

FOURTH EDITION

Teaching  
Guide



For Secondary Classes

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## Introduction to the series

*Right Byte (Fourth Edition)* is a three-book series aimed at introducing secondary level students to the logic behind computer operations. Students are now putting more effort into things that interest them and things they are convinced are relevant to them. Hence, the purpose of this book is to help students become competent in computer skills by explaining their practicality and usefulness. The new edition has been updated with respect to software and technology.

Education systems are based on examinations, and examination boards develop subject curricula accordingly. However, the foundation for all subjects is constructed well in advance. Computer studies is no different.

Written by experienced teachers, *Right Byte (Fourth Edition)* has been devised keeping in view the fact that the course should be a worthwhile experience in itself. The authors have sought to present the subject in a way which is accessible to all students. The series uses a simple and easy-to-learn approach throughout. Special attention has been paid to making the material comprehensive, interesting, concise, and practical.

Each chapter is self-contained and can be read independently. This provides the flexibility of studying chapters selectively. The chapters address a class-wise content and assessment methodology so that teachers can implement the curriculum effectively. The questions at the end of each chapter follow a logical progression in the amount of analysis and logical thinking required.

The authors sincerely hope that *Right Byte (Fourth Edition)* will shape the future of computer education at the secondary level.

## For the instructor

In today's teaching environment, we understand that offering a textbook alone is not sufficient to meet the needs of the many different teachers who will be using it. To teach effectively, teachers must have a complete array of supplementary resources to assist them at every stage of teaching, from lesson planning to assessment.

Throughout the three Students' Books, important terms have been presented in bold and defined within the text. Summaries appear at the end of each chapter. The objective of these summaries is to provide a recapitulation of key concepts and terms in an engaging and meaningful way.

The approach of this fourth edition is to present information in clear and carefully-controlled steps. Engaging questions and tasks have been designed to test students' skills and explore the information presented. In addition, each chapter contains a number of objective questions to test students' recall of information. There is a list of key terms in the glossary at the end of each Student's Book.

All the concepts presented in the Students' Books are illustrated with suitable examples as and when required. This will enable the students to use the books most effectively.

## Introduction to the Teaching Guides

Each Student's Book is accompanied by a Teaching Guide to help teachers use the textbook effectively. Our intention has been to produce a series that covers different aspects of IT. Every effort has been made to make it readable and accessible to those using this series. Simple and plain English has been used throughout.

The Teaching Guides have been developed keeping in mind that some teachers have had little or no prior experience of teaching computer studies. Efforts have been made to make sure that those teachers who have some experience of technology will benefit from the teaching ideas. The approach is practical and applied as well as theoretical. We believe that people learn by doing. A hands-on approach has been used to introduce each type of application. Sample lesson plans have been provided for each chapter that teachers can use to prepare their own lesson plans and activities appropriate for their class.

## Features of the Teaching Guides

- Teaching objectives and learning outcomes
- Background information on important topics to guide the teacher during lesson planning
- Sample lesson plans
- Sample answers to questions given in the Students' Books
- Additional information that the teacher can incorporate in class discussions
- Activity sheets and test sheets for reinforcement and assessment
- Answers to activity sheets and test sheets

Note that students' answers to analytical questions might differ from the answers given in the guides. The answers given in the guides are only suggestions.

## A practical approach

In order to function as an effective tool, the computer needs useful software that will make a student's work easier. We believe that the best way to learn is by doing. We encourage teachers to use the computer as a personal tool first and then to think about how to use it in the classroom. A tool is a means to an end, so it makes sense that the computer as a tool should be integrated throughout the school's curriculum. It is essential that the students get as much practical experience of using computers as they can because real understanding of computers can only come by using them as often as possible.

## Issues involved in using computers

1

### Location of the computers in the computer lab

One advantage of a computer lab is that it can accommodate the whole class at one time. An ideal lab should have enough computers so that there is one computer per child. But if that is not possible, then two students per computer is also a workable arrangement. Tables should also be provided in the computer lab so that students who are involved in off-computer activities have a place to work.

2

### Keyboarding

It is important for students to learn the appropriate techniques for using a keyboard to enter data. Make sure that students do not develop bad keyboard habits. Schools should start formal keyboard instruction during the initial classes. The overall goal is for students to be able to type as fast as they can write. Emphasis should be placed on the correct technique as well as on accuracy.

## Ideas on class management

- It is important to teach students some basic tasks such as how to insert a CD or a USB and how to protect them, how to plug in and unplug cables, how to navigate around a hard disk, how to use the printer properly, and so on.
- It is important to encourage students to make back-up copies of their important files.
- Pairing students at the computer is always very helpful. One student can enter information while the other can proofread what appears on the screen. Always remind them to change roles halfway through the task.

- When students work in pairs, make sure that each student does his or her own keyboarding. Sometimes the pair decides to let the faster typist do all the keyboarding and the other one does not get a chance to improve his or her keyboard skills. Please remember that one always learns to use software through hands-on experience, not by watching someone else.
- Always remind students to save their work periodically to minimize data loss caused by power failure. You could post a sign near the computer area saying, "Have you saved your work lately?"
- Students' keyboarding skills vary. Do not expect every student to need the same amount of time to complete a particular task. Help those who are slower.
- You can allow individual students to become class experts on particular software or on particular skills. These students can then help other students who need help, while you are busy with other students or tasks.
- When students ask for your help, never put your hands on their keyboard or mouse. Instead, tell them which key to press or what to do with the keyboard or mouse. Students should always do the task themselves in order to learn.
- Prepare a reference sheet for each software or software skill you introduce to students. Then, whenever they come for their practical class, they can bring their reference sheets to the computer lab to remind them of the most commonly-used procedures. This will save class time as students will have their own sheets and will refrain from asking questions again and again. You can also store students' reference sheets in a folder in the computer lab. Store the folders in alphabetical order on a shelf in the lab so that students can easily locate them whenever they need them.
- Another way to encourage students is to send letters to parents once in a term along with printouts of their practical work. Parents are always interested in knowing how their children are doing in class.

## Some ideas for practical application

Your goal should be to stimulate students to think of new ways to integrate current lessons with computer activities.

Encourage students to interview their parents, grandparents, relatives, friends, or even their teachers to gather information about a given topic such as global warming. They can then enter the information on a Word document.

Students can prepare a newsletter of the events that have taken place at school over a period of three months or more, or about some other important event taking place in the country.

Encourage students to communicate and exchange ideas with other students in class via email.

Students can prepare a class database of all the students in their class along with their addresses and telephone numbers. They can also maintain a database of the weather for a month or two, or keep a database of all their school field trips and the places they have visited.

Always remember that if computer-related activities are designed to support the regular curriculum, they will not distract from learning, they will enhance it.

## Teaching objectives

The objectives of this chapter are to:

- introduce the data-processing cycle
- explain the stages involved in the collection and processing of data
- explain that data can be processed in various forms
- discuss manual and computerized data-processing systems.

## Learning outcomes

After completing this chapter, students should be able to:

- explain the data-processing cycle
- define and distinguish between data collection, data capture, data transmission, and data communication
- identify situations when sorting, grouping, and calculating would be appropriate ways of processing data
- compare and contrast manual and computerized data-processing systems.

