes in a worksheet
3	Vertical Top Alignment	Align text to the top of a cell
4	Vertical Middle Alignment	Align text to the middle of a cell
5	Vertical Bottom Alignment	Align text to the bottom of a cell
6	Orientation	Rotate the text to diagonal angle or vertical orientation
7	Number Format	Choose how the values in a cell are displayed
8	Bold	Make the selected text bold
9	Italic	Italicize the selected text
10	Underline	Underline the selected text
11	Left Alignment	Align text in a cell to the left
12	Center Alignment	Align text in a cell to the center
13	Right Alignment	Align text in a cell to the right
14	Increase decimal places	Show more precise value by showing more decimal places
15	Decreased decimal places	Show less precise decimal places

Fig 2.2. 3 Tools and their usages

The format cells dialog box' in the tool bar can be used to find more about formatting a cell or range of cell.

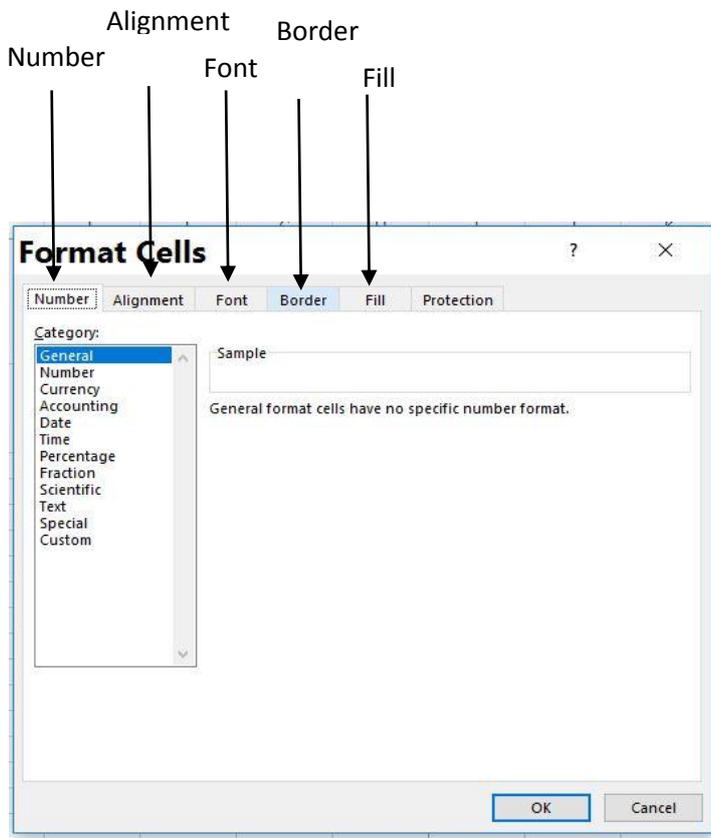
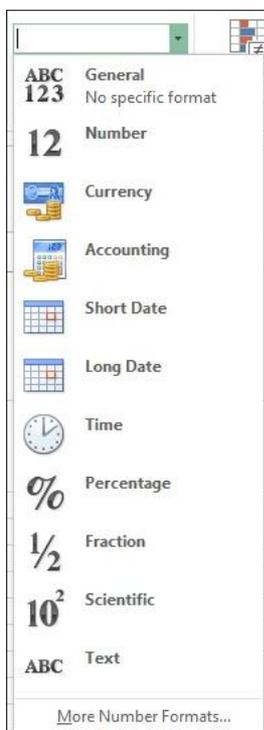


Fig 2.2.4 The format cells dialog box

- Data types

In order to format the labels and value in a worksheet Number formatting window can be used.

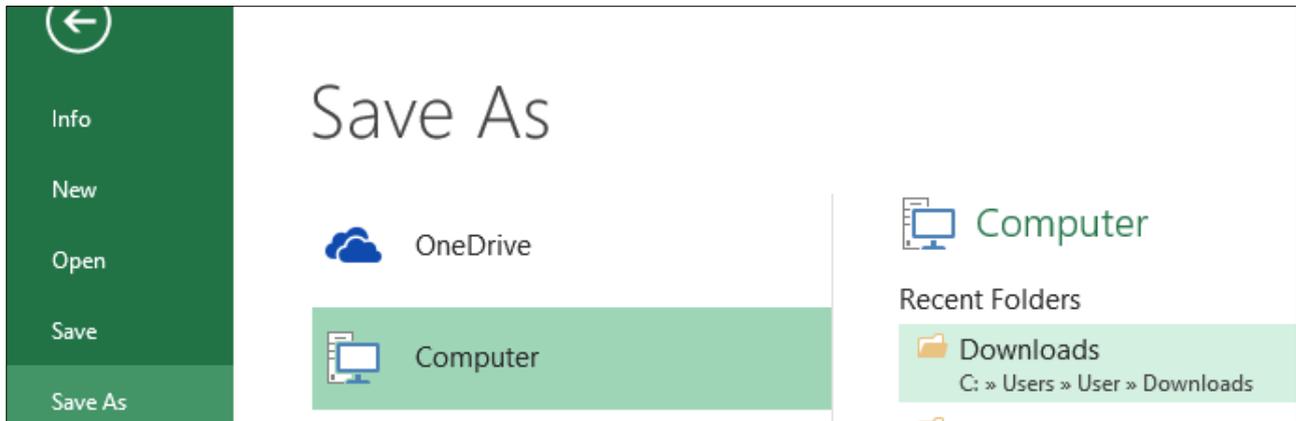


- Saving a work book

*Fig 2.2. 5 Number formatting window*

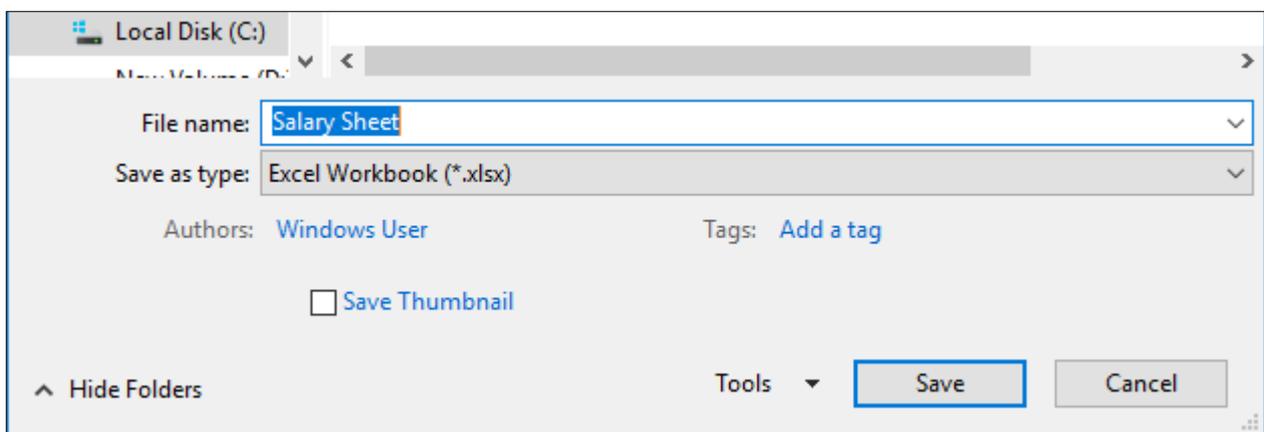
**In order to save the workbook click on the**

**File → Save as**



*Fig 2.2. 6 Save as window*

**Type the File name → Select the Save as type → Save**



*Fig 2.2. 7 Window for selecting Save as type*

**Competency 2:** Uses spreadsheet software for calculations and for simple analysis of data

**Competency Level 2.3:** Carries out Simple mathematical calculations

**Number of Periods:** 01 period

**Learning Outcomes:**

- Identifies mathematical operators
- Uses operators correctly

**Contents:**

- Use of mathematical operators
  - Addition
  - Subtraction
  - Multiplication
  - Division

**Concepts and terms to be highlighted:**

- Use of brackets in mathematical calculations.
- Importance of using cell addresses in calculations: ease of editing.
- Automatic recalculation.
- Copying of expressions for same calculations.

**Guidance for lesson plans:**

Laboratory sessions:

- Demonstrate how to do calculations.
- Provide exercises on calculations to be done on software.

**Guidance for assessments and evaluations:**

- Provide mathematical expressions to be evaluated using spreadsheet software.
- Provide a table of data to carry out same computations.
- Check whether students use the software properly to avoid repeating the writing of same mathematical expressions.

**Quality inputs:**

- Computers, Internet facility, Spreadsheet software
- <https://support.office.com/en-us/article/use-excel-as-your-calculator-a1abc057-ed11-443a-a635-68216555ad0a>
- <https://www.youtube.com/watch?v=7RCdzTpKO0A>

## Reading Material

### Formulae

The expressions beginning with an equals '=' mark using values, cell address and functions are called a formula. When a formula is entered in a cell in a worksheet the value of the equation is displayed in the cell and the formula is shown in the formula bar.

### Mathematical operators used in formulae

Operator	Meaning
+	addition
-	subtraction
*	multiplication
/	division
^	exponentiation (power)

**Note:** The order of evaluation can be changed by using brackets. (The expressions within the brackets are evaluated first).

Simple and operators **Operator precedence:** calculations using values

Operator	Formula	Result
Addition (+)	= 2+4	6
Subtraction (-)	= 5-2	3
Multiplication (*)	= 4*5	20
Division (/)	= 12/6	2
Exponentiation (^)	= 2^4	16

### Examples

#### Addition

Student	Mathematics	English	Science	Total	Average
Subha	88	80	65	=C3+D3+E3	
Pasan	75	64	89		
Nilu	76	90	65		
Namal	83	65	78		

Student	Mathematics	English	Science	Total	Average
Subha	88	80	65	233	
Pasan	75	64	89		
Nilu	76	90	65		
Namal	83	65	78		

Student	Mathematic	English	Science	Total	Average
Subha	88	80	65	233	
Pasan	75	64	89		
Nilu	76	90	65		
Namal	83	65	78		

Student	Mathematic	English	Science	Total	Average
Subha	88	80	65	233	
Pasan	75	64	89	228	
Nilu	76	90	65	231	
Namal	83	65	78	226	

## Division

Student	Mathema	English	Science	Total	Average
Subha	88	80	65	233	$=(C3+D3+E3)/3$
Pasan	75	64	89	228	
Nilu	76	90	65	231	
Namal	83	65	78	226	

Student	Mathematic	English	Science	Total	Average
Subha	88	80	65	233	77.67
Pasan	75	64	89	228	
Nilu	76	90	65	231	
Namal	83	65	78	226	

**Competency 2** : Uses spreadsheet software for calculations and for simple analysis of data

**Competency Level 2.4** : Uses Functions to carry out Simple mathematical calculations and data sorting

**Number of Periods** : 01 period

**Learning Outcomes** :

- Identifies functions and its parameters for required task
- Applies spread sheet software tools to carry out the task
- Applies spread sheet software for data sorting

**Contents:**

- Basic Function used in spreadsheets  
SUM, AVERAGE, MAX, MIN, COUNT, COUNTA
- Data sorting

**Concepts and terms to be highlighted:**

- Spreadsheet functions
- Data Sorting

**Guidance for lesson plans:**

Laboratory sessions:

- Demonstrate the use of functions.
- Provide worksheets to create electronic version of it using software.

**Guidance for assessments and evaluations:**

- Provide a data set to perform specified calculations using software.
- Exercises on manual spreadsheet calculations.

**Quality inputs:**

- Computers, Internet facility, Spreadsheet software
- <https://support.office.com/en-us/article/countif-function-e0de10c6-f885-4e71-abb4-1f464816df34>

## Reading Material

When there is a large quantity of data it becomes a difficult and complex task to write formulae using only the cell addresses. In this kind of situation functions are used. The spreadsheet applications contain different functions to meet the requirements of different fields.

Name of function	Syntax	Use
SUM	=SUM(Number 1,Number2.....)	Adds the values contained in a range of cells.
AVERAGE	=AVERAGE(Number1,Number2.....)	Finds out the average of the values contained in a range of cells.
MAX	=MAX(Number1,Number2.....)	Finds out the largest value contained in a range of cells.
MIN	=MIN(Number1,Number2.....)	Finds out the smallest value contained in a range of cells.
COUNT	=COUNT(Number1,Number2.....)	Counts the number of cells within a range of cells.

## Examples

### SUM

	A	B	C	D	E	F
1	Student	Mathema	English	Science	Total	Average
2	Subha	88	80	65	=SUM(B2:D2)	
3	Pasan	75	64	89		
4	Nilu	76	90	65		
5	Namal	83	65	78		
6						

	A	B	C	D	E	F
1	Student	Mathema	English	Science	Total	Average
2	Subha	88	80	65	233	
3	Pasan	75	64	89	228	
4	Nilu	76	90	65	231	
5	Namal	83	65	78	226	

### AVERAGE

Student	Mathema	English	Science	Total	Average
Subha	88	80	65	233	=(C3+D3+E3)/3
Pasan	75	64	89	228	
Nilu	76	90	65	231	
Namal	83	65	78	226	

Student	Mathema	English	Science	Total	Average
Subha	88	80	65	233	77.67
Pasan	75	64	89	228	
Nilu	76	90	65	231	
Namal	83	65	78	226	

### MAX

Student	Mathematics	English	Science	Total	Average
Subha	88	80	65	233	76.83
Pasan	75	64	89	228	76.50
Nilu	76	90	65	231	76.17
Namal	83	65	78	226	78.50
Maximum Marks	=MAX(C3:C6)				

## MIN

Student	Mathematics	English	Science	Total	Average
Subha	88	80	65	233	76.83
Pasan	75	64	89	228	76.50
Nilu	76	90	65	231	76.17
Namal	83	65	78	226	82.17
Maximum Marks	88	90	89	233	
Minimum Marks	=MIN(C3:C6)				
Number of Students					

## COUNT

Count the number of cells in a range that contain numbers

Student	Mathematics	English	Science	Total	Average
Subha	88	80	65	233	76.83
Pasan	75	64	89	228	76.50
Nilu	76	90	65	231	76.17
Namal	83	65	78	226	82.17
Maximum Marks	88	90	89	233	
Minimum Marks	75				
Number of Students	=COUNT(C3:C6)				

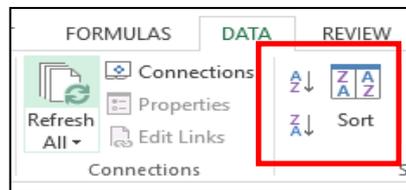
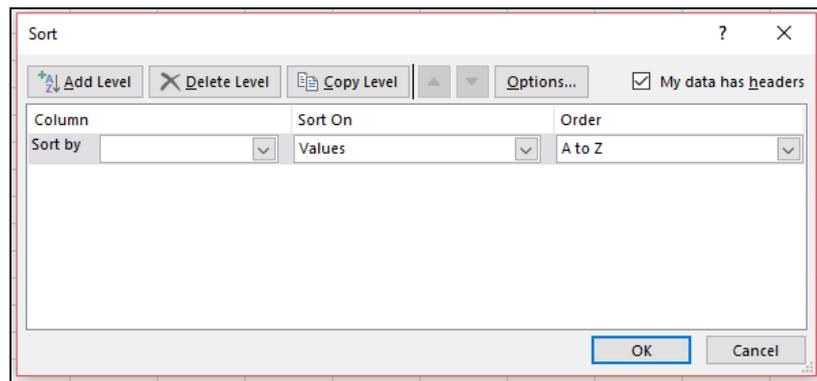
## COUNTA

Count the number of cells in a range that are not empty

Student	Mathematics	English	Science	Total	Average
Subha	88	80	65	233	76.83
Pasan	75	64	89	228	76.50
Nilu	76	90	65	231	76.17
Namal	83	65	78	226	82.17
Maximum Marks	88	90	89		
Minimum Marks	75	64	65		
Number of Students	=COUNTA(B3:B6)				

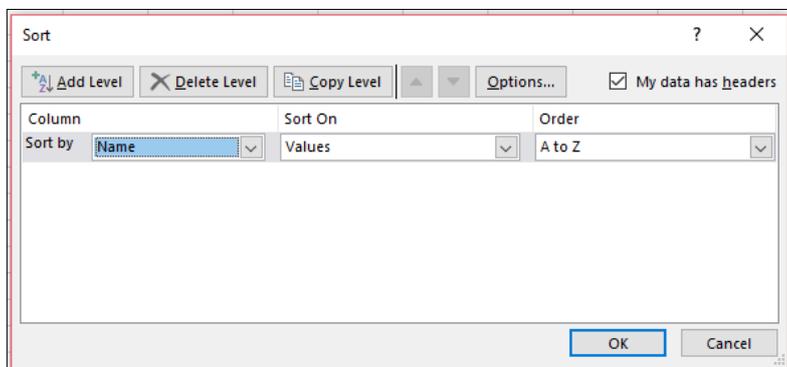
## Data Sorting

Name	Marks
Sam	67
Vishu	89
Nick	98
Sally	76
Dick	45
Emma	68
Angy	56
Tim	32
Lucy	20
Jolly	87
Harry	90
Porter	93
Watson	37



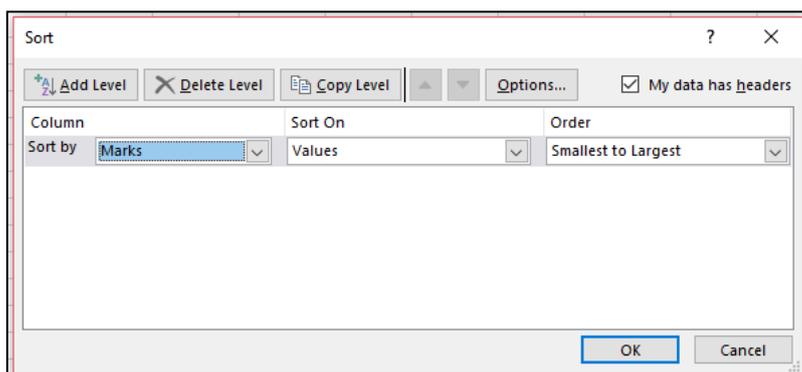
## Examples

### Sort on Name – Order by A-Z



Name	Marks
Angy	56
Dick	45
Emma	68
Harry	90
Jolly	87
Lucy	20
Nick	98
Porter	93
Sally	76
Sam	67
Tim	32
Vishu	89
Watson	37

### Sort on Marks – Order by Smallest to Largest



Name	Marks
Lucy	20
Tim	32
Watson	37
Dick	45
Angy	56
Sam	67
Emma	68
Sally	76
Jolly	87
Vishu	89
Harry	90
Porter	93
Nick	98

**Competency 2:** Uses spreadsheet software for calculations and for simple analysis of data

**Competency Level 2.5.** Uses various charts to display data

**Number of Periods:** 02 periods

**Learning Outcomes:**

- Identifies the relevant chart types
- Creates the chart using relevant tools
- Creates and format the suitable chart for the relevant data

**Contents:**

- Basic Chart types: Column Chart, Bar Chart, Line Chart, Pie Chart
- Chart options: Change of chart type, formatting Legend, Formatting data series and axles, Switching row and column

**Concepts and terms to be highlighted:**

- Selection of suitable chart type.
- Selection of non-adjacent columns.
- Relocation of a chart to a new sheet.
- Labeling of the chart.

**Guidance for lesson plans:**

- Demonstrate the creation of charts.
- Provide worksheets with specification for charts.

**Guidance for assessments and evaluations:**

Laboratory sessions

- Creation of graphs for given data sets.

**Quality inputs:**

- Computer hardware , Internet facility, spreadsheet software
- <https://support.office.com/en-us/article/create-a-chart-from-start-to-finish-0baf399e-dd61-4e18-8a73-b3fd5d5680c2>

**Reading Material**

When data are presented in the form of charts they become an effective tool to communicate. Because it is an easiest way to comprehend, compare, analyze and present data.

**Types of Chars**

Type of chart	basic form	Purpose of chart
Column Chart		Comparing classes of data items in group. Group comparison
Bar Chart		Comparing classes of data items in group. Group comparison
Line Chart		Comparing classes of data items in group. Group comparison
Pie Chart		Comparing classes of data items as percentage.

Fig 2.5. 1 Types of Charts

**Charts Group**

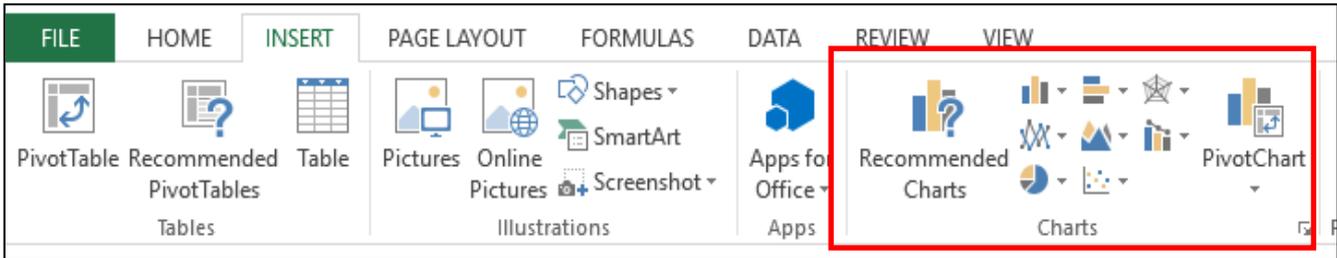


Fig 2.5.2 Charts Group

**Chart Tool**

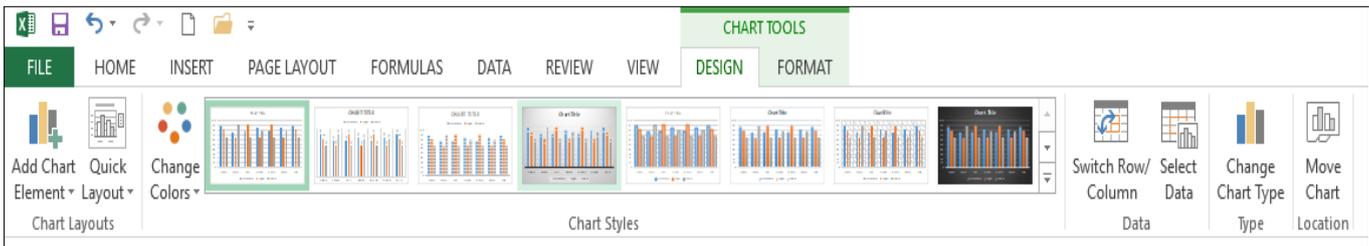


Fig 2.5.3 Chart Tools

### Example 01

	A	B	C	D	E	F
1	<b>Student</b>	<b>Mathema</b>	<b>English</b>	<b>Science</b>	<b>Total</b>	<b>Average</b>
2	<b>Subha</b>	88	80	65	233	77.67
3	<b>Pasan</b>	75	64	89	228	76.00
4	<b>Nilu</b>	76	90	65	231	77.00
5	<b>Namal</b>	83	65	78	226	75.33
6	<b>Anitha</b>	76	90	65	231	77.00
7	<b>Kishna</b>	83	65	78	226	75.33
8	<b>Sally</b>	88	80	65	233	77.67

#### Steps to create charts.

1. Select the range of data (A1:D8)
2. Insert → Chart
3. Select the type of chart
4. Select the Chart

#### Give a title to the chart

1. Select the chart title
2. Type a title

#### Change of chart type

1. Click on the Change Chart Type tool
2. Select a chart type from recommended charts.

#### Formatting Legend

1. Click on the Add Chart Element tool
2. Select the Legend
3. Select suitable legend type

#### Switching row and column

1. Click on the Switch Row / Column tool on Data group.
2. Switch Column to Row / Row to Column

#### Formatting data series and axes

1. Click on the Select Data tool on Data group.
2. Add, Edit or Remove Legend Entries/ Series

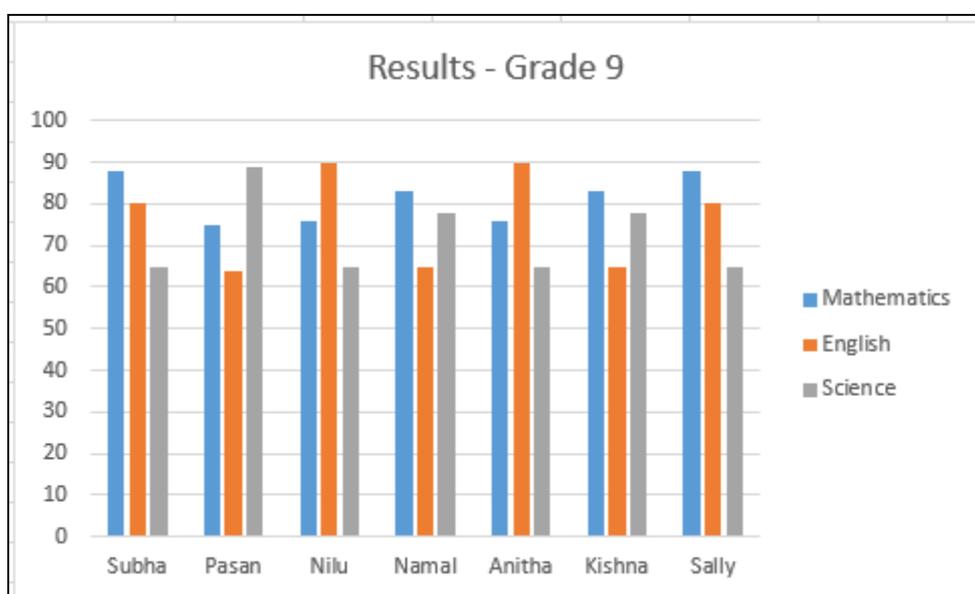


Fig 2.5. 4 The Chart for Example 01

**Competency 3** : Uses flow charts to solve simple problem with Sequence, Selection, Iteration and develop programs (using Scratch)

**Competency Level 3.1:** Uses Sequence, Selection and Iteration control structure for drawing Flow charts

**Time** : 02 periods

**Learning Outcomes** :

- Draws flow charts to solve simple problems
- Identifies the problem and decide solution

**Contents:**

- Problem solving using multiple Selections
- Problem solving using Iterations
- Problem solving using nested Iterations

**Concepts and terms to be highlighted:**

- Steps of analyzing a problem (input, output, process)
- Process of problem solving as a series of steps
- Tools that are used to represent an algorithm(Flow chart and pseudo code)
- Symbols of flowchart
- Way that symbols used
- Types of control structures are used in an algorithm(Sequence, Selection, Iteration)
- Problem solving using suitable control structure

**Guidance for lesson plans:**

- Introduce some problems in the real world
- Analyze those problems (Identify input, output and process)
- Identify the series of steps for solving those problems
- Choose correct control structure to solve the problem
- Draw the flow chart

**Guidance for assessments and evaluations:**

- Discuss with students about
- Analyze a given problems(multiple Selections, Iterations, nested Iterations)
- Draws flow charts to solve those problems

**Quality inputs:**

- Internet facility, Computer, Task sheet
- <https://www.edrawsoft.com/algorithm-flowchart-examples.php>

## Reading Material

### Problem solving using multiple Selections

Imagine one of the pots have many marble with different color and different weight, how to select the marble with 50 grams and red color.

First find the marbles with red color. After that find the marble with 50 gram in red color. Here we use two selection condition such as “Is the marble red color?” And “is the marble 50 grams?”.

Occasionally, an algorithm contains a series of decisions in which the algorithm tests a variable or expression separately for each value that the variable or expression might assume. The algorithm then takes

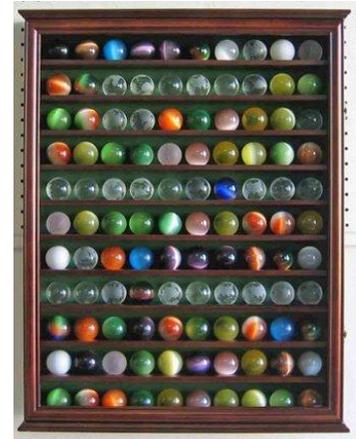


Fig 3.1. 1 Different marbles

different actions based on those values.

If there are multiple conditions one after the other, multiple selections should be used. In flow chart, diamond shaped symbol is used to represent each and every decision.

Multiple Selection Flowchart structure as follows. It is like as filtration.

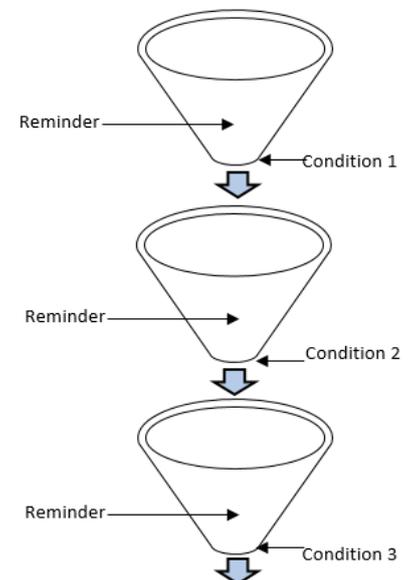
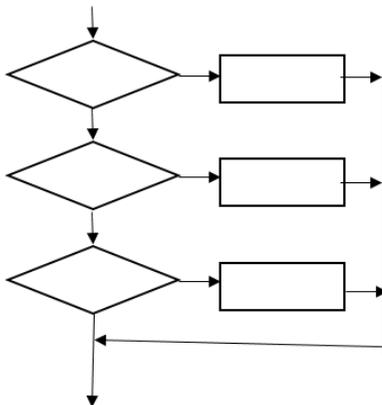
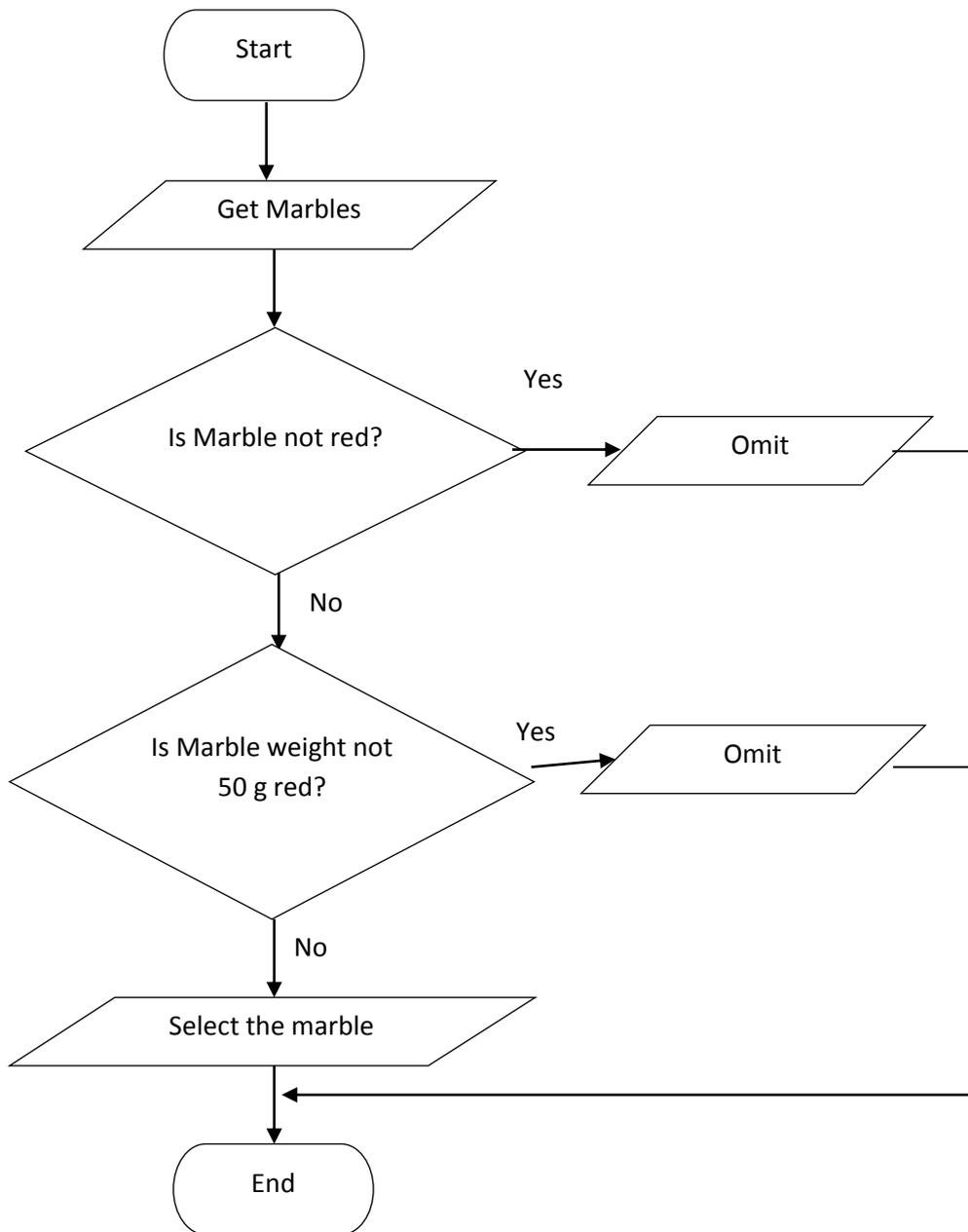