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## Introduction for the teacher

The purpose of this chapter is to explain the data-processing cycle. In Book 1, students learned about data-processing as a linear activity. They should now understand that data-processing is a cyclical activity. At the start of the chapter, revise the input, processing, output, and storage stages of the process. Next, explain that the output of one activity can be stored and used as input for another activity. Explain the importance of data collection, data capture, data transmission, and data communications.

Students know that data is processed into information. Explain that information can take various forms, depending on what it is being used for. Introduce the techniques of sorting, grouping, and calculating. Make sure that each is distinguished from the others.

After students have become familiar with the data-processing cycle, introduce manual and computerized data-processing systems. This is the stage where students begin to understand that computers only help us do something that we have been doing for ages simply with the help of our brain.

Once students have become familiar with manual and computerized systems, explain how computerized systems are better than manual systems. Describe the important features of computerized systems such as speed, accuracy, efficiency, variety, ease of use, and capacity. Also identify situations in which computerized systems might not be preferable.



By the end of this chapter, students should have gained an understanding of the context of computerized data-processing systems.

## Number of allocated periods: 3

### Period 1

#### Sample lesson plan for a 40-minute period

##### **Starter activity (5 minutes)**

Ask students the following questions:

*How do you process data?*

*In what ways can you use information?*

*Do computers also function in the same manner?*

##### **Reading and explanation (30 minutes)**

Discuss section 1.1 on pages 3 to 6 of the textbook.

Begin the lesson by refreshing students' memories of what they learned about data-processing from Book 1. Students should be able to recall the input, processing, output, and storage functions. Next, write the word **input** on the board. Explain why we need to process data. Next, ask students to explain how one might go about collecting data for input.

Using the responses given by students, think of a suitable example and introduce the terms **data collection, data capture, data transmission, and data communications**. Stress that the input stage would be incomplete if any one of these activities were missing.

Since students are familiar with the processing and output stages, use the example developed in the previous stage to explain how the data might be processed by a computer.

Refresh students' memories by asking them to recall how data is stored on a computer. They should be able to recall storage devices like hard disks, CDs, and USB drives from Book 1. Ask them why we need to store data. Encourage them to identify some possible uses of previously-stored data. Explain how stored data can be used as input for another activity. This makes the data collection process much quicker.

Introduce and explain the terms **source document** and **turnaround document**. Students should now be able to appreciate that data-processing can be seen as a cycle, where the results of one activity can be used as input for another activity.

##### **Homework assignment (5 minutes)**

Assign questions 1 and 2 from section D (page 12) as homework. Clarify what is required of students in their answers. You should stress that reproducing from the textbook is not desirable.

### Period 2

##### **Starter activity (5 minutes)**

##### **Reading and explanation (30 minutes)**

Discuss section 1.2 on pages 6 to 7 of the textbook.

##### **Homework assignment (5 minutes)**

Assign question 3 from section D (page 12) as homework. Clarify what is required of students in their answers. You should stress that reproducing from the textbook is not desirable.



### **Period 3**

#### **Starter activity (5 minutes)**

#### **Reading and explanation (20 minutes)**

Discuss sections 1.3 and 1.4 on pages 7 to 10 of the textbook.

#### **Classroom activity (10 minutes)**

Assign sections A, B, and C on pages 11–12 to be completed in the classroom.

#### **Homework assignment (5 minutes)**

Assign questions 4 to 7 from section D and section E (page 12) as homework. Clarify what is required of students in their answers. You should stress that reproducing from the textbook is not desirable.

### **Suggested answers to end-of-chapter questions on page 11–13**

#### **A. Fill in the blanks.**

1. Data collection
2. information
3. criteria
4. spreadsheets
5. decisions
6. Computers
7. programmed

#### **B. State whether the following statements are true or false. Rewrite the false statements to make them true.**

1. True.
2. True.
3. False. Sorted data is processed data.
4. False. A computerized system is more efficient than a manual system.
5. True.

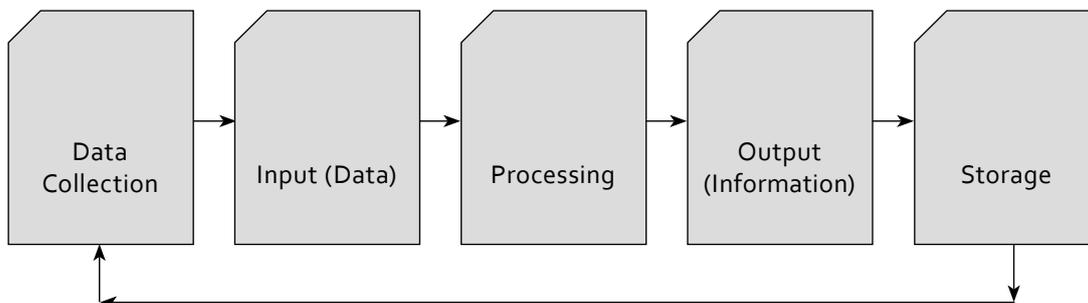
#### **C. Select the correct option for each question.**

1. d
2. b
3. c
4. c
5. c

#### **D. Answer the following questions.**

##### **1. Describe the data-processing cycle with the help of a diagram.**

The data-processing cycle describes how data is processed into information by the computer. The input stage is the first stage of the data-processing cycle. Data is collected and entered into the computer. In the processing stage, the computer converts data into information according to given instructions. After processing, the information is presented to users in the output stage. Information is stored on different types of media in the storage stage. The stored information can be used later for a different data-processing cycle. In this way, the data-processing cycle continues.



**2. What is the difference between encoding and decoding?**

Encoding is the conversion of data into a form that makes it easier for users to enter it into the computer. It takes place at the input stage. For example, the name of a person can be encoded as JS instead of John Smith. Decoding is the conversion of information into a form that makes it easier for users to read and understand. It occurs at the output stage. The initials JS can be decoded as John Smith and displayed on the screen.

**3. Describe three forms in which data can be processed.**

Data can be processed in different ways. Three ways of processing data are sorting, grouping, and calculating. In sorting, data is arranged in a specified order. Data can be arranged in alphabetical, ascending, or descending order. In grouping, similar data items are arranged in groups. This makes it easy to locate data. In calculations, we can add, subtract, multiply, and divide data. We can use it to create graphs and charts.

**4. What is a computerized system? Explain with an example.**

A computerized system uses computers to perform a set of tasks. There is little need for human involvement. This results in greater speed and accuracy. A computerized attendance system in an office consists of a fingerprint reader and a computer. Employees place their fingers on the reader and their attendance is marked automatically on the computer. They do not need to sign on a register.

**5. What is information technology?**

Information technology is the use of a variety of processing devices and methods to process data into information. It usually consists of a set of manual and computerized systems for doing work. Information technology involves the use of computers and machines to do jobs that used to be done by humans.

**6. Describe three advantages of a computerized system over a manual system.**

A computerized system has several advantages over a manual system:

1. A computerized system processes data faster than a manual system.
2. A computerized system makes fewer errors than a manual system.
3. A computerized system processes more data than a manual system.