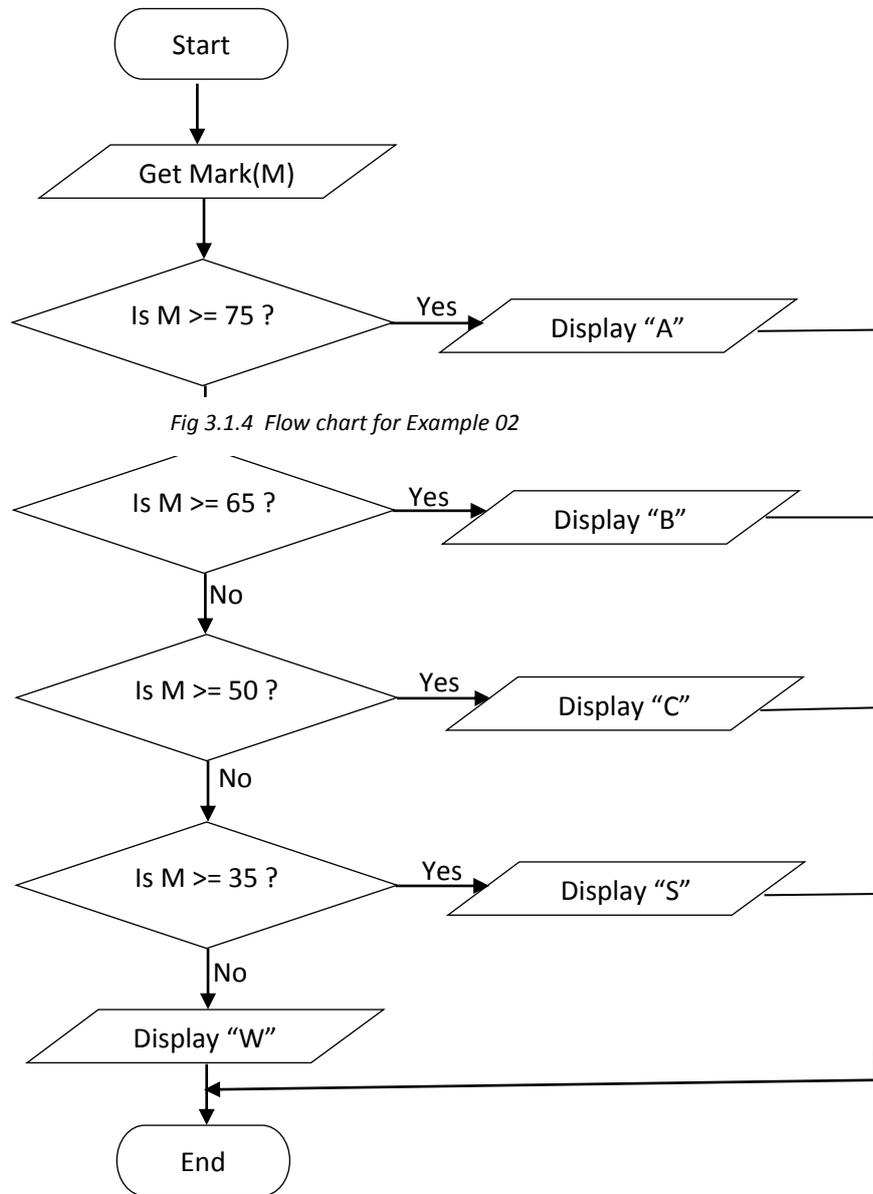
Fig 3.1. 2 Multiple Selection Flowchart structure

**Example: 1** Find 50 grams red marbles in box of marbles



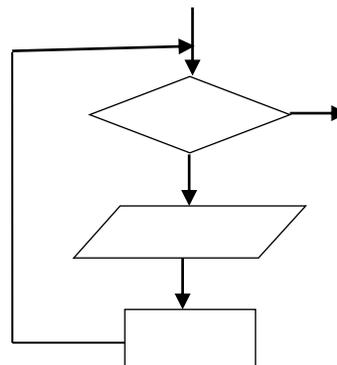
*Fig 3.1.3 Flow chart for Example 01*

**Example: 2** Find the Grade from Get marks.



- **Problem solving using Iterations**

Repetition of the process is also called an "iteration" and the results of one iteration are used as the starting point for the next iteration.



*Fig 3.1.5 Flow chart for Iteration*

**Example: 3** Draw a square

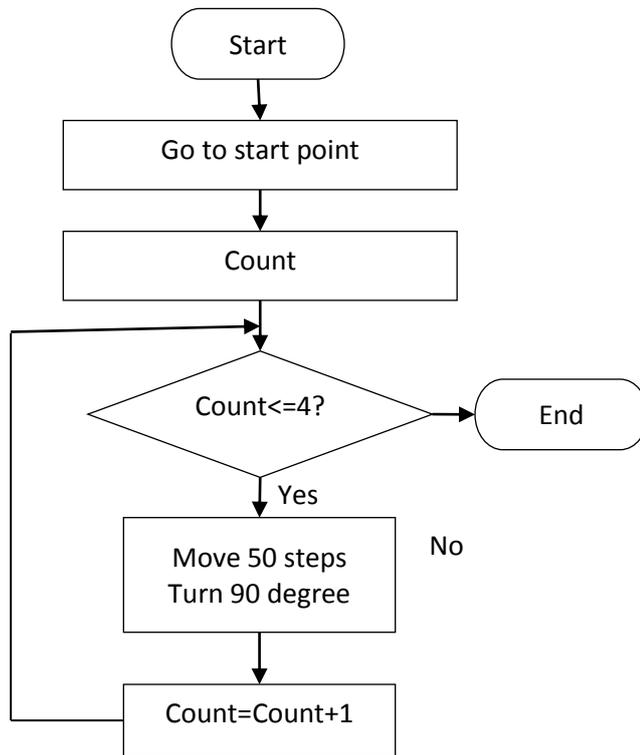


Fig 3.1. 6 Flowchart for Example 03

**Example: 4** Display numbers from 1 to 10

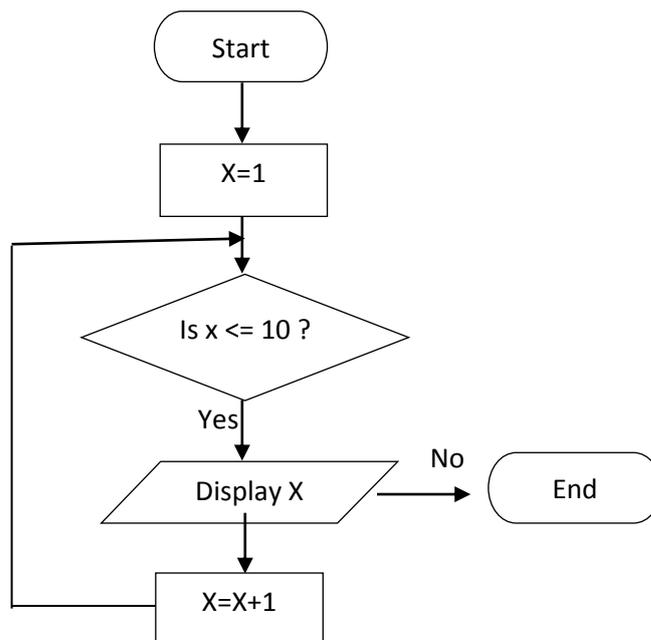


Fig 3.1. 7 Flowchart for Example 04

- **Problem solving using Nested Iterations**

The placing of one loop inside the body of another loop is called nesting. When you "nest" two loops, the outer loop takes control of the number of complete repetitions of the inner loop. While all types of loops may be nested, the most commonly nested loops are for loops.

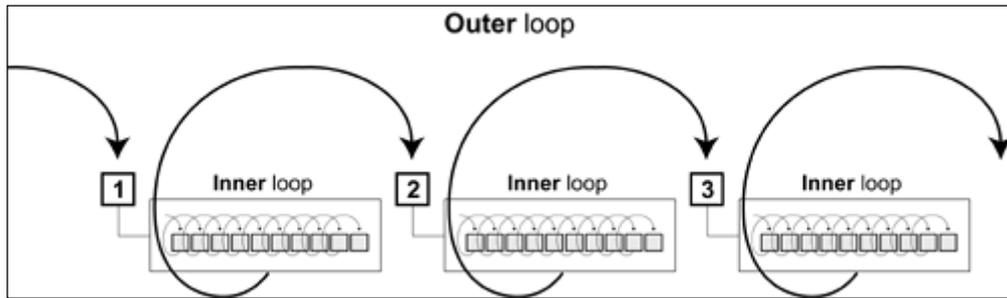


Fig 3.1. 8 Structure of Nested Iterations

Flow chat structure of Nested Iteration

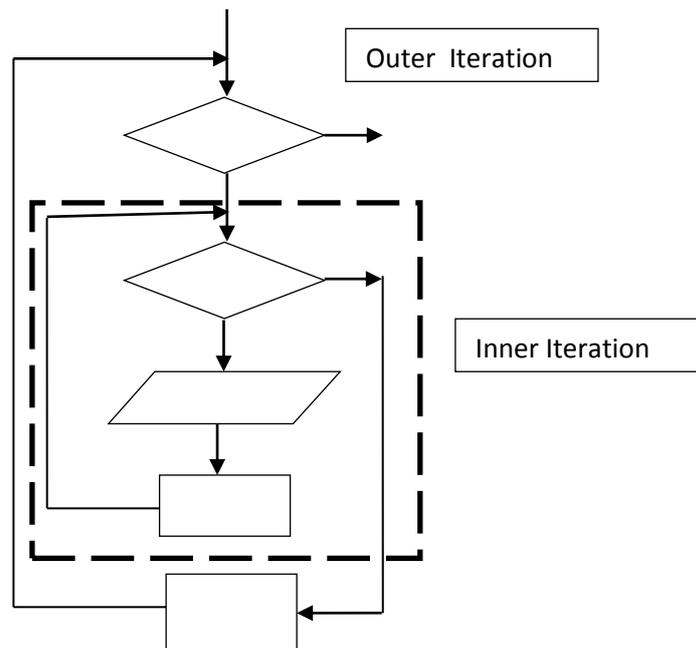


Fig 3.1.9 Flow chat structure of Nested Iteration

**Example: 5** Draw design - first draw a square then turn 30 degree it is repeat 24 times

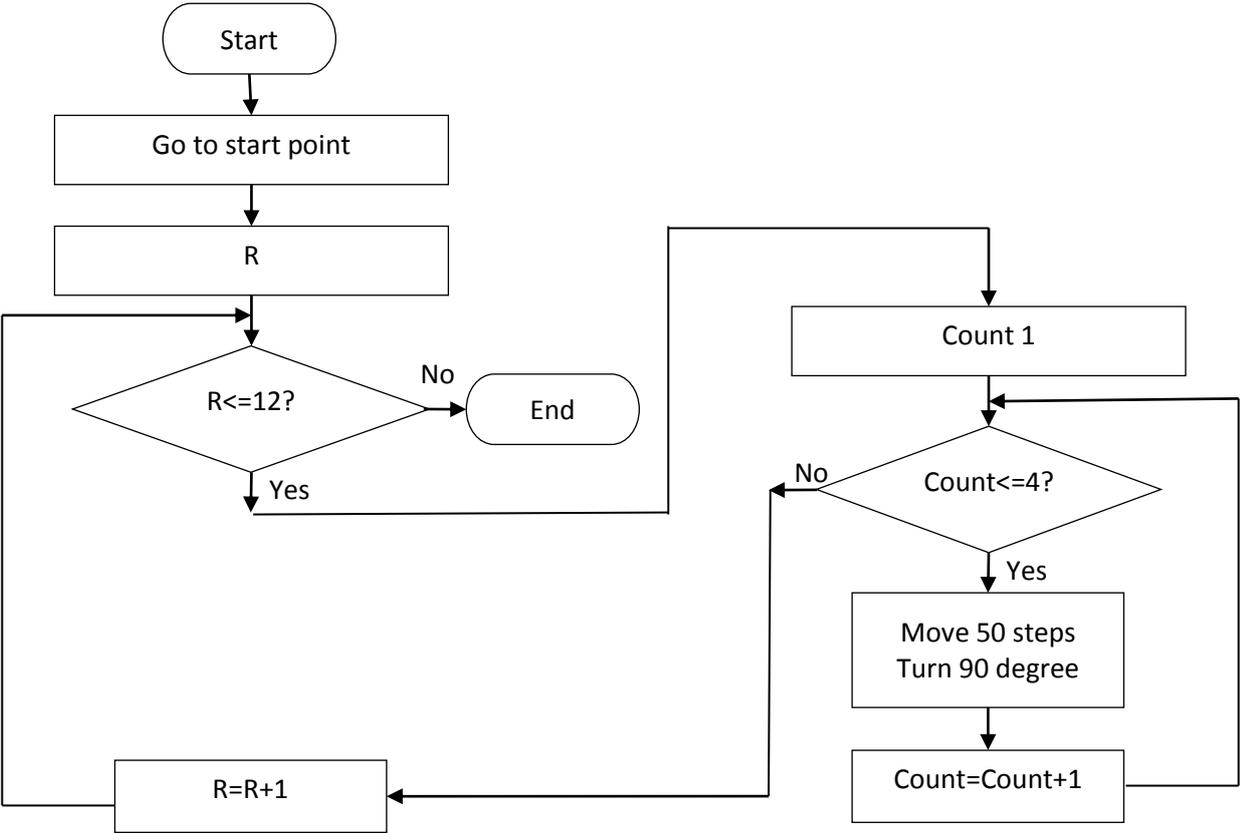


Fig 3.1.10 Flowchart for Example 05

**Competency 3:** Uses flow charts to solve simple problem with Sequence, Selection, Iteration and develop programs (using Scratch)

**Competency Level 3.2:** Uses Selection and Iteration (Repetition) control structures for solving simple problems with visual support

**Time:** 05 periods

**Learning Outcomes:**

- Applies multiple conditions in selection control structure
- Identifies the difference between selection and iteration
- Uses iteration control structure to solve relevant problems

**Contents:**

- Selection control structures with multiple conditions
- Control structure with simple iteration
- Development of simple programs (sequence, selection and iteration) using visual supports of programming language (using an Interface)

**Concepts and terms to be highlighted:**

- Sequence, selection and iteration control structures
- Nested selection
- Difference between selection and iteration
- Tools of the Scratch

**Guidance for lesson plans:**

- Introduce Sequence, selection and iteration control structures
- Discuss nested selection with example
- Discuss difference between selection and iteration
- Draw square and triangle using Scratch to display sequence control structure visually

**Guidance for assessments and evaluations:**

- Analyze a given problems(multiple Selections, Iterations, nested Iterations)
- Draws flow charts to solve those problems

**Quality inputs:**

- Internet facility, Computer, Software
- <https://www.youtube.com/watch?v=GpDUQqu-Bnc>

## Reading Material

- **Development of simple programs**  
**Iteration control structure**

Iteration, in the context of computer programming, is a process wherein a set of instructions or structures are repeated in a sequence a specified number of times or until a condition is met. When the first set of instructions is executed again, it is called an iteration. When a sequence of instructions is executed in a repeated manner, it is called a loop.