**7. Why is a computerized system not effective in all situations?**

A computerized system is not effective in all situations because it cannot work in situations for which it has not been programmed. It cannot learn new things without the help of a programmer. It is also not suitable for situations where human feelings and emotions are involved.

**E. Write paragraphs to answer the following questions.****1. Describe the data-processing cycle at a bank.**

Modern banks operate through computerized systems. Below are the steps commonly used to process data at a bank:

Data about cheques, payments, utility bills, etc. is input through manual systems. Data about credit card payments is input through automated methods. At the processing stage, data is processed into different reports. These reports are prepared in the form of weekly, monthly, and annual reports. At the output stage, the bank produces statements and notifications that are sent to customers of the bank. These statements are used as receipts of the transactions. All data is stored on servers and hard disks.

**2. In how many ways can a list of students' names from your class be organized?**

There are several ways to organize a list of students' names. The list can be prepared in alphabetical order so that the names of students are listed according to the first letter of their name. This list can be used



when preparing an attendance register. The list can be prepared in ascending order of roll numbers. This list is used to find out who has paid the school fees. The names can be organized according to descending order of percentage marks. This list can be used to find how well students have performed on an exam.

**3. What reasons would you give to convince a supermarket owner to install a computerized system?**

The following reasons can be suggested:

The owner will be able to process data relating to sales of thousands of products faster. All calculations of total price, change paid, etc. can be made accurately and without any error. With a computerized system, the owner can keep track of all items in the store for accurate counting of stock. A computerized system can prepare a variety of reports to compare the profits and expenses of the business.

**F. Lab exercise**

For the teacher: You could organize this activity by circulating a sheet in the class on which students can enter their respective data. Make copies of this list for each student before they enter the lab. Help the students recall the tools and features of MS Excel they learned in the previous year to accomplish this task.

**G. Project**

For the teacher: Help students develop a strategy for this project. Ask them to identify five shops in the neighbourhood they accompany their parents to. Examples include grocery shops, dairies, supermarkets, tailors, etc. Help students prepare a list of questions they will ask the shopkeepers for this project and advise them to take the questionnaire with them on each visit. Advise them to only visit shops they are familiar with and to be accompanied by a trusted adult at all times.

## Additional information for the teacher

- To understand a data-processing system, it is important to understand what a system is. A **system** is a set of processes for getting any job done. Processing data is just one kind of job. We can have systems for several kinds of jobs, like preparing food, painting a house, and so on. Some terms are useful to know when understanding systems.
- Every system has a **goal**. A goal is an outcome or a result that we want to realize in the future. The goal of a data-processing system is to produce useful information. Similarly, the goal of a food-processing system is to produce chopped vegetables. The goal of an assembly line at a toy factory is to produce a large number of toys. It is important to identify the goal of a system to understand it better.
- People take certain actions to achieve their goals. A painter mixes paint and oil to paint a house. A chef chops vegetables and lights the stove to prepare a meal. Different actions are required for different types of goals. Therefore, it is important to think of the actions that are likely to help us achieve our goals and avoid the ones that are useless.
- Every action requires some **resources**. We need cans of paint to paint a house. We also need rollers, brushes, and ladders. Similarly, we need pans, vegetables, meat, and heat to prepare a meal. It is important to note that these resources are limited. We can never have all the wealth or food that we would like to have. This is because other people also need to use the same resources to realize their goals. This leads to **competition**. Because of competition, we have to make sure that we do not waste resources, and use them as efficiently as possible.
- No system consists of just one action to achieve its goal. Several actions are needed to achieve a single goal. To achieve good grades, students need to be good at several subjects and other activities. It is important to give adequate time and concentration, i.e. resources, to each action. This leads to **coordination**. A good system coordinates the various actions that need to be performed. It ensures that no task is repeated and no task is left out. Without coordination, a system cannot achieve its goal.



- Each action that needs to be performed is **learned**. None of us were born with the skills to survive. We acquired these by observing our elders or through education. Similarly, a system needs to be instructed about the different actions that it needs to perform and coordinate. In a computer, these instructions exist in the form of a **program**.
- Humans are inventive creatures. From the earliest times, we have been developing tools and methods for performing several actions. At one time, people used stones to produce fire: nowadays, we can use a lighter. The use of different tools and methods for doing a job is called **technology**. Systems improve when more efficient tools and methods are developed to perform the required actions. Old microprocessors processed data slowly. They wasted time and therefore the system was inefficient. Newer processors are faster and they save time: they make the system more efficient.
- An important feature of technology is that it keeps on changing. People will continue to invent better tools and methods to achieve their goals. Therefore, it is important for us to continue learning how to use these new devices. Otherwise, we might end up with outdated skills and knowledge.

# Activity Sheet

## I. What is...?

1. What is the need for data-processing?

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2. What is a source document?

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3. What is data communications?

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4. What is the storage stage?

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5. What is grouping?

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6. What is meant by efficiency?

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## II. Complete each sentence by circling the correct words in the brackets.

1. Data does not provide (meaning/numbers).
2. Entering data into a computer is called (data collection/data capture).
3. (Encoded/Decoded) data is easier to enter into a computer.
4. Data can be sorted according to some (criteria/input).
5. A (manual/computerized) system uses computers to process data.
6. Making fewer errors results in greater (accuracy/speed).
7. Computers can perform a (greater/smaller) variety of tasks than human beings.



# Test Sheet

## I. Tick five boxes to show which five of these statements are most likely to be true.

(5 marks)

1. The stages of data-processing are connected in the form of a cycle.
2. Data consists of meaningful information.
3. Entering data into a computer is called data transmission.
4. Computers follow instructions called programs to process data.
5. Output is presented through devices like keyboards and printers.
6. A turnaround document becomes useless after one data-processing activity.
7. Organizing data in ascending or descending order is a way of sorting it.
8. A manual system is slower and less accurate than a computerized system.
9. Information technology involves the use of a large number of people to process data.
10. A computer cannot learn on its own.

## II. Complete the following statements by filling in the blanks with the correct terms. Each word or phrase can be used only once.

(4 marks)

understand      manual      source document      adapt  
 rules      Encoding      spreadsheets      stored

1. Data is recorded on a \_\_\_\_\_ during data collection.
2. \_\_\_\_\_ makes it easier to enter data into a computer.
3. Viewing output helps users to \_\_\_\_\_ what the data means.
4. Information can be \_\_\_\_\_ to be used later.
5. We can sort data with the help of computer programs like \_\_\_\_\_.
6. A \_\_\_\_\_ system involves almost no use of machines to process data.
7. Computers work according to certain \_\_\_\_\_.
8. A computer cannot \_\_\_\_\_ to new situations on its own.



# Test Sheet

III. List three types of calculations you can perform on a computer. (3 marks)

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IV. Why do we use encoding and decoding? (3 marks)

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## Answers to activity sheet

### I. What is...?

1. Data-processing is needed because data on its own is not very useful. It does not tell us what the data represents or what it means.
2. A source document is a document on which data is recorded during data collection.
3. Data communications consists of a set of activities that enable us to send data from one data-processing system to another.
4. The storage stage is where information is stored for future use. It can be stored on various storage media like hard disks and CDs.
5. Grouping is the arrangement of data into groups. All the data items in one group are similar to each other in some respect.
6. Efficiency is the ability to process data accurately at great speed. Efficiency helps us to save time.