Scratch supports 3 basic types of iteration



Fig 3.2. 1 three basic types of iteration supported by Scratch

**Example : 1** Move 2 step is it repeat till 50 steps.



Fig 3.2. 2 The Block for Example 01

**Example : 2** Move 2 step forever if on edge, bounce.



Fig 3.2. 3 The Block for Example 02

**Example : 3** Draw a square

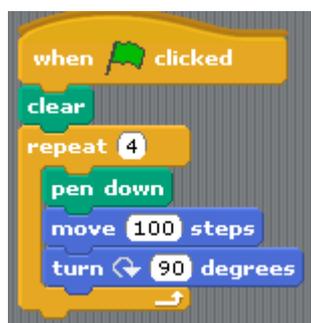


Fig 3.2. 4 The Block for Example 03

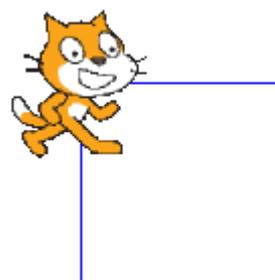


Fig 3.2. 6 Result for Example 03

#### Example : 4

- **Draw triangle and repeat it**
  - Select pen down script block from the Pen toll
  - To draw triangle, select move 10 steps and turn 15 degrees script blocks from the Motion toll
  - Change 10 steps to 80 steps and 15 degrees to 120 degrees
  - It will draw 80 steps straight line and turn 120 degrees
  - Repeat 2 and 3 steps
  - select move 10 steps and turn 15 degrees script blocks from the Motion toll
  - Change 10 steps to 80 steps and 15 degrees to 130 degrees
  - It will draw 80 steps straight line and turn 130 degrees. (If you change 15 degrees to 120 degrees, second triangle also draw on the first triangle. This mean all the triangles are overlapped)
  - After that Select wait 1 secs from control tool(After drawing a triangle, It'll wait one second to draw the next triangle)
  - Select forever block from control tool and put all the script blocks which you have created inside the forever block(then triangles will be drawn repeatedly)
  - Select clear script block from Pen Tool and put that script to the top of the script blocks(It will be cleared previously drawn shapes)
  - After that select when clicked script blocks from the Control toll and put that script to the top of the script blocks



Fig 3.2. 7 The Block for Example 04

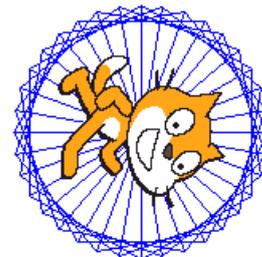


Fig 3.2. 8 Result for Example 04

### Example : 5

Draw a rectangle with the help of following scratch

Click and modify the following steps in Scripts area.

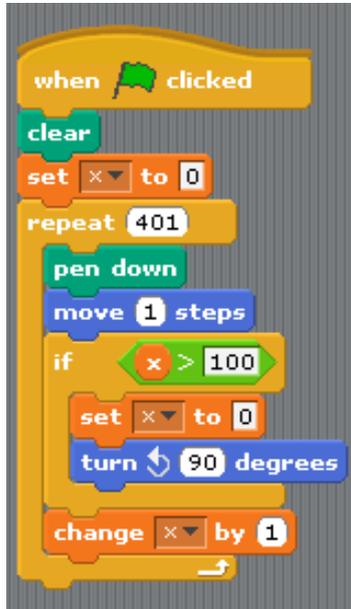


Fig 3.2. 5 The Block for Example 05

When click it will be work  
Every time Clear the Screen  
Set x value to 0  
Do the following steps in 401 times  
Draw line  
Move 1 steps  
If x value is greater than 100 do following two steps  
    Set x value to 0  
    Turn 90° in left hand side  
Add 1 in every time of the iteration

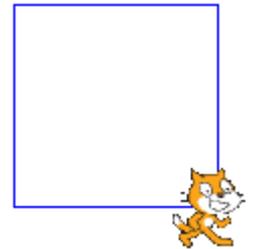


Fig 3.2. 7 Result for Example 05

**Competency 3:** Uses flow charts to solve simple problem with Sequence, Selection, Iteration and develop programs (using Scratch)

**Competency Level 3.3:** Develops programs with visual support with nested iterations

**Time:** 03 periods

**Learning Outcomes:**

- Creates animated program using repetition control
- Explains the different usage of repetition structures

**Contents:**

- Development of programs using basic iteration control structure: Repeat
- Development of visual program with selection & iteration and nested iteration control structure

**Concepts and terms to be highlighted:**

- Sequence, selection and iteration control structures
- Nested iteration
- Nested Iteration Stretch Structure

**Guidance for lesson plans:**

- Introduce Sequence, selection and iteration control structures
- Discuss nested iteration with example
- Divide the students into groups and guide the students to develop the given Stretch task.
- Guide the students group to change the Given Stretch and observe the display.
- Ask students group to prepare a such program.

**Guidance for assessments and evaluations:**

- Observe the student group to do the task.
- Guide the students to develop such Scratch program

**Quality inputs:**

- Computer, Scratch Program
- <https://www.youtube.com/watch?v=GpDUQqu-Bnc>

## Reading Material

**Example : 1** Draw design - first draw a square then turn 15 degree it is repeat

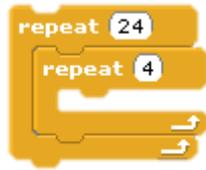


Fig 3.3. 1 The Block for Nested Iteration

There are two Iteration are nested

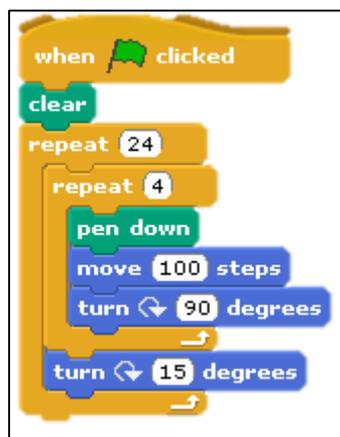


Fig 3.3. 2 The Block for Example 01

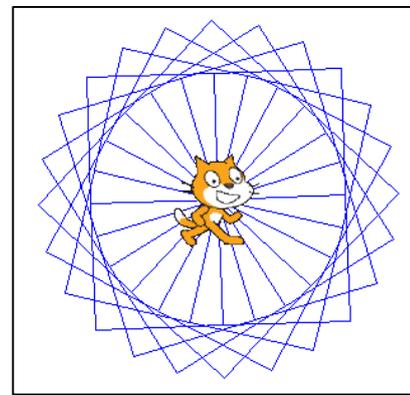


Fig 3.3.3 Result for Example 01

**Example : 2** Draw design - first draw a square then turn 60 degree it is repeat 6 times with different color Square on one point. (Every Square is same color because “**Change pen color by (10)**” is in outer loop)

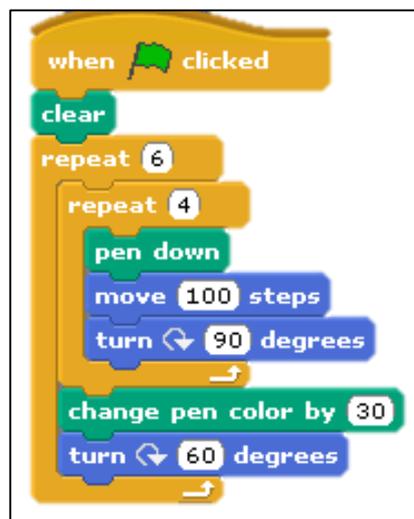


Fig 3.3. 4 The Block for Example 02

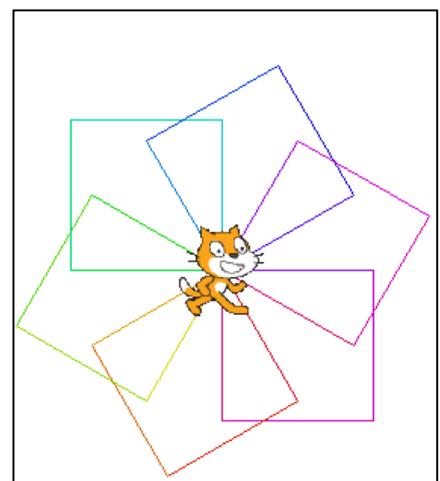


Fig 3.3. 5 Result for Example 02

**Example : 3** Draw design - first draw a square then turn 60 degree it is repeat 6 times with different color line Square on one point. (Every Line is every color because “**Change pen color by (10)**” is in innr loop)

```

when clicked
clear
repeat 6
  repeat 4
    pen down
    change pen color by 10
    move 100 steps
    turn 90 degrees
  turn 60 degrees
  
```

Fig 3.3. 6 The Block for Example 03

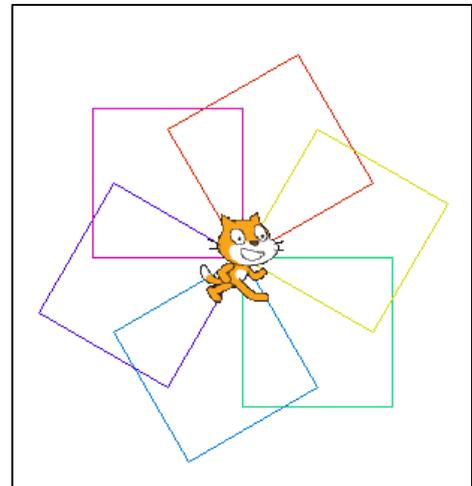


Fig 3.3. 7 Result for Example03

**Example :4** Draw a flower with the help of above scratch (Example 3)

```

when clicked
clear
repeat 6
  repeat 4
    pen down
    set pen color to red
    move 50 steps
    turn 60 degrees
  turn 60 degrees
  
```

Fig 3.3. 8 The Block for Example 04

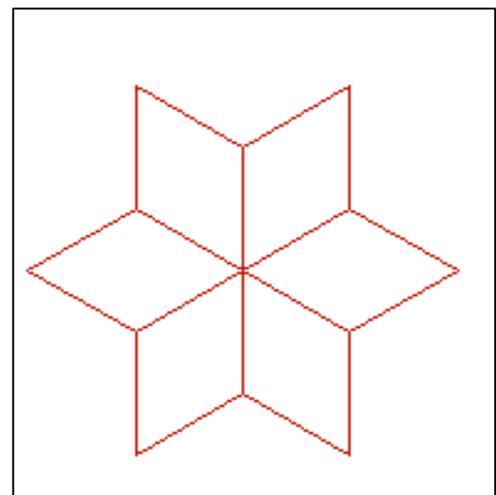


Fig 3.3. 9 Result for example 04

**Example :5** Draw a flower with the help of above scratch (Example 4)

There are three Iteration are nested.

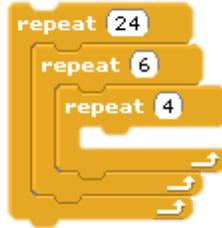


Fig 3.3. 10 There are three Iteration are nested

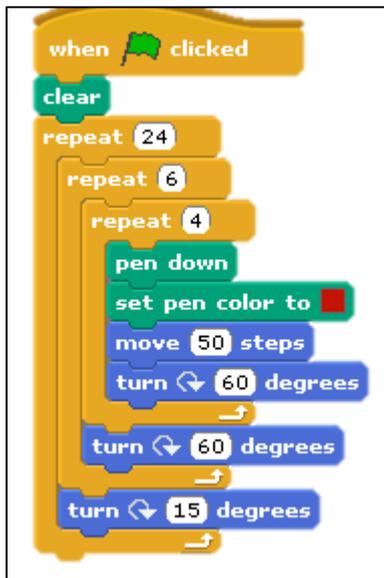


Fig 3.3. 11 The Block for Example 05

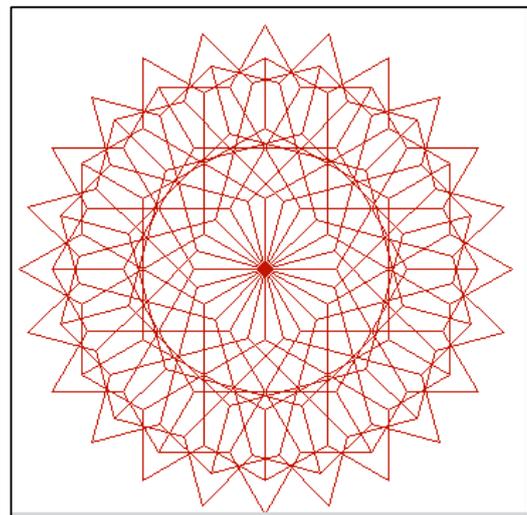


Fig 3.3. 12 Result for Example 05

**Competency 3:** Uses flow charts to solve simple problem with Sequence, Selection, Iteration and develop programs (using Scratch)

**Competency Level 3.4:** Develops programs with array variables

**Time:** 02 periods

**Learning Outcomes:**

- Describes the use of array variables
- Uses array variables in programs to solve simple problems

**Contents:**

- Declaration of array variable
- Applying of array variables to solve problems

**Concepts and terms to be highlighted:**

- Variable
- Array variable
- Scratch Array variable in Scratch

**Guidance for lesson plans:**

- Discuss the Array concept and its uses
- Discuss the Array used in Scratch.
- Introduce Array concept in Scratch (List)
- Group the students and guide them to do example in scratch.
- Ask the groups to develop a scratch with array.

**Guidance for assessments and evaluations:**

- Analyze a given problems with array (multiple Selections, Iterations, nested Iterations)
- Do the scratch for above problems.

**Quality inputs:**

- Computer, Scratch Software
- <https://www.youtube.com/watch?v=qeSGRPd616c>

## Reading Material

### Array

An array is collection of value of same data type. It can store huge amount of different value in a single variable. Array stores all the values on the specified index position. Using the index position the value can be retrieved or stored. It is similar to a list, however, most high-level languages provide first-class data which allows the concept of "an array of arrays" to be feasible

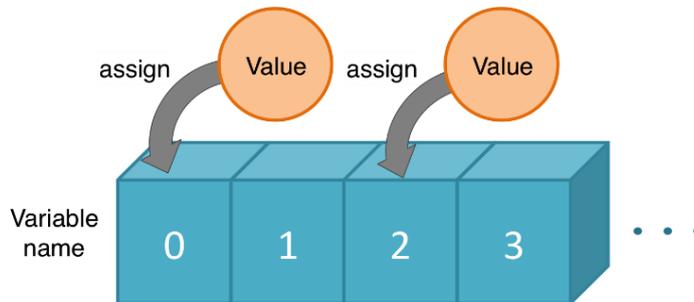


Fig 3.4. 1 Structure of Array Variable

### List

Lists are similar to one-dimensional arrays. However, they are always mutable. Since they are always one-dimensional, they have many special constructs such as the pair construct and the stack construct, unlike arrays who are always constructed with a simple integer-value construct.

There are ways, however, to simulate them using lists.

The list is used just like a two-dimensional array, where each item in the list is a row of the array, and the letter of the item represents the column number in the array. It is important to note that in this method, only single character values can be stored.

### Create List in Scratch

There are two button display in block **Blocks Palette** when click variable block The following image will be show.



Fig 3.4. 2 When click variable block

When click **Make a List** in the **Blocks Palette** the following dialog box display.

Type the List name in the dialog box and select one of the radio button and click OK.

For all sprites : Create a new List that all sprites can see

For this sprite only : Creates a new List that only this sprite can see.

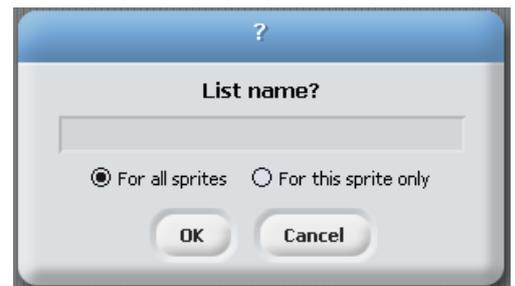


Fig 3.4. 3 When click **Make a List** in the **Blocks Palette**

Once create a variable the following blocks appears in **Blocks Palette**.