### II. Complete each sentence by circling the correct words in the brackets.

1. Data does not provide (meaning/numbers).
2. Entering data into a computer is called (data collection/data capture).
3. (Encoded/Decoded) data is easier to enter into a computer.
4. Data can be sorted according to some (criteria/input).
5. A (manual/computerized) system uses computers to process data.
6. Making fewer errors results in greater (accuracy/speed).
7. Computers can perform a (greater/smaller) variety of tasks than human beings.

## Answers to test sheet

### I. Tick five boxes to show which five of these statements are most likely to be true.

1. The stages of data-processing are connected in the form of a cycle.
4. Computers follow instructions called programs to process data.
7. Organizing data in ascending or descending order is a way of sorting it.
8. A manual system is slower and less accurate than a computerized system.
10. A computer cannot learn on its own.

### II. Complete the following statements by filling in the blanks with the correct terms. Each word or phrase can be used only once.

- |            |          |                 |        |
|------------|----------|-----------------|--------|
| understand | manual   | source document | adapt  |
| rules      | Encoding | spreadsheets    | stored |
1. source document
  2. Encoding
  3. understand
  4. stored
  5. spreadsheets
  6. manual
  7. rules
  8. adapt

**III. List three types of calculations you can perform on a computer.**

1. Adding up the marks scored on a test
2. Calculating monthly savings
3. Finding the percentage of boys in a class

**IV. Why do we use encoding and decoding?**

We use encoding because it saves time. We use decoding because it helps us understand what the data means.

### Teaching objectives

The objectives of this chapter are to:

- explain the nature of digital data and binary data
- introduce number systems as a set of rules for representing data using numbers
- explain the decimal, binary, octal, and hexadecimal number systems
- explain the conversion of decimal numbers into binary numbers and *vice versa*
- explain the addition and subtraction of binary numbers
- explain data storage in terms of bits and bytes.

### Learning outcomes

After completing this chapter, students should be able to:

- explain that computers understand information in binary form
- explain how the binary number system uses two digits (0 and 1) to represent binary states
- convert decimal numbers into binary numbers and *vice versa*
- perform addition and subtraction of two binary numbers
- explain that data is stored in the computer's memory in the form of bits and bytes.

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### Introduction for the teacher

The purpose of this chapter is to introduce students to number systems. Students have an understanding of the processing function of the computer. They should now be curious as to how a computer processes data. This chapter explains that in order to process data, the computer has to convert it into a form that makes it easier to process. Number systems should be introduced as different ways of representing data. Introduce the four types of number systems described in the chapter. Next, emphasize that the binary form of data can be processed by a computer.

Explain what is meant by binary data. Use the example of a light bulb to clarify the concept of the two binary states. Explain that these two states are represented by two digits, i.e. 1 and 0, in the binary number system. Explain that the computer can process data in binary form because the computer receives data in the form of electronic signals.

Once students are familiar with the binary form of data, explain that the computer converts data entered by us into binary form so that it can process it. Explain the conversion of binary numbers into decimal numbers and *vice versa*. Next, ask students to recall the types of processing learnt in Chapter 1. They should be able to recall sorting, grouping, and calculations. Select two types of calculations, i.e. addition and subtraction, and explain how they are performed using binary data.

Next, ask students to recall the output stage and the importance of decoding. Describe the procedure for converting binary numbers into decimal numbers. This should help students understand that output should be in a form that humans can easily understand.

Ask students to recall the importance of the storage function in the data-processing cycle. Refresh their memories about microprocessors and other storage devices from Book 1. Explain that data is stored by the computer in the form of electronic signals. Introduce the concept of bits and bytes. End the chapter with a discussion of larger units of data storage.

By the end of this chapter, students should understand that data is converted into binary form by a computer. They should also be able to relate the stages of the data-processing cycle to the processing of data into a binary form by the computer.

## **Number of allocated periods: 4**

### **Period 1**

#### **Sample lesson plan for a 40-minute period**

##### **Starter activity (5 minutes)**

Ask students the following questions:

*Can we read a book written in a language that we do not know?*

*Can we say the same thing in different ways or by using different words?*

*Where do we store what we have learnt?*

##### **Reading and explanation (30 minutes)**

Discuss sections 2.1, 2.2, and 2.3 on pages 15 to 16 of the textbook.

Using the responses given by the students, explain that just as different people understand different languages, the computer also understands a language that is different from the languages understood by human beings. Therefore, the computer cannot understand data in the form that we enter it as input: it has to translate or convert it into a form that it can understand and process.

Next, ask students to think about what exactly this form in which the computer can understand data is. Ask them to recall the definition of a computer. They should be able to identify it as an electronic machine. Ask students to recall other electronic machines that they see around them. After collecting their responses, ask them how a light bulb works.

Explain that a bulb can either be on or off. Ask them if a third state is possible. They should reply in the negative. Next, explain how electric current flows in the form of electrons. Therefore, the bulb glows when electrons are flowing and does not glow when electrons are not flowing. Similarly, electrons flow inside a computer when we enter data. When we do not enter data, there is no flow of electrons other than the current necessary to keep the computer running. Then, ask them for ways in which these two states can be identified. Their responses might be 'on' and 'off.' Next, explain that the two states can also be identified as 1 and 0, respectively.

By the end of the lesson, students should be able to describe how the same data can be represented in various forms. They should be able to state that a computer understands data in binary form because data travels inside a computer in the form of electric current.

##### **Homework assignment (5 minutes)**

Assign questions 1 to 3 from section D (page 25) as homework. Clarify what is required of students in their answers. You should stress that reproducing from the textbook is not desirable.

## Period 2

### **Starter activity (5 minutes)**

### **Reading and explanation (30 minutes)**

Discuss sections 2.4, 2.5, and 2.6 on pages 17 to 18 of the textbook.

### **Homework assignment (5 minutes)**

Assign reading of the topics covered in the classroom.

## Period 3

### **Starter activity (5 minutes)**

### **Reading and explanation (30 minutes)**

Discuss section 2.8 on pages 19 to 20 of the textbook.

### **Homework assignment (5 minutes)**

Assign questions 5 and 6 from section D (page 25) as homework. Clarify what is required of students in their answers.

## Period 4

### **Starter activity (5 minutes)**

### **Reading and explanation (30 minutes)**

Discuss sections 2.9 and 2.10 on pages 20 to 22 of the textbook.

### **Homework assignment (5 minutes)**

Assign sections A, B, and C (page 24) and questions 4 and 7 from section D and section E (page 25) as homework. Clarify what is required of students in their answers. Students may also be asked to perform the activity given in section G (pages 25 to 27).

## **Suggested answers to end-of-chapter questions on pages 24 and 25**

### **A. Fill in the blanks.**

1. numerical      2. binary      3. 1010      4. octal      5. expansion

### **B. State whether the following statements are true or false. Rewrite the false statements to make them true.**

1. True.
2. False. Alphanumeric data consists of letters, numbers, and other special characters.
3. True.
4. True.
5. True.
6. False. A binary number can be converted into a decimal number by the expansion method.
7. False. One memory location can store one bit.