Fig 3.4. 4 eight blocks appear when you make a list

If you want delete the list Click on **Delete List (List is the name of the List)**. When a list is deleted any of its blocks used in script will remain, but script will not function properly.

### Add Data in to the List

- Create a list → the empty List is shown → Click  Button to add data one by one



Fig 3.4. 5 when click on "create a list"



Fig 3.4. 6 After adding data

- Prepare the following scratch to display the data from List



Prepare the following scratch to display the data from List one by one

```

when clicked
repeat 10
say item 1 of Weekdays for 2 secs
    
```



Here only Sunday item from the list is shown for 2 second 7 times.

- Prepare the following scratch to display the data from List one by one

```

when clicked
set Count to 1
repeat 7
say item Count of Weekdays for 2 secs
change Count by 1
    
```

**Example 1:** Display multiples of two in a List

```

when clicked
delete all of Table
repeat 12
add 2 * a to Table
set a to a + 1
    
```

Table	
1	4
2	6
3	8
4	10
5	12
6	14
7	16
8	18
9	20
10	22
11	24
12	26

length: 12

```

when clicked
delete all of Table
set a to 1
repeat 12
add join join 2 x join a = 2 * a to Table
set a to a + 1
    
```

Table	
1	2 x 1=2
2	2 x 2=4
3	2 x 3=6
4	2 x 4=8
5	2 x 5=10
6	2 x 6=12
7	2 x 7=14
8	2 x 8=16
9	2 x 9=18
10	2 x 10=20
11	2 x 11=22
12	2 x 12=24

length: 12

Fig 3.4. 7 Blocks for Example 01

Fig 3.4. 8 Result for Example 01

“delete all of Table” deletes the items that is already in the list “Table”.

“ set a to 1” allocates 1 at each time that the scratch will start.

**Example 2:** Display multiple Table in the list to the given number.

```

when green flag clicked
  delete all of Table
  set a to 1
  ask Which table Do you want? and wait
  repeat 12
    add join join join answer x join a = answer * a to Table
    set a to a + 1
  
```

Fig 3.4. 9 Bliock for Example 02

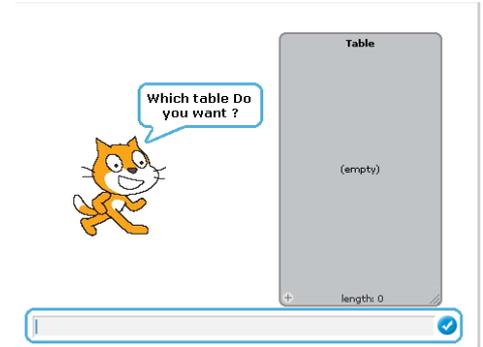


Fig 3.4. 11 Result for Example 02

**Example 3:**

Prepare a list of marks for a term test. Develop a Scratch program to display the chart to represent the marks.

Marks	
1	52
2	45
3	85
4	12
5	85
6	100
7	75
8	90
9	60

length: 9

Fig 3.4. 12 List of Marks

```

when green flag clicked
  clear
  pen up
  set x to -200
  set y to -100
  set a to 1
  repeat length of Marks
    pen down
    set pen size to 5
    change pen color by 10
    move 2 * item a of Marks steps
    change a by 1
    wait 2 secs
    set x to -200
    change y by 20
  
```

Fig 3.4. 10 Block for Example 03

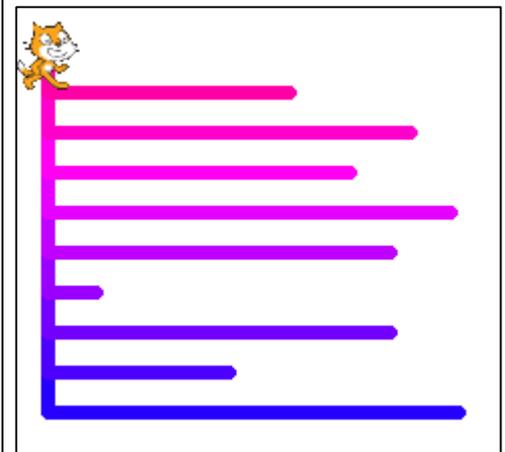


Fig 3.4 14 The Chart for Example 03

**Competency 3:** Uses flow charts to solve simple problem with Sequence, Selection, Iteration and develop programs (using Scratch)

**Competency Level 3.5:** Evaluates the solution to ensure that it properly satisfies the problem

**Time:** 01 period

**Learning Outcomes:**

- Evaluates whether the solution to ensure the problem is created accurately and efficiently

**Contents:**

- Proper decomposition of the problem
- Ensuring all aspects are covered in decomposition
- Designing and writing a program with correct decomposition

**Concepts and terms to be highlighted:**

- Sequence, selection and iteration control structures
- Tools of the Scratch program

**Guidance for lesson plans:**

- Introduce a problem
- Analysis the problem
- Discuss the problem and the solution
- Use scratch program to solve the problem.

**Guidance for assessments and evaluations:**

- Analyze a given problems
- Develop a scratch program to solve them

**Quality inputs:**

- Computer with scratch Software
- <https://www.youtube.com/watch?v=qeSGRPd616c>

## Reading Material

In our day to day activity we face lot of problem. Some problem can be solve by easily but some problems are difficult. We use some tools to solve the problems. The scratch program is also used to solve problems.

To get mouse practice.

Some find it difficult to use the mouse freely as they don't have prior mouse handling opportunities. A program to develop with scratch overcome this problem.

To get an idea for a real life solution

Get an idea for a problem. The scratch program give a visual solution for the problem.

Eg: Run a car in the specific path.

Find the calculation.

We can find some basic calculation.

Eg: Celsius to Fahrenheit

Can be easily taught curriculum.

Develop activities and demonstration with the help of Scratch program.

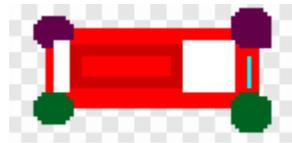
Develop brain storming games

Eg: Develop brain storming game to develop skill.

### Example: 1

Visual animation of a car that moves in a specific path.

- Click "paint new sprite" in sprit list



- Draw a car shape (Both upper wheels are violet color and bottom wheels are Green color)
- Click Stage in Sprit list → click Background→ Edit (Paint Editor window appear).
- Click brush→Select Ass color→ click Brush size and change the size→ draw a path.
- Click car Sprit in Sprit list → arrange the following structure

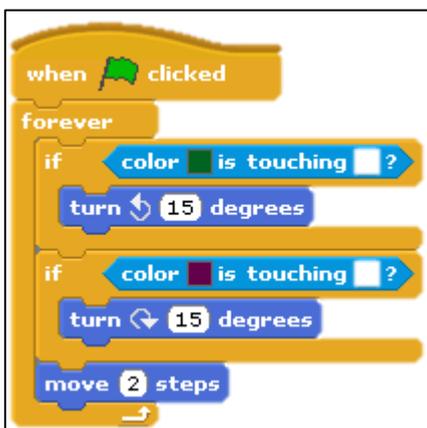


Fig 3.5. 2 The Block for Example 01

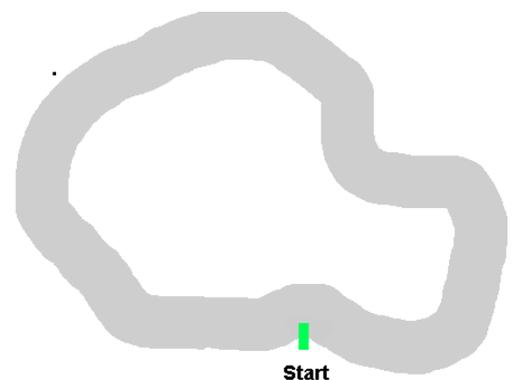


Fig 3.5. 1 Result for Example 01

## Example : 2

Modify the above program to Visual animation of a car that moves in a specific path (like circle). The number of time that the user enters.

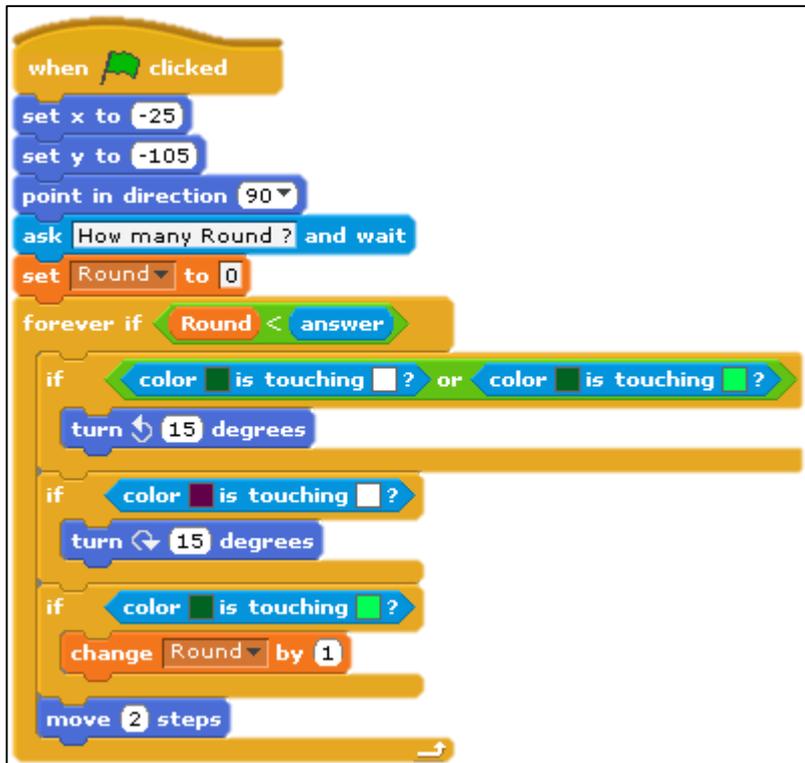


Fig 3.5. 3 The Block for Example 02



Fig 3.5. 4 Result for Example 02

**Competency: 4** Improves skills in Physical Computing

**Competency Level:** 4.1. Programs simple digital systems (Micro controller based kit)

**Time:** 5 periods

**Learning Outcomes:**

- Develops programs for detecting the inputs from sensors
- Develops programs for controlling actuators simple sense detector

**Content**

- Development of programs for detecting the inputs from sensors
- Development of programs for controlling actuators

**Concepts and terms need to be highlighted:**

- Sensors
- Actuators
- Different types sensors available in the Micro Bit circuit.
- Different types of actuators

**Guidance for lesson plans:**

- Find out and explain the functionalities existing sensors on Micro Bit circuit
- Find out and explain the functionalities of possible external sensors for Micro Bit circuit
- Read values from sensors and display with LED grid.
- Activate the actuators according the values read from sensors

**Guidance for assessments and evaluations:**

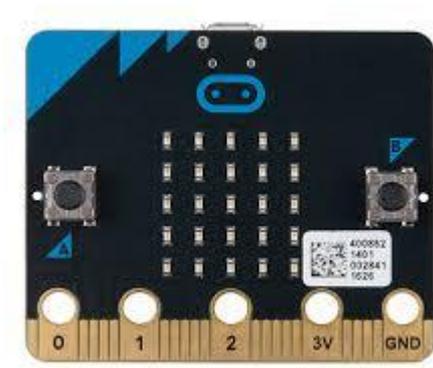
- Show sensor values in the LED grid
- Activate actuators using sensor values

**Quality inputs:**

- Computer, Micro Bit circuit and USB connecting cable, downloaded software from the Internet
- <https://www.youtube.com/watch?v=-fZm1JCvxIE>
- <https://makecode.microbit.org/>

## Reading Material

- Micro Bit circuit



### Coding with Micro Bit microcontroller circuit

Open the editor using the following web site to create coding for Micro Bit circuit.

<https://makecode.microbit.org/>

When the editor is open in the above address, make a desktop link dragging the address bar icon to the desktop to create a desktop icon.

The next time you may not need to have Internet connection for the Micro Bit editor. Simply, you can open the editor by clicking on the desktop icon.

You may have following screen with the editor.

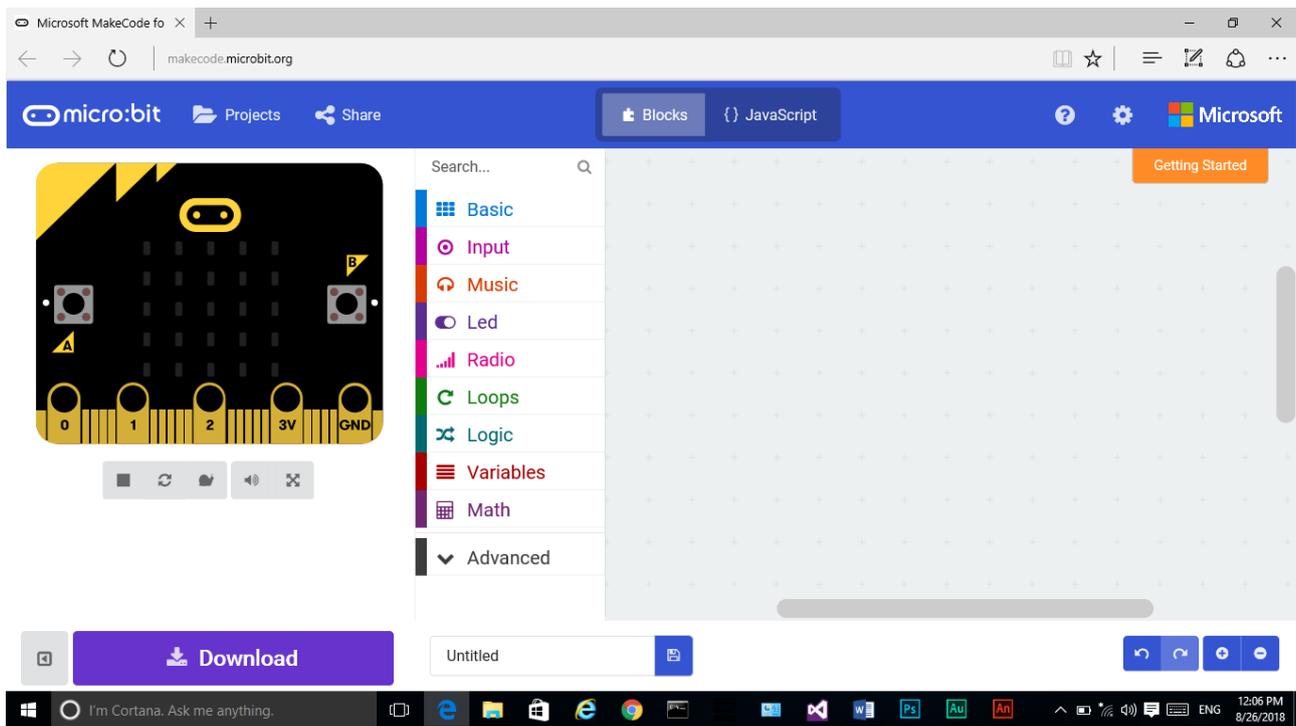


Fig 4.1. 1 screen with the Micro Bit editor.

There are two modes in editor Blocks and JavaScript(). Do not select JavaScript(). It is difficult for beginners. See the Teachers Guide of ICT Grade 8 for more initial information and basic practices with Micro Bit circuit.

#### Example 01: G9Pro01

Create the following program with the given instruction below.

1. Select the “on button A pressed” from Input category and drag the block to screen.
2. Select “Make a variable” in the Variables category.
3. Type the name of the variable : here variable name is “Tem”
4. A new block named “Tem” is created.
5. Select “Set item to 0” block and drag it to screen and select Tem instead of “item” in the block.
6. Drag Temperature ( $^{\circ}\text{C}$ ) in the Input category to the location of 0 above.
7. Drag “show number 0” in the basic category and set Tem variable instead of 0.

In this program, the block is run when the Button A is clicked. Then the Centigrade Temperature value is read from the built-in sensor of the Micro Bit circuit. That value is taken to variable Tem. The value stored in variable Tem is displayed in the next block of show number block.