### **C. Select the correct option for each question.**

1. b      2. c      3. c      4. d      5. c

**D. Answer the following questions.****1. Describe three forms of data.**

Data can exist in three forms:

1. Numeric data is comprised of digits and the decimal point. It is used for calculations.
2. Alphabetic data includes the 26 letters of the English alphabet, i.e. A-Z and a-z.
3. Alphanumeric data is comprised of alphabetic data, numeric data, and special characters such as @, #, and %.

**2. What two states do the digits 0 and 1 represent under the binary system?**

The digits 0 and 1 represent the absence or presence of electronic signals in a circuit. The digit 0 represents the absence of electric current, while the digit 1 represents the presence of electric current.

**3. Why do we use binary digits to represent the presence or absence of electronic signals?**

We use binary digits to represent the presence or absence of electronic signals because data travels in the form of electronic signals in the computer. It is processed and stored in the form of electronic signals.

**4. What is a bit?**

A bit is the smallest unit of data that can be processed by a computer. The word bit is derived from Binary digIT. Data is stored on a computer in the form of bits.

**5. Convert the following decimal numbers into binary numbers.****a. 27**

	Number	Remainder
2	27	
2	13	1
2	6	1
2	3	0
	1	1

$$(27)_{10} = (11011)_2$$

**b. 15**

	Number	Remainder
2	15	
2	7	1
2	3	1
	1	1

$$(15)_{10} = (1111)_2$$

**6. Convert the following binary numbers into decimal numbers.****a. 110111**

$$= (1 \times 2^5) + (1 \times 2^4) + (0 \times 2^3) + (1 \times 2^2) + (1 \times 2^1) + (1 \times 2^0)$$

$$= (1 \times 32) + (1 \times 16) + (0 \times 8) + (1 \times 4) + (1 \times 2) + (1 \times 1)$$

$$= 32 + 16 + 0 + 4 + 2 + 1$$

$$= (55)_{10}$$

b. **1100100**

$$\begin{aligned}
 &= (1 \times 2^6) + (1 \times 2^5) + (0 \times 2^4) + (0 \times 2^3) + (1 \times 2^2) + (0 \times 2^1) + (0 \times 2^0) \\
 &= (1 \times 64) + (1 \times 32) + (0 \times 16) + (0 \times 8) + (1 \times 4) + (0 \times 2) + (0 \times 1) \\
 &= 64 + 32 + 0 + 0 + 4 + 0 + 0 \\
 &= (100)_{10}
 \end{aligned}$$

7. Perform the following binary operations.

a. **101+111**

$$\begin{array}{r}
 \text{Carry over} \qquad 1 \ 1 \\
 \qquad \qquad \qquad 1 \ 0 \ 1 \\
 + \qquad \qquad \qquad 1 \ 1 \ 1 \\
 \hline
 \qquad \qquad \qquad 1 \ 1 \ 0 \ 0
 \end{array}$$

b. **1101-0011**

$$\begin{array}{r}
 \text{Borrow} \longrightarrow \qquad 0 \ 1 \\
 \qquad \qquad \qquad 1 \ 1 \ 0 \ 1 \\
 - \qquad \qquad \qquad 0 \ 0 \ 1 \ 1 \\
 \hline
 \qquad \qquad \qquad 1 \ 0 \ 1 \ 0
 \end{array}$$

E. Write paragraphs to answer the following questions.

1. What are the differences between binary and decimal number systems?

The binary number system is based on two digits, i.e. 0 and 1 while the decimal number system consists of ten digits, i.e. 0-9. The base for binary numbers is 2 while the base for decimal numbers is 10. The binary number system is used in computer data processing while the decimal number system is used in everyday life.

2. Explain how bits and bytes are stored in the CPU.

One bit is capable of storing 1 or 0 and is the lowest form of storage. 1 byte is equal to 8 bits, e.g. 01011010 and can store one letter such as 'a.' Bits and bytes are stored on the RAM are processed quickly by the fast and efficient CPU. When a word is typed on the computer, each letter is stored on the RAM in the form of a byte. The same storage principle is used for hard disk drives and other storage media.

3. Describe the process of binary subtraction with an example.

Subtract  $(10010)_2$  from  $(1101011)_2$ .

Starting from the ones column the bottom digit is subtracted from the top digit according to the rules of binary subtraction. In this system  $1-1=0$ ,  $10-1=1$ , and for  $0-1$  we need to borrow 1 from the left column. After borrowing, the number becomes 10 instead of 0. Below is an example:

Solution:

$$\begin{array}{r}
 \text{Borrow} \longrightarrow \qquad 0 \ 1 \\
 \qquad \qquad \qquad 1 \ 1 \ 0 \ 1 \ 0 \ 1 \ 1 \\
 - \qquad \qquad \qquad 1 \ 0 \ 0 \ 1 \ 0 \\
 \hline
 \qquad \qquad \qquad 1 \ 0 \ 1 \ 1 \ 0 \ 0 \ 1
 \end{array}$$

## F. Project

For the teacher: This activity is meant to be carried out by students independently but the teacher can stimulate their interest by bringing in various storage devices and explain to students where they can find the memory size on the device. Encourage them to visit computer hardware shops near their home with a trusted adult and compare different storage devices. Ask them to reflect on this project and compare their knowledge before and after the activity.

## Additional information for the teacher

- The binary number system was invented by an Indian mathematician named Pingala in the third century BC. The system was then developed by Leibniz in the seventeenth century and Boole in the nineteenth century.
- The binary number system is used by a computer because a computer works with digital data. As opposed to analog data, digital data is discrete. It measures data in steps. Analog data measures data in a continuous form.
- It is important to understand why computers work with digital data. It is important for data to be precise. Data that has **precision** is more useful than vague data because precise data can be relied upon.
- It is important to note that although digital data is more precise, it is not **accurate**. This is because it does not measure intermediate steps between two states. Intermediate steps are measured more easily with the help of analog devices.
- Precision helps us specify data with greater certainty. This is useful in making calculations and scientific experiments. However, it is common knowledge that the results of scientific experiments and calculations include some margin for error. This is due to the lack of accuracy in using digital devices.

## Activity Sheet

### I. What is...?

1. What is a number system?

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2. What is the ASCII code?

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3. What is the octal number system?

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4. What is a kilobyte?

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### II. Perform the following binary operations.

a.  $1111+1011$

b.  $11001-10100$

# Test Sheet

- I. Tick five boxes to show which five of these statements are most likely to be true. (5 marks)
1. Numeric data consists of digits, the decimal point, and no symbols.
  2. The decimal number system is based on 10 digits.
  3. The hexadecimal number system uses numbers and letters to represent data.
  4. The computer can process decimal data.
  5. The EBCDIC code is used in minicomputers.
  6. We use the repeated division method to convert decimal numbers into binary numbers.
  7. In binary addition,  $1+1=11$ .
  8. One byte is equal to ten bits.
  9. Gigabytes and terabytes are larger units of data storage.
  10.  $(1101)_2 = (13)_{10}$

II. Convert  $(10111)_2$  into its decimal equivalent. (2 marks)

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III. Convert  $(98)_{10}$  into its binary equivalent. (2 marks)

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IV. Add  $(100111)_2$  and  $(110010)_2$ . (3 marks)

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# Test Sheet

V. Subtract  $(1001)_2$  from  $(1110)_2$ .

(3 marks)

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## Answers to activity sheet

### I. What is...?

1. A number system is a method of using numbers and letters to represent data.
2. ASCII stands for American Standard Code for Information Interchange. It is a binary coding scheme used to save files on microcomputers.
3. The octal number system is a number system that uses 8 digits (0-7) to represent data. It is also called the base 8 system.
4. A kilobyte is a unit of data storage that is equal to 1024 bytes.

### II. Perform the following binary operations.

a.  $1111+1011$

$$\begin{array}{r}
 \text{Carry over} \longrightarrow 1\ 1\ 1 \\
 \phantom{\text{Carry over}} \phantom{\longrightarrow} 1\ 1\ 1\ 1 \\
 + \phantom{\text{Carry over}} \phantom{\longrightarrow} 1\ 0\ 1\ 1 \\
 \hline
 1\ 1\ 0\ 1\ 0
 \end{array}$$

b.  $11001-10100$

$$\begin{array}{r}
 \text{Borrow} \longrightarrow 0\ 1 \\
 \phantom{\text{Borrow}} \phantom{\longrightarrow} 1\ \cancel{0}\ 0\ 0\ 1 \\
 - \phantom{\text{Borrow}} \phantom{\longrightarrow} 1\ 0\ 1\ 0\ 0 \\
 \hline
 0\ 0\ 1\ 0\ 1
 \end{array}$$

## Answers to test sheet

### I. Tick five boxes to show which five of these statements are most likely to be true.

2. The decimal number system is based on 10 digits.
3. The hexadecimal number system uses numbers and letters to represent data.
6. We use the repeated division method to convert decimal numbers into binary numbers.
9. Gigabytes and terabytes are larger units of data storage.
10.  $(1101)_2 = (13)_{10}$

### II. Convert $(10111)_2$ into its decimal equivalent.

$$\begin{aligned}
 &= (1 \times 2^4) + (0 \times 2^3) + (1 \times 2^2) + (1 \times 2^1) + (1 \times 2^0) \\
 &= (1 \times 16) + (0 \times 8) + (1 \times 4) + (1 \times 2) + (1 \times 1) \\
 &= 16 + 0 + 4 + 2 + 1 \\
 &= (23)_{10}
 \end{aligned}$$



III. Convert  $(98)_{10}$  into its binary equivalent.

	Number	Remainder
2	98	
2	49	0
2	24	1
2	12	0
2	6	0
2	3	0
	1	1

$$\therefore (98)_{10} = (1100010)_2$$

IV. Add  $(100111)_2$  and  $(110010)_2$ .

$$\begin{array}{r}
 \text{Carry over} \longrightarrow \quad \quad \quad 1 \ 1 \\
 \quad \quad \quad \quad \quad \quad \quad 1 \ 0 \ 0 \ 1 \ 1 \ 1 \\
 + \quad \quad \quad \quad \quad \quad \quad 1 \ 1 \ 0 \ 0 \ 1 \ 0 \\
 \hline
 \quad \quad \quad \quad \quad \quad \quad 1 \ 0 \ 1 \ 1 \ 0 \ 0 \ 1
 \end{array}$$

V. Subtract  $(1001)_2$  from  $(1110)_2$ .

$$\begin{array}{r}
 \text{Borrow} \longrightarrow \quad \quad \quad 0 \ 1 \\
 \quad \quad \quad \quad \quad \quad \quad 1 \ 1 \ 1 \ 0 \\
 - \quad \quad \quad \quad \quad \quad \quad 1 \ 0 \ 0 \ 1 \\
 \hline
 \quad \quad \quad \quad \quad \quad \quad 0 \ 1 \ 0 \ 1
 \end{array}$$

### Teaching objectives

The objectives of this chapter are to:

- explain system software and its types
- explain BIOS
- explain the functions, components, and types of operating systems
- explain some common utility programs and software development tools.

### Learning outcomes

After completing this chapter, students should be able to:

- define system software
- explain the booting up process
- explain the functions of the file manager, image viewer, disk scanner, and other utility programs
- explain the functions of compilers, linkers, and debuggers.

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## Introduction for the teacher

The purpose of this chapter is to explain the role played by system software in the functioning of a computer. Since the computer is a data-processing system, it needs to be told how to process data. System software does not tell the computer how to process data, but it helps the computer to remain effective. It ensures that the system operates smoothly without any hindrance to the processing activity.

This chapter builds on the processing concepts built in the earlier chapters by explaining that, to process data in a binary form, the computer needs to be well-maintained. The chapter also serves as a foundation for subsequent chapters by creating a suitable environment for the computer to begin processing data. It explains the role of the BIOS program, operating system, and utility programs in making the computer perform its routine activities. These activities are distinct from processing activities.

Begin the chapter by elaborating on the functions of the BIOS program, the operating system, and utility programs. Describe the various types of operating systems and utility programs. Lay special emphasis on explaining the application of each.

Conclude the chapter by describing software development tools. These are distinct from the earlier programs because they are used whenever a system does not work as it is supposed to. Describe the functions of compilers, linkers, and debuggers.

By the end of the chapter, students should understand and be able to describe the role played by system software in the smooth functioning of a data-processing system.

## Number of allocated periods: 3

### Period 1

#### Sample lesson plan for a 40-minute period

##### **Starter activity (5 minutes)**

Ask students the following questions:

*How does a computer run?*

*What do you see on the screen when you switch on the computer?*

*Why does the computer start in the same way every time you switch it on?*

##### **Reading and explanation (30 minutes)**

Discuss sections 3.1 and 3.2.1 on pages 29 to 30 of the textbook.

Ask students to recall what they learned about system software and the operating system from Book 1. They should be able to identify some of the functions performed by an operating system. They should also be able to identify some of the routine functions performed by a computer.

After students have given their responses, introduce the term **BIOS** and explain that the routine function of starting up the computer is performed by the BIOS program. Once students understand this concept, describe in greater detail the functions of the operating system. Revisit the concepts of files, folders, programs, and system devices as you progress with the chapter.

Explain the importance of multitasking by asking students for examples from daily life. They should be able to identify situations where they have to perform two or more tasks at the same time.

By the end of the lesson, students should be fairly familiar with the functions of the operating system. This should be the foundation for the discussion of the components and types of operating systems in the next lesson.

##### **Homework assignment (5 minutes)**

Assign question 2 from section D (page 37) as homework. Clarify what is required of students in their answers. You should stress that reproducing from the textbook is not desirable.

### Period 2

##### **Starter activity (5 minutes)**

##### **Reading and explanation (30 minutes)**

Discuss sections 3.2.2 and 3.2.3 on pages 31 to 32 of the textbook.