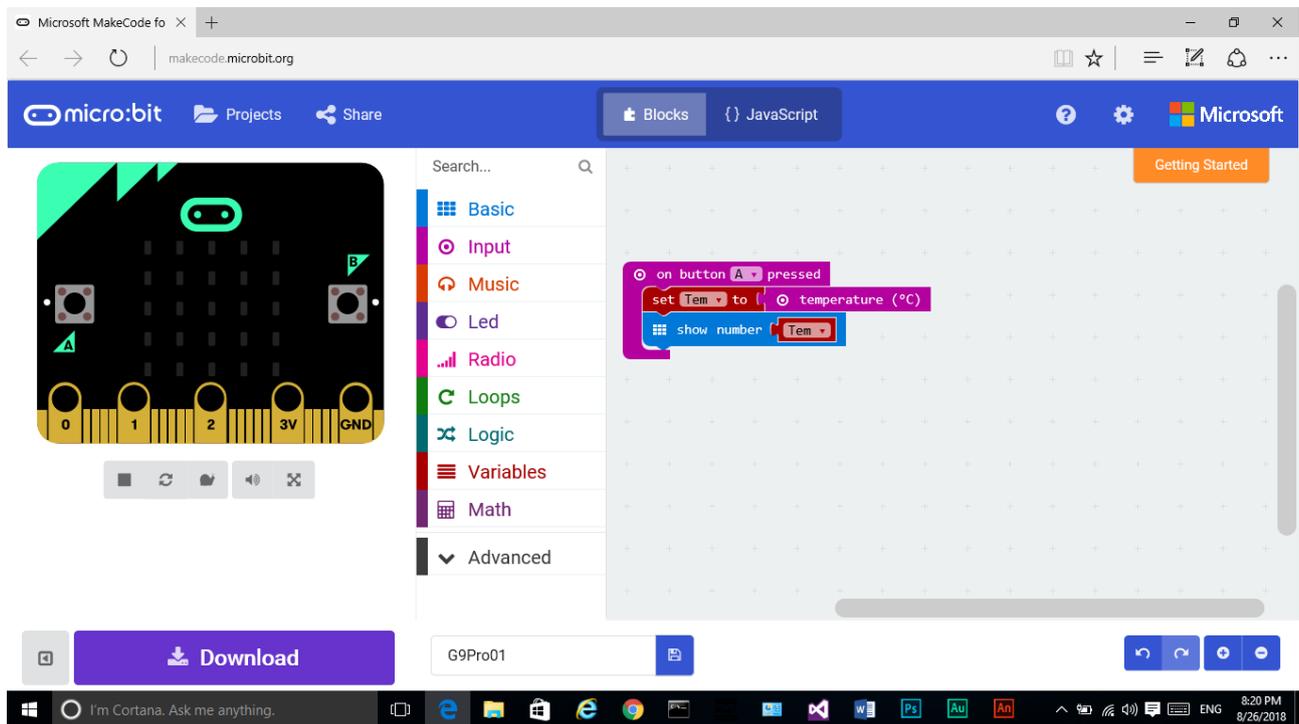


Fig 4.1. 2 The Block for Example 01

Download the program and copy and upload the relevant hex file to the circuit. Then press the Button A to see the current temperature around the circuit by the LED grid.

If you touch the circuit, temperature is increasing. Then you will guess the location of the sensor. If you keep it alone the temperature may come to the previous value.

### Example 02: G9Pro02

In this program, another similar block is used to read light level. New variable LLev stores the value of light level. The Button B has arranged for this block. I button B is pressed the light level is given.

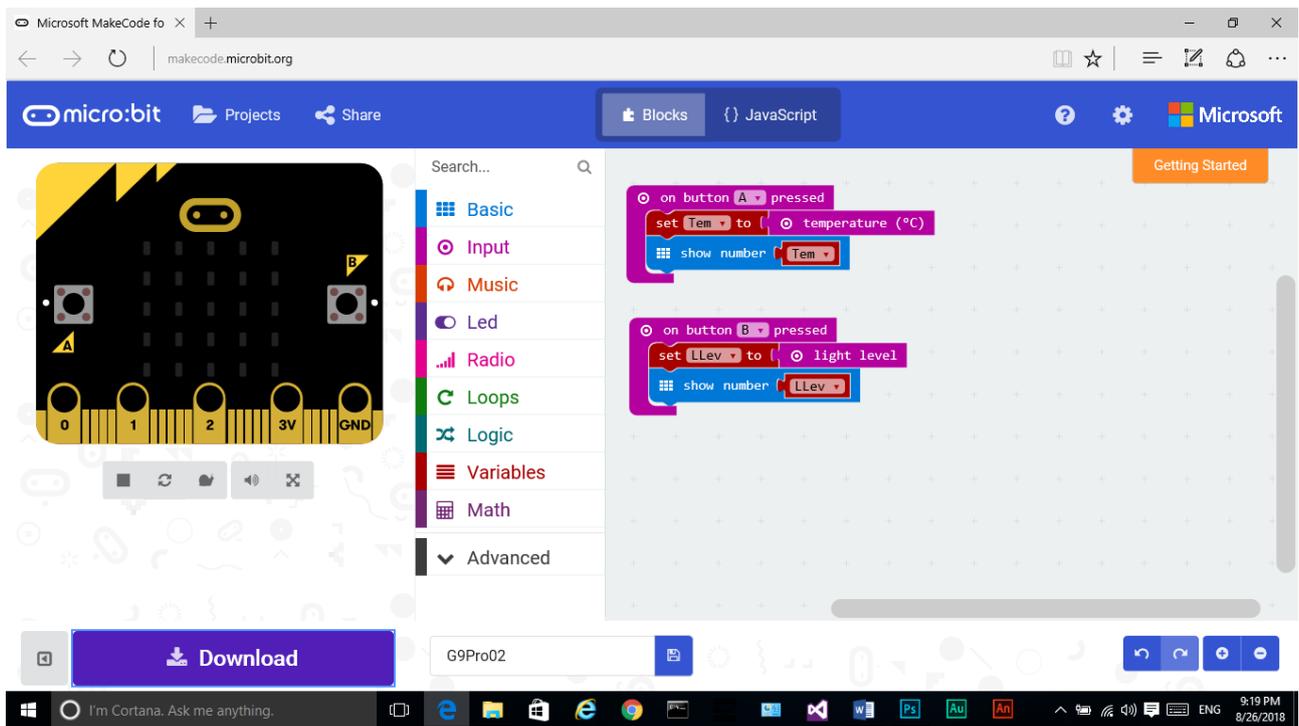


Fig 4.1. 3 The Block for Example 02

### Example 03 : G9Pro03

In this program for loops has applied to light LEDs. The LEDs are identified and light with the block of plot. The x and y positions in the block of plot identify the column and row positions of the circuit respectively.

The block of Plot X,Y increase the light level of LED. The block of Unplot X,Y decrease the light level of the relevant LED.

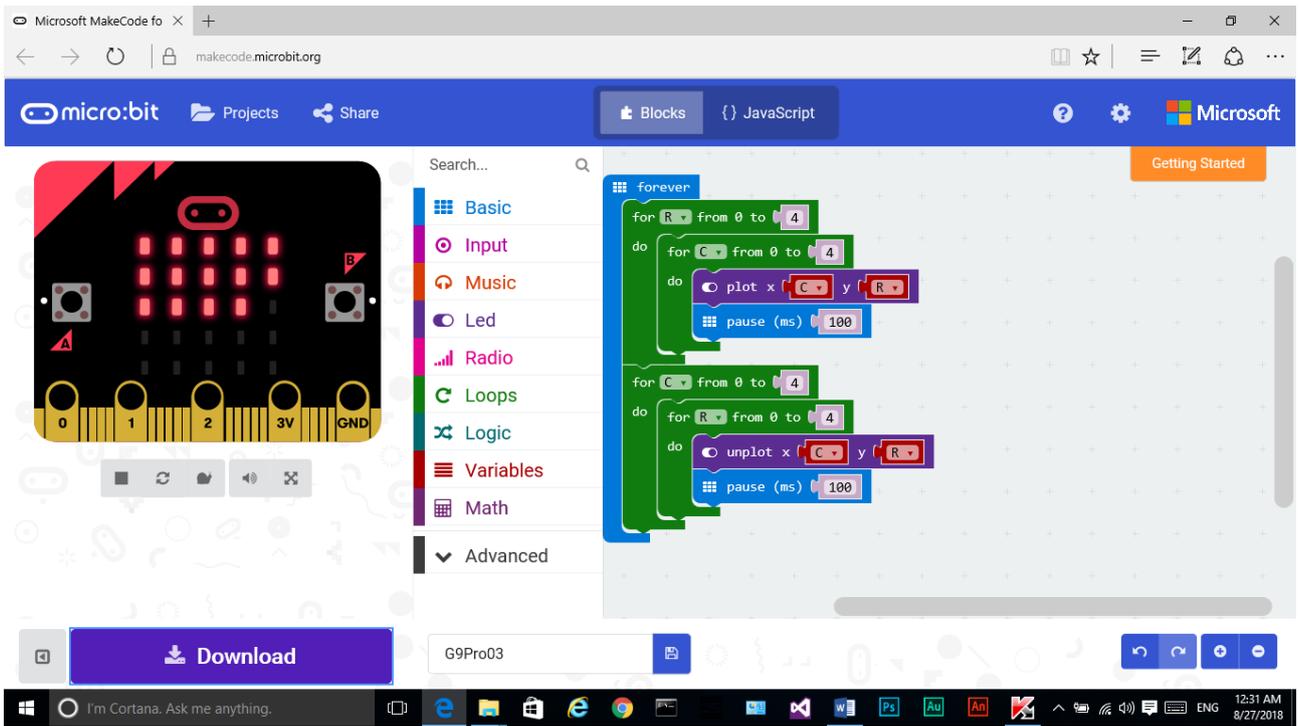


Fig 4.1. 4 The Blocks for Example 03

The Micro Bit circuit has 25 external Pin Connections as follows.

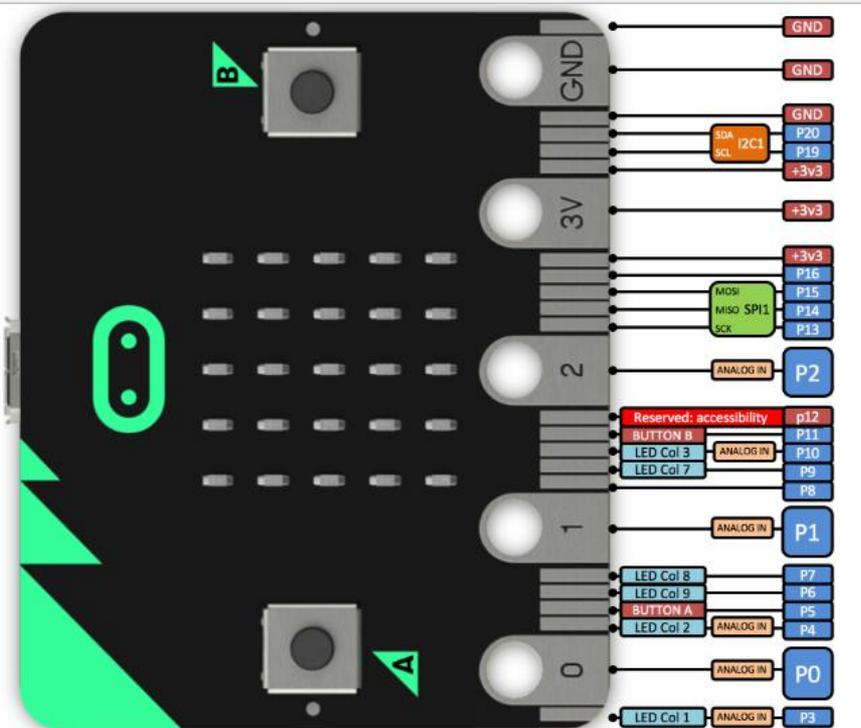


Fig 4.1. 5 The Micro Bit Circuit

There are 3 ground (negative) pins and 3 pins with +3 volt voltage. Other pins may have 0 volt or +3 volt voltage occasionally.

#### Example 4: G9Pro04

This program has written to control the actuators. The Micro bit circuit read the temperature value. If the value is greater than to 29 °C then the Micro bit circuit provide +3 volt voltage to the pin 0 by the block of “digital write pin P0 to 1”. The pin number can change for another pin. The last value may be 0 or 1 such that 0 provides low voltage (0 volt) and 1 provides high voltage (+3 volt).

Then an actuator like 3v fan or sound bazar can connect to ground pin and pin P0 to activate. Then the temperature is high than 29 °C, the fan will start to reduce the temperature. When the temperature is reduced again than or equal 29 °C, the fan will stop. Then the fan become temperature sensitive decision making equipment.

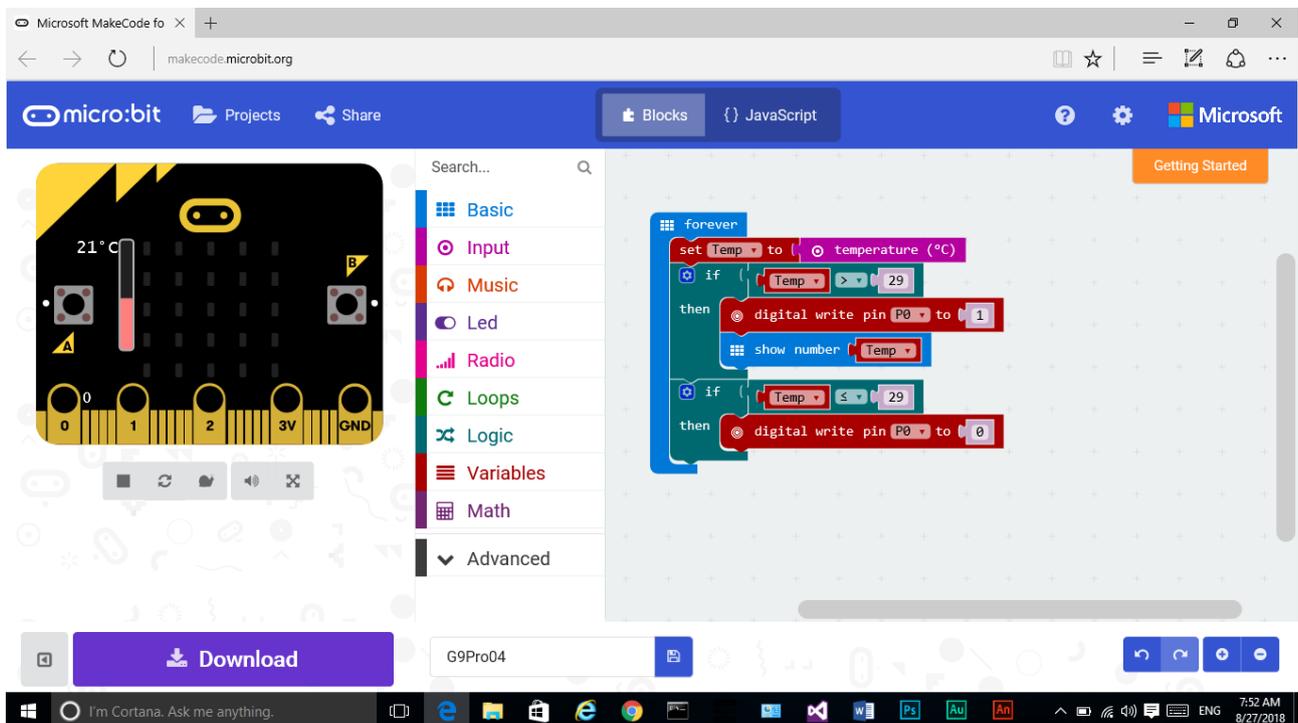


Fig 4.1. 6 The Block for Example 04

You can write more programs handling different pins to activate different actuators by reading values from different sensors. For example, use light sensor to light a lamp in the low light intensity automatically.