##### **Homework assignment (5 minutes)**

Assign question 3 from section D (page 37) as homework. Clarify what is required of students in their answers. You should stress that reproducing from the textbook is not desirable.

### Period 3

##### **Starter activity (5 minutes)**

##### **Reading and explanation (20 minutes)**

Discuss sections 3.3 and 3.4 on pages 33 to 55 of the textbook.

##### **Classroom activity (10 minutes)**

Assign sections A, B, and C on pages 36 and 37 to be completed in the classroom.

### Homework assignment (5 minutes)

Assign questions 1, 4, and 5 from section D and section E (page 37) as homework. Clarify what is required of students in their answers. You should stress that reproducing from the textbook is not desirable.

## Suggested answers to end-of-chapter questions on pages 36 and 37

### A. Fill in the blanks.

1. booting                      2. firmware                      3. operating                      4. multitasking                      5. virus scanner

### B. State whether the following statements are true or false. Rewrite the false statements to make them true.

1. False. Utility programs are used to perform specific tasks on the computer.
2. True.
3. True.
4. False. DOS is an example of command line interface.
5. True.

### C. Select the correct option for each question.

1. b                      2. b                      3. b                      4. a                      5. c

### D. Answer the following questions.

#### 1. Define system software. Name three categories of system software.

System software is a set of programs that helps a computer perform general tasks like starting up, creating files and folders, saving files, deleting files, and shutting down. Three categories of system software are:

1. Basic Input Output System                      2. Operating system                      3. Utility programs

#### 2. Describe three functions of an operating system.

An operating system performs several functions. It helps in the booting up process. The booting up process involves starting up the computer and making it ready for use. An operating system manages the programs that run on the computer. These programs help the computer run properly. An operating system also maintains the files and folders stored on the computer so that they can be used by the user.

#### 3. What is the function of a device driver?

A device driver runs the system devices attached to the computer. It first checks whether all the drivers are installed. It then checks whether all devices are connected to their drivers. It then displays a list of devices and tells the user whether any drivers need to be installed.

#### 4. What is disk failure? How can we avoid data loss as a result of disk failure?

Loss of data from the hard disk is called disk failure. We can avoid data loss as a result of disk failure by regularly making back-up copies of our data. We can use back-up software to prepare back-up copies.

#### 5. What is meant by debugging?

Debugging is the process of removing errors from a file.



**E. Write paragraphs to answer the following questions.**

1. **Describe two examples of multitasking by a computer. What enables the computer perform multiple tasks at the same time?**

The first example of multitasking could be writing in MS Word while the browser is running. The user may type a document in MS Word or prepare a spreadsheet in MS Excel while listening to an audio file on the Windows Media Player. The CPU allocates processing time and capacity to different applications which enables the computer to multitask.

2. **A computer has both CLI and GUI interfaces. Why do people still prefer GUI interfaces?**

CLI (command line interface), e.g. MS DOS and GUI (graphical user interface), e.g. Microsoft Windows have different strengths and weaknesses when compared to each other. GUI is more popular because everything is visible on the desktop and multiple programs can be executed at the same time by using the mouse, keyboard, and other input devices. CLI involves memorization of commands and a plain background which is not attractive. Only the keyboard is used for input.

**F. Lab exercise**

For the teacher: Ensure that there are adequate resources and time for this activity. Two or three students may be seated at a computer if the lab has fewer computers. If a scanner is available, you could ask students to bring in their favourite photographs from home, scan them in the lab, and create an image file on the computer. Alternatively, students could be asked to download a photo from the Internet. Make sure that security controls are in place and access to undesirable content is blocked. Ask the students to explore the editing tools such as flipping, rotating, resizing, blurring, etc.

**G. Project**

For the teacher: Brainstorm with students to come up with examples of GUI operating systems they have heard of. You can also suggest examples such as Google Chrome, etc. Ask students to find information about these programs on the Web or consult their friends and family who use such systems. Once students have prepared their projects, discuss the features of two most-commonly cited operating systems in the classroom.

**Additional information for the teacher**

- System software is a class of software essential for running computer operations. They include operating systems, antivirus programs, file managers, etc. Apart from antivirus programs, most system software is included within the OS setup. This allows necessary components to be accessed from one package instead of having to be purchased separately. These tools can be accessed by checking the properties of any hard disk drive.
- Device drivers are an essential feature of operating systems as they control the devices included in, and attached to, a system. To see the number of devices related to a system, simply click on the Start Menu and select Control Panel. Then click and open Device Manager. All the stated devices require drivers. If the driver is not functioning properly, an error message is displayed. Right-clicking on any device in the list will show its properties and this will include whether it is functioning properly or not.
- Utility programs perform multiple maintenance functions for a system. They scan computer data, diagnose errors, and also suggest solutions. Without them, a computer cannot perform at its optimally. An example is that of an **antivirus program** which prevents viruses and malicious programs from infecting the system. An effective antivirus system protects the computer system and ensures data protection.
- Back-up software is useful software that saves information at a particular date and time. This feature comes into use when the system suffers a crash or data is lost. The user can restart work from the position at which data has been saved, i.e. the back-up point. Back-up can be maintained on CDs to ensure that information is not affected by system failures.

# Activity Sheet

## I. What is...?

1. What is booting up?

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2. What is firmware?

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3. What is the function of a loader?

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4. What is WIMP?

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5. What is open-source software?

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6. What is a virus?

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## II. Complete each sentence by circling the correct words in the brackets.

1. A (boot sequence/bootloader) includes the first few operations needed to boot up the computer.
2. A (user program/user interface) enables a user to communicate with a computer.
3. (CLI/GUI) is entirely text-based.
4. A (file manager/virus scanner) enables us to use the files stored on the computer.
5. A virus scanner is a (utility program/system development tool).
6. A compiler converts a (document file/source file) into an object file.



# Test Sheet

## I. Tick five boxes to show which five of these statements are most likely to be true.

(5 marks)

1. An operating system manages the files and folders stored on a computer.
2. Multitasking means doing two or more things at the same time.
3. Only microcomputers need an operating system.
4. A disk finder searches the hard disk for damaged files.
5. Back-up software helps us to find files on the computer.
6. A compiler converts instructions written in high-level languages into binary code.
7. A debugger is a utility program.
8. A disk defragmenter combines fragments of a single file.
9. We can rotate a picture using an image viewer.
10. DOS is a GUI-based operating system.

## II. Complete the following statements by filling in the blanks with the correct terms. Each word or phrase can be used only once.

(3 marks)

ROM  
syntax

Utility  
bug

system  
application

1. A printer is a \_\_\_\_\_ device.
2. The BIOS is stored on a \_\_\_\_\_ chip.
3. The operating system manages all \_\_\_\_\_ programs.
4. It is difficult to learn the \_\_\_\_\_ of every command in a CLI-based operating system.
5. \_\_\_\_\_ programs are different from application programs.
6. An error is also called a \_\_\_\_\_.