**Competency 5:** Investigates computer network for communication and resource sharing

**Competency Level 5.1:** Explores the main components of the network in the school computer Lab

**Time:** 01 period

**Learning Outcomes:**

- Describes main components of the computer network

**Contents:**

- Main components of computer network (Computers, Network Interface Card (NIC), Switches and etc.)

**Concepts and terms to be highlighted:**

- Define the computer network
- Main components of computer network

**Guidance for lesson plans:**

- Define the computer network
- Uses of computer network
- Main components of computer network (Computers, Network Interface Card (NIC), Switches, etc.)

**Guidance for assessments and evaluations:**

- Write down definition for the computer network
- Identify main components of computer network
- Write down Uses of computer network

**Quality inputs:**

- Internet facility, Computer , Hardware
- <https://www.google.lk/search?q=main+components+of+the+computer+network&oq=main+components+of+the+computer+network&aqs=chrome..69i57j0l5.3942j0j8&sourceid=chrome&ie=UTF-8>

## Reading Material

- **Definition for the computer network**

A computer network is a group of two or more computer systems connected together for the purpose of sharing resources.

- **Uses of computer network**

- Data and information can be shared between computers.
- The devices like printer, scanner and modem can be connected to network and shared by multiple users.
- Only the authorized clients can access the server computer. Data and information in a network can be made secure.
- Network users can communicate by email and instant messenger.

- **Main components of the computer network**

- Computers
- Network Interface Card (NIC)
- Switches/ Hubs
- Routers
- MODEM
- Firewall



Fig 5.1. 1 Computer network

- **Network Interface Card (NIC)**

A network interface card (NIC) is a circuit board or [card](#) that is installed in a computer so that it can be connected to a network. NIC has an RJ45 port and is built into the mother board in modern computers.



- **Switch/Hub**

Switches/Hubs connect various network devices together, like computers, printers. It allows communication between those devices. A guided/wired transmission media is used. One end is connected to port in the computer and the other end is connected to the port in the Switch / Hub.



- **Router**

*Router* joins two or more computer *networks* together via either wired or wireless connections. This finds out the most suitable path for data transmission in network communication.



- **MODEM**

The modem is used to connect the computers of a computer network or a personal computer at home to the internet. The modem acts as a data translator. Digital signals sent from the computer is translated to analog signals and the analog signals send to the computer from the internet is translated to digital signals. This is called MODulation and DEModulation. Hence, ‘MODEM’ is a combination of these two words.



- **Firewall**

A firewall is a network security device that control the data and instruction transmission between internet and computer network. Firewalls can be implemented as both hardware and software. Firewall is frequently used to prevent unauthorized Internet users from accessing private networks connected to the Internet.



**Competency 5:** Investigates computer network for communication and resource sharing

**Competency Level 5.2:** Utilizes computer network in resource sharing and communication

**Time:** 01 period

**Learning Outcomes:**

- Sends messages through computer network
- Shares the resources through a computer network

**Contents:**

- Sending messages through a computer network
- Sharing resources (Software, Folder, File, CD Drive, Printer etc.)

**Concepts and terms to be highlighted:**

- Sends messages through computer network
- Shares the resources through a computer network

**Guidance for lesson plans:**

- Divide the students in Groups.
- Provide a Computer to Each Group.
- Guide the students groups to following activity.
  - Check the computer to connected in network
  - Guide the students to check the net connection
  - Create a folder (Folder name is Group Name)
  - Guide the student to share the folder within each other.
  -
- Discuss with students advantage of computer network and its users

**Guidance for assessments and evaluations:**

- Guide the students group to develop a computer network
- Guide the students group to share resource and hardware between a computer networks.

**Quality inputs:**

- Computers in LAN, Proper software.
- Presentations
- <https://www.google.lk/search?q=main+components+of+the+computer+network&oq=main+components+of+the+computer+network&aqs=chrome..69i57j0l5.3942j0j8&sourceid=chrome&ie=UTF-8>

## Reading Material

- Sends messages through computer network

Today, more and more companies are abandoning free public messengers using an Internet connection, as they may cause leaks of confidential information. Besides, employees' time is often spent on personal chats. As practice shows, installing a corporate messenger is economically justified and its benefits outweigh the cost of licenses. We propose downloading and trying out a simple and convenient LAN messenger!

LAN Messenger can facilitate the intercommunication and file transfers anywhere in within the network, without the need to connect to the Internet or to a centralized server. The most common LAN Messenger software for Windows are Softros LAN Messenger, Outlook Messenger, Akeni Messenger, BigAnt Messenger, BORGChat, Net-C, Pichat, LanTalkPop Messenger, Bopup Messenger and many others.

Below are some of the various methods of sending text messages from one computer to another computer. All of the below methods of sending messages to other computers will require that the computer have network.

If you are at your workplace or at your office and want a free communication source in your office, so that you can stay in contact with all your employes and can have a conference within your office – or maybe have some instant small chats with your employes without any internet connection, then you should read-on to know about top 3 LAN (Local Area Network) messengers which will enable you to do so. (Eg: Tonic, LAN Messenger and Squiggle)

### LAN Messenger

Which is currently available for Windows, Mac, and Linux is a **free and open-source** instant messaging application. Through a local network, this application will foster instant communication, eliminating the need for having a server and internet connection. More than just for instant messaging, it also comes with extra features, such as transferring files, archiving of past messages, and being notified of upcoming events.

### Download LAN Messenger

To get started, you can visit this download's page to select the version of Softros LAN Messenger and then download it to your computer.

(<https://messenger.softros.com/downloads/>)

The program will automatically scan and recognize new PCs in the network.

## Main IDE

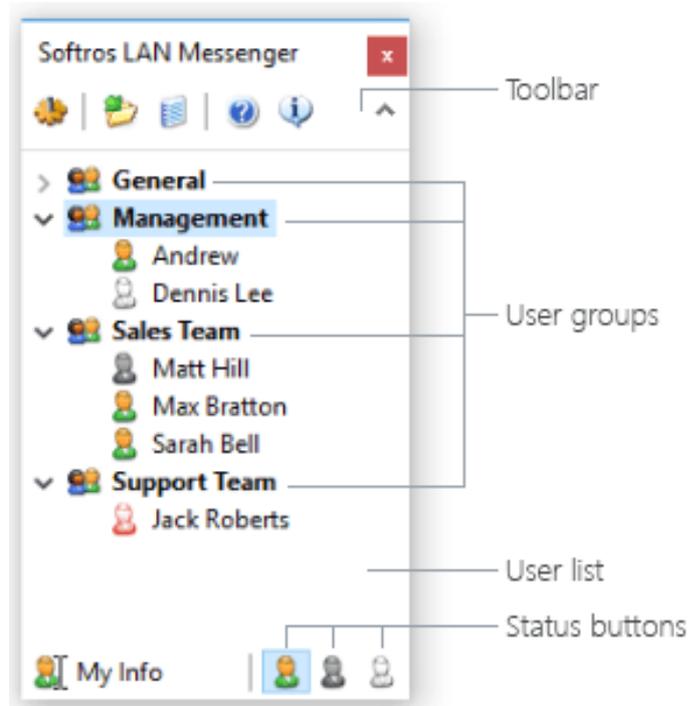


Fig 5.2. 1 Main IDE

## Toolbar

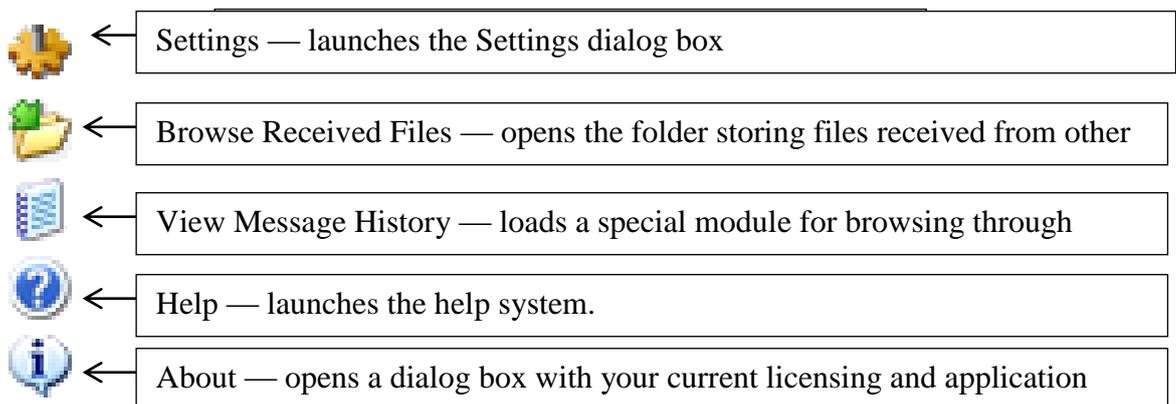


Fig 5.2. 2 Tool bar

## User List

By default, all users of Softros LAN Messenger, both online and offline, are shown in this area. You can exchange messages and files with other users, view their information plus send broadcast messages to certain or all users in the list.

Please note that file transfer functionality is not available for offline users. If you would not like any offline users to show up in the user list, right-click the blank space of the list and then click Hide Offline Users, or check the corresponding check box on the General tab in the Settings dialog box.

### User Groups

You can create user groups, move users between them and also manage the groups the way you need

### My Info Button

Clicking this button opens the User Information tab in the Settings dialog box where you can change your user name appearing in all users' lists. If specified in the domain settings, your full name is your default user name. Otherwise, the default user name is your account name in Windows.

### Status Buttons



**Available** – you are available to chat with other users.



**Busy** – you are working at the moment but still able to reply to urgent messages and reserve file



**Away** – you are away from your desk

### Minimizing Main Window

To minimize Softros LAN Messenger to the taskbar notification area, click the Close button found in the top right-hand corner of the main window. You will still be able to receive and respond to messages from other users as well as accept files from them.

### Restoring Main Window

By default, the Softros LAN Messenger button is located in the taskbar at all times. You can restore the main Softros LAN Messenger window or bring it to the foreground by clicking that button.

### To Chat with other computer

To chat with any computer, just click on it from the list and start chatting, or sending files. To send a file, you can drag and drop it to the chat window.

Or click on “Send File(s)” in the left corner. You can even send a folder to other PC without any problems.

The good point of Softros LAN Messenger is that you can send offline messages to a recipient. Those messages will be delivered when the recipient is online. The application doesn't require a

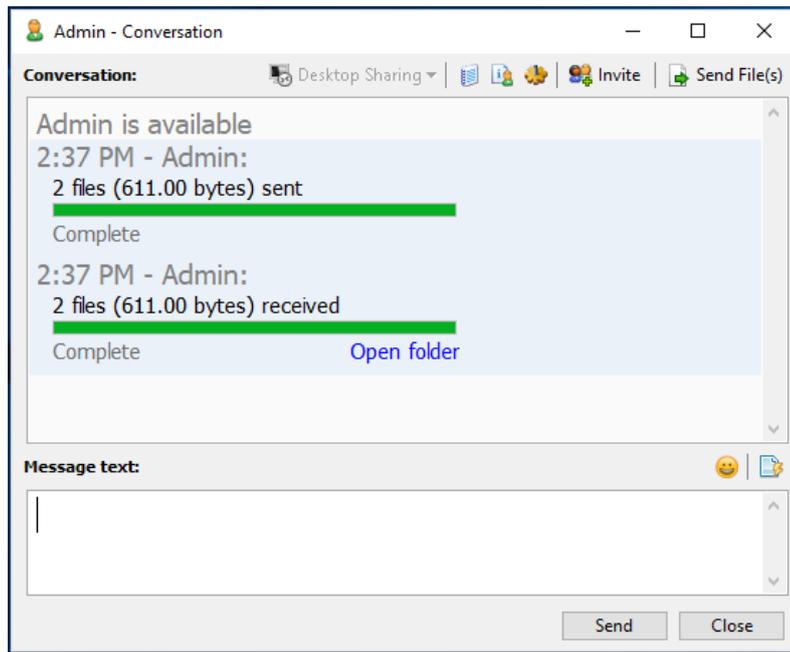


Fig 5.2. 3 Chat window

server to store those offline messages because it's based on the serverless architecture. You don't need to have a server to use it. Softros LAN Messenger is a standalone P2P (peer to peer) based application.

### Multiple LAN Network

Having multiple LAN networks with different subnets? You can also combine all together to be a single messaging environment. For further information regarding set up and use Softros LAN Messenger, watch this video from YouTube.com.

Softros LAN Messenger comes with many useful features that most users are looking for when finding a LAN messenger program, such as individual & group chats, file transfer, encryption, or offline messages. It can be use for 30 days for free.

### Shares the resources though a computer network.

We can share the hardware and software between computers in network.

### Sharing a Folder

Sharing folders is essential for share the data quickly and easily within the computer network.

Right click on folder (NIE) → Properties

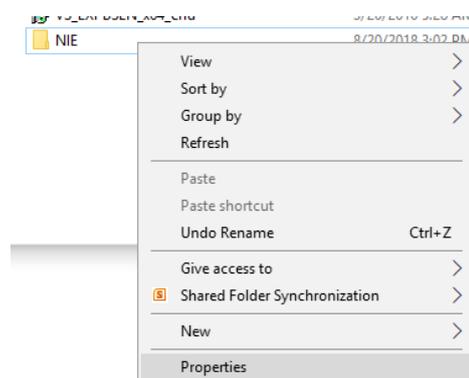
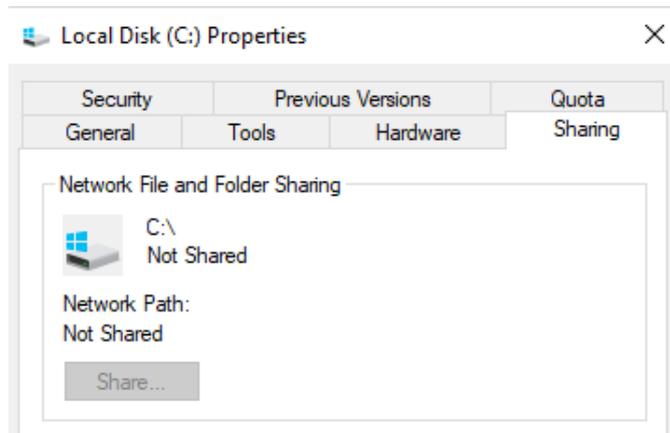
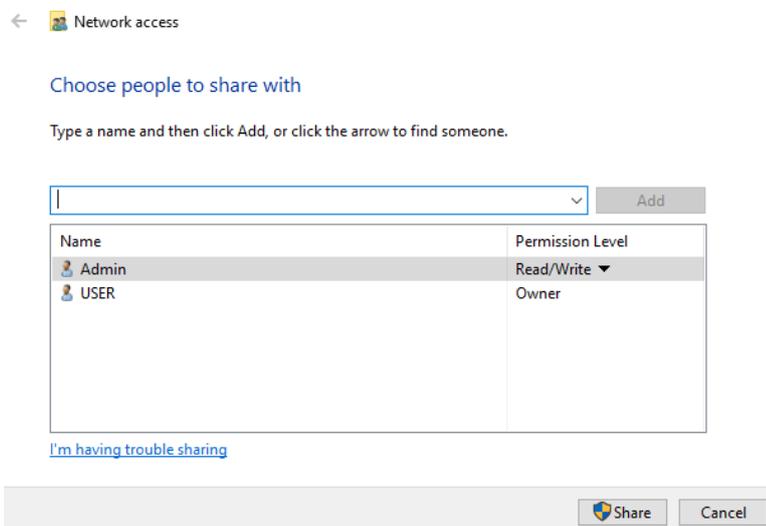


Fig 5.2. 4 when Right click on folder (NIE)

Sharing → Share



Choose people to share with Type or select the name and click Add)→ Click Share Button → Done



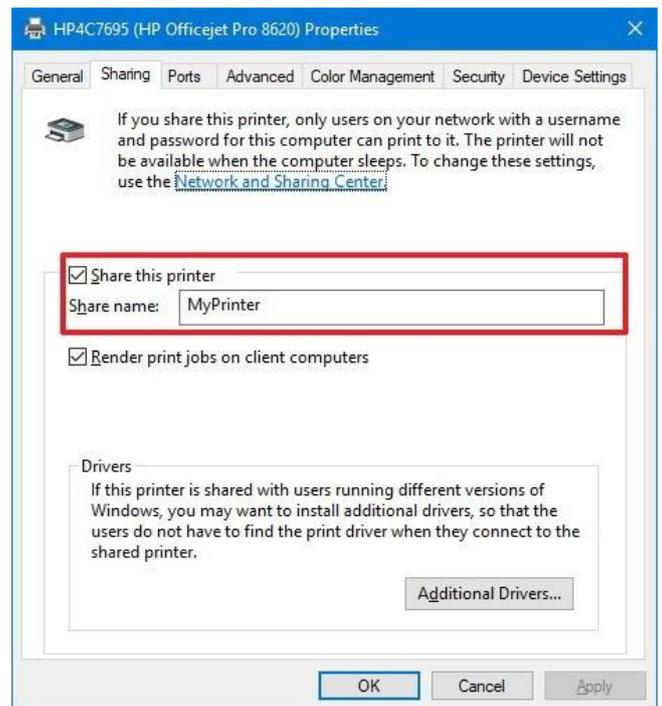
## Sharing Printers.

In order to share a printer with other users on the local network, do the following:

1. Open **Settings**.
2. Click on **Devices**.
3. Click on **Printers & scanners**.

4. Under "Printers & scanners," select the printer you want to share.
5. Click the **Manage** button.
6. Click the **Printer properties** link.
7. Click on the Sharing tab.
8. Check the Share this printer option.
9. In the "Share name" field, type a new descriptive name. (If this is the only printer on the network, you can just use the default name.)
10. Click **Apply**.
11. Click **OK**.

Once you've completed the steps, the last thing left to do is to connect all the devices on the local network to the new shared printer.



**Competency 6** : Explores the impact of ICT on society and career opportunities

**Competency Level 6.1:** Describes impact of ICT on society

**Time** : 01 period

**Learning Outcomes :**

- Describes the benefits in use of ICT in society
- Describes the negative aspects arise in using ICT

**Contents:**

Applications of ICT

- Office automation
- e-Learning
- e-Commerce, m-Commerce
- e-Health
- e-Government
- Digital Divide
- Safe disposal of electronic waste

**Concepts and terms to be highlighted:**

- Introduce the definition of ICT
- Application of ICT in the society e-government, agriculture, education, health, industry, entertainment
- Discuss the proposals to minimize the digital divide
- Explain changes in employment caused by advances in ICT
- Explore the use of ICT and participate in a classroom discussion.
- Explain problems caused by ICT in society
- Search achievements for Safe removal of electronic waste

**Guidance for lesson plans:**

- Divide the students in Groups.
- Provide a Computer to Each Group.
- Guide the students groups to following activity.
  - Ask the students to collect information about use of ICT in society
- Guide the students to collect information about
  - Office automation
  - e-Learning
  - e-Commerce, m-Commerce
  - e-Health
  - e-Government
  - Digital Divide
- Ask the students to find out the safe disposal method of electronic waste

**Guidance for assessments and evaluations:**

- Preparation of a booklet on the use of ICT in given fields
- included in the DVD

**Quality inputs:**

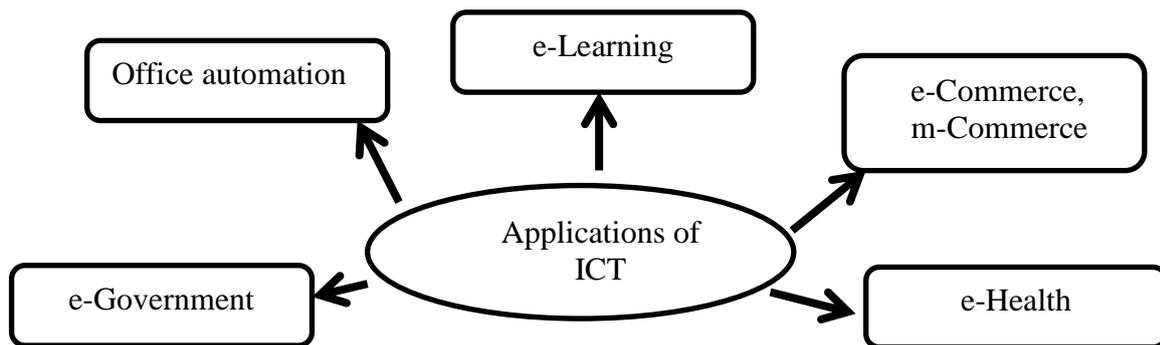
- Internet facility, Computer , Software, smart phones

## Reading Material

- **Definition of ICT**

"ICT" is the **Information and Communication Technologies**. ICT refers to technologies that provide access to information through telecommunications. It is similar to Information Technology (IT), but focuses primarily on communication technologies. This includes the computers, Internet, mobile and wireless devices, satellite communications, e-mail and other communication mediums.

- **Benefits in use of ICT in society**



- **e- Government**

When a government communicates with its citizens, companies, Government and Non-Government Organizations and with other Governments (of different countries) using ICT, it is called e-Government. There are numerous web sites for e-Government activities. The difficulties in communicating with the Government and obtaining Government information have been overcome by these.

- ✓ E-Government Services (<http://www.gov.lk/>)
- ✓ 1919 (Government Information Center)
- ✓ ICTA (Information Communication Technology Agency)( [www.icta.lk](http://www.icta.lk))
- ✓ Issuing of identity cards, driving licence and passports - Issuing birth, marriage, and death certificates.

- **Office automation**

Office automation refers to the varied computer machinery and software used to digitally create, collect, store, manipulate, and relay office information needed for accomplishing basic tasks. Raw data storage, electronic transfer, and the management of electronic business information comprise the basic activities of an office automation system. Office automation include higher production rates and increased productivity, more efficient use of materials, better product quality, improved safety, shorter workweeks for labor, and reduced factory lead times.

Ex:- payroll Systems,

## ○ e-Learning

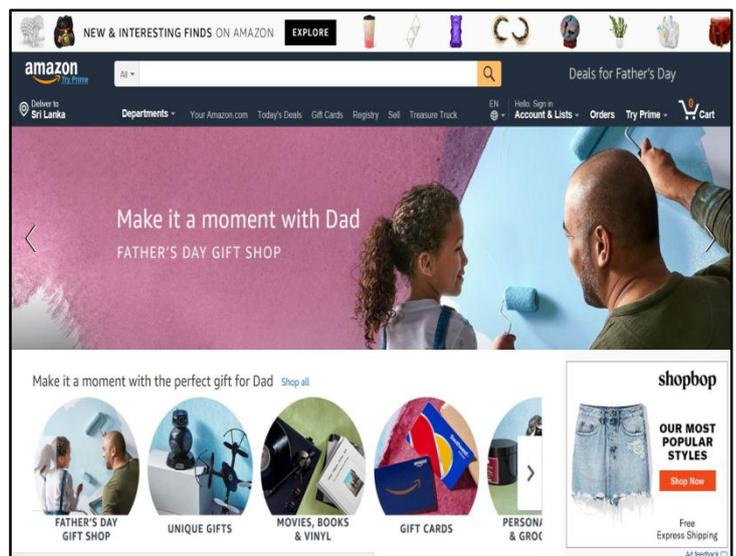
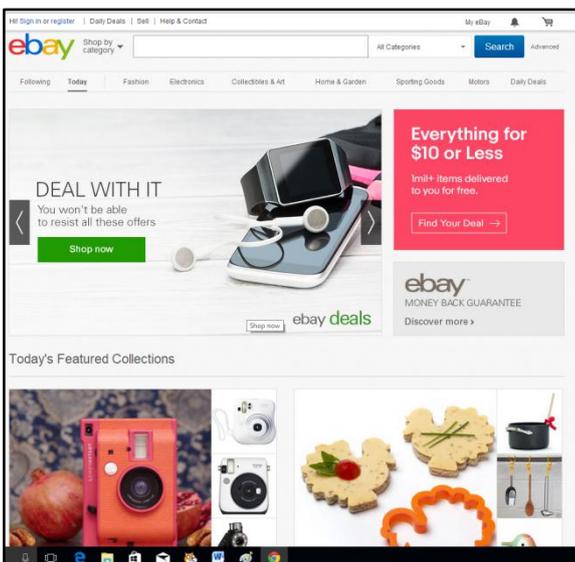
e-Learning is learning utilizing electronic technologies to access educational curriculum outside of a traditional classroom. Students can learn independently in any time and place. E-Learning is self-paced and the learning sessions are available all time. Teachers can use pictures, animations and audio-visuals to explain subjects that are difficult to explain and they can make the lessons interesting using presentations. In many countries it has become a common practice to use a Learning Manage the System (LMS) to manage school system or higher education system. Today a person from any country can connect with a university or any other learning center of his choice with low cost using Online Distance Learning. Students can use the following educational websites to do self-study and improve their knowledge.

- [www.nie.lk](http://www.nie.lk)
- [www.edupub.gov.lk](http://www.edupub.gov.lk)
- [www.e-thaksalawa.moe.gov.lk](http://www.e-thaksalawa.moe.gov.lk)
- [www.nenasala.lk](http://www.nenasala.lk)
- [www.vidumanpetha.com](http://www.vidumanpetha.com)

## ○ e-Commerce

Electronic commerce or e-commerce is the buying and selling of goods and services, or the transmitting of funds or data, over the internet. It provides 24x7 support and customers can enquire about a product or service and place orders anytime, anywhere from any location. Customers need not travel to shop a product, thus less traffic on road and low air pollution. Customers can access the global market.

Ex:- 1. [www.ebay.com/](http://www.ebay.com/)  
2. [www.amazon.com/](http://www.amazon.com/)

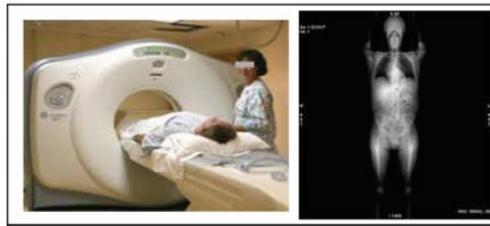


- **e-Health**

e- Health refers to the use of information and communications technologies in healthcare. Many of the difficult processes in the medical field have become efficient with through the use of modern equipment. There are plenty of areas where ICT is used in the health sector to diagnosis, treatment of diseases, Simulations in medical education and telemedicine.

There are numerous high tech machines which help us in the diagnosis and treatment of diseases.

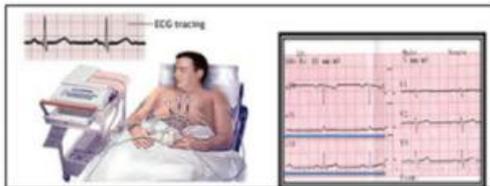
01) CAT - Computerized Axial Tomography Machine



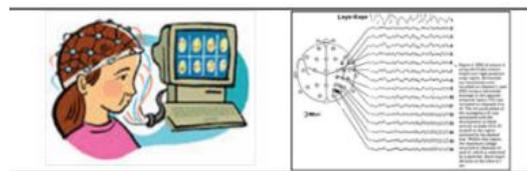
02) MRI (Magnetic Resonance Imaging Machine)



03) ECG - Electrocardiogram Machine



04) -EEG (Electro-encephalography)



**Telemedicine**

- Emergency Telemedicine
- Home health medicine
- Telemedicine Consultation
- Telesurgery (Remote Surgery)
- Medical Teletraining

- **Negative aspects arise in using ICT**

The Effects of ICT lens looks at how our lives have been changed, for better and for worse, by the impact of ICT. It includes negative effects to individuals, organizations and society and environment.

- Digital Divide
- Safe disposal of electronic waste

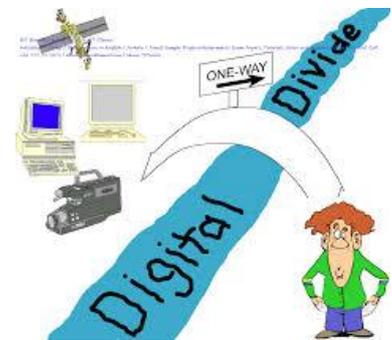
- **Digital Divide**

Digital divide is a term that refers to the gap between regions that have access to modern information and communications technology, and those that don't or have restricted access. This technology can include the telephone, television, personal computers and the Internet.

**Reasons for Digital Divide**

The gap in a digital divide may exist for a number of reasons.

- Income level (Rich and poor)
- Geographic location (Rural area and urban )
- Educational attainment (Educated and not educated)
- Gender
- Skills
- Age
- Awareness of Technology
- cultural and psychological attitudes



- **Safe disposal of electronic waste**

Electronic waste from equipment of all sizes includes dangerous chemicals like lead, cadmium, beryllium, mercury and brominated flame retardants. When we dispose of gadgets and devices improperly, these hazardous materials have a high risk of polluting the air, contaminating soil, and leaching into water sources. Health risks range from kidney disease, cancer and brain damage to genetic mutations.

**Recycle E-Waste Safely**

The three R's – reduce, reuse and recycle – all help to cut down on the amount of e-waste we throw away.

- Reduce – Repair broken items rather than buy new ones.
- Reuse – Donate or sell unwanted electronic devices.
- Recycle –Equipment that cannot be repaired are referred to an institution recyclable.



**Competency 6:** Explores the impact of ICT on society and career opportunities

**Competency Level 6.2:** Explains career opportunities in computing

**Time:** 02 periods

**Learning Outcomes:**

- Explains the career opportunities in the present society
- Explains the job role of different careers in computing

**Contents:**

Career Opportunities

- Software Quality Assurance Engineer
- Software Engineer
- Database Administrator
- Software Architect
- Programmer
- System Analyst
- Web Application Developer
- Graphic Designer
- Network Administrator

**Concepts and terms to be highlighted:**

- Introduce each job role of careers in computing
- Identify opportunity for users in ICT include careers in computing
- Separate the service of careers in computing individually

**Guidance for lesson plans:**

- Divide the students in Groups.
- Provide a Computer to Each Group.
- Guide the students groups to following activity.
  - To find out career opportunities in the present society
  - To find out job role of different careers in computing

**Guidance for assessments and evaluations:**

- List each responsibility of careers in computing
- Group work for describe every service of careers in computing individually
- Engage the students to create a suitable computer practical laboratory to show careers in computing

**Quality inputs:**

- Computers, internet facility

## Reading Material

- **Career opportunities in the present society**

There are so many career opportunities in ICT (Information and Communication Technology) sector.

- Software Quality Assurance Engineer
- Software Engineer
- Database Administrator
- Software Architect
- Programmer
- System Analyst
- Web Application Developer
- Graphic Designer
- Network Administrator

- **Job role of different careers in computing**

<b>Job Role</b>	<b>Basic Tasks to be performed</b>
Software Quality Assurance Engineer	Responsible for conducting tests before product launches to ensure software runs smoothly and meets client needs. Assure quality of the software.
Software Engineer	Typically software engineers, working in applications or systems development, analyze first the needs of the user. They then design, construct, test, and maintain computer applications software or systems to meet these needs. These engineers use different programming languages, depending on the purpose of the program.
Database Administrator	Develop and maintain databases. They analyze and design code for database access and modification. Responsible for the proper functioning of the database.
Software Architect	Design, develop, modify, document, test, implement, install and support software applications. They require knowledge of different software programming languages and apply the best methodology to suit a specific environment.
Programmer	Create, maintain and modify computer and software programs such as operating systems, communications software and utility programs.
System Analyst	Match business and system requirements, including developing data and system process flow diagrams, charts and specifications to suit different needs. They must specialize in one or more programming languages. Systems analysts plan and coordinate system feasibility studies.
Web Application Developer	They create web pages, web applications and web content. Responsibilities include the design, implementation, website content changes and upgrades. They also need proficiency in Web languages, like HTML, CSS and JavaScript.

Graphic Designer	Graphic designers create visual concepts, by hand or using computer software, to communicate ideas that inspire, inform consumers. They develop the overall layout and production design for advertisements, brochures, magazines, and corporate reports
Network Administrator	Design and maintain computer network. This includes resolution of network faults, security and the allocation of server resources ensuring optimum network performance. The role may also include the design and support of server systems and software, system back-ups.