## III. What is the difference between a disk scanner and a disk defragmenter? (2 marks)

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## Answers to activity sheet

### I. What is...?

1. Booting up is the process of starting up a computer and making it ready for use.
2. Firmware is software that is stored on a ROM chip. Its contents cannot be changed.
3. A loader loads programs and instructions from back-up storage to the main memory so that the computer can follow them.
4. WIMP stands for Windows, Icons, Menus, Pointing device. It is used to describe a GUI-based operating system like Windows.
5. Open-source software is software to which users can make changes according to their needs.
6. A virus is a program that can destroy files stored on a computer.

### II. Complete each sentence by circling the correct words in the brackets.

1. A (boot sequence/bootloader) includes the first few operations needed to boot up the computer.
2. A (user program/user interface) enables a user to communicate with a computer.
3. (CLI/GUI) is entirely text-based.
4. A (file manager/virus scanner) enables us to use the files stored on the computer.
5. A virus scanner is a (utility program/system development tool).
6. A compiler converts a (document file/source file) into an object file.

## Answers to test sheet

### I. Tick five boxes to show which five of these statements are most likely to be true.

1. An operating system manages the files and folders stored on a computer.
2. Multitasking means doing two or more things at the same time.
6. A compiler converts instructions written in high-level languages into binary code.
8. A disk defragmenter combines fragments of a single file.
9. We can rotate a picture using an image viewer.

### II. Complete the following statements by filling in the blanks with the correct terms. Each word or phrase can be used only once.

- | ROM<br>syntax | Utility<br>bug | system<br>application |
|---------------|----------------|-----------------------|
| 1. system     | 2. ROM         | 3. application        |
| 4. syntax     | 5. Utility     | 6. bug                |

### III. What is the difference between a disk scanner and a disk defragmenter?

A disk scanner is a utility program that searches for unnecessary or damaged files and suggests what to do about them. It helps us to create space for new files to be stored. A disk defragmenter locates the various fragments of a single file and moves them to a single location.



### Teaching objectives

The objectives of this chapter are to:

- clarify the concept of application software
- expand students' understanding of application software beyond word processors, electronic spreadsheets, and presentation software
- introduce different types of application software such as educational software, productivity software, and entertainment software.

### Learning outcomes

After completing this chapter, students should be able to:

- differentiate between system software and application software
- identify the benefits of educational software and productivity software
- display a basic understanding of database management software and decision-making software.

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## Introduction for the teacher

The aim of this chapter is to elaborate on the difference between system and application software. Once that is clear, explain the various functions of application software. Along with that, describe the different types of application software that are available for performing different types of tasks.

The chapter describes the different types of application software according to the familiarity students have with the functions they are used to perform. Since students are most familiar with education and academics, educational software has been described first. Next, productivity software has been described to build on students' knowledge about the various manufactured products they find in their environment.

Word processing software, spreadsheet software, and presentation software have been explained next. These software should be explained with reference to students' experience with Microsoft Word, Microsoft Excel, and Microsoft PowerPoint in Book 1.

Students might not be familiar with the subsequent types of software. Graphics software should be described with reference to the images students find in computer games. Desktop publishing software should then be described as a tool for combining text and graphics. The textbook can be referred to as an example. Entertainment software should be described next.

The concepts of database and database management software should be introduced along with their applications. Students should understand the necessity of organized data for decision-making. Finally, decision-making software should be described as going one step further from database management software and helping business managers make decisions.

By the end of this chapter, students should have a clear understanding of the difference between system and application software. They should also be able to identify various activities for which application software might be used.

## Number of allocated periods: 3

### Period 1

#### Sample lesson plan for a 40-minute period

##### **Starter activity (5 minutes)**

Ask students the following questions:

*Can you tell me what system software is?*

*What functions does it perform?*

*Can we use system software to write a letter or play a game on the computer?*

##### **Reading and explanation (30 minutes)**

Discuss sections 4.1 to 4.2.2 on pages 39 to 41 of the textbook.

After students have replied to the last starter question in the negative, you could proceed with a description of application software. It is important at this stage to enable students to distinguish between system and application software. You could discuss the example given on page 39 of the textbook. Explain that just as an electricity generator produces electricity to keep the various electrical appliances running without performing any of their unique functions (an electricity generator cannot produce cool air or play music), system software keeps the computer running smoothly so that the different application software can perform their unique functions. Introduce the term **dedicated task** at this stage.

Ask students what these dedicated tasks might be. After collecting their responses, introduce educational software. Ask students to suggest ways in which computers might be used in education. Introduce educational CDs and software. You might also bring such CDs into the classroom and allow students to have a look at them. Introduce the term **computer-aided learning** at this stage.

Next, ask students why we use machines. Ask them how those machines are controlled. Their responses might include 'by hand,' or 'by electricity.' Explain that computers can also be used to control machines like robots. Such machines can be used to perform difficult and dangerous tasks in factories. Introduce the terms **computer-aided design (CAD)** and **computer aided manufacturing (CAM)**, and explain what they mean.

Encourage students to use their imagination to think of different ways in which robots might be used. Towards the end of the period, ask students to think of other tasks that can be performed on a computer. This will prepare students for a discussion on other types of application software in subsequent periods.

##### **Homework assignment (5 minutes)**

Assign questions 1 to 3 from section D (page 47) as homework. Clarify what is required of students in their answers. You should stress that reproducing from the textbook is not desirable.

### Period 2

##### **Starter activity (5 minutes)**

##### **Reading and explanation (30 minutes)**

Discuss sections 4.2.3 to 4.2.7 on pages 41 and 42 of the textbook.



**Homework assignment (5 minutes)**

Assign question 4 from section D (page 47) as homework. Clarify what is required of students in their answers. You should stress that reproducing from the textbook is not desirable.

**Period 3****Starter activity (5 minutes)****Reading and explanation (20 minutes)**

Discuss sections 4.2.8 to 4.2.10 on pages 43 and 44 of the textbook.

**Classroom activity (10 minutes)**

Assign sections A, B, and C on page 46 to be completed in the classroom.

**Homework assignment (5 minutes)**

Assign question 5 from section D and section E (page 47) as homework. Clarify what is required of students in their answers. You should stress that reproducing from the textbook is not desirable.

**Suggested answers to end-of-chapter questions on pages 46–47****A. Fill in the blanks.**

1. dedicated
2. Educational
3. dictionaries, encyclopedias
4. design
5. graphics

**B. State whether the following statements are true or false. Rewrite the false statements to make them true.**

1. True.
2. True.
3. True.
4. False. Presentation software helps us prepare presentations for meetings and education.
5. False. A video player is entertainment software.

**C. Select the correct option for each question.**

1. c
2. a
3. b
4. d
5. a

**D. Answer the following questions.****1. Differentiate between application software and system software with the help of examples.**

System software is responsible for the running and maintenance of a computer system. It cannot perform specific tasks. The Windows operating system, image viewers, and disk scanners are parts of system software. Application software is used for specific tasks. Microsoft Word and Microsoft Excel are two examples of application software.

**2. What is educational software used for?**

Educational software is used to provide interactive exercises on various topics. It offers interesting activities that make learning enjoyable. Educational software comes in the form of dictionaries, encyclopedias and educational games. It can be used to educate young children at home, and to train people in large offices.



**3. How do different types of design software help people who work in factories?**

Design software helps people who work in factories by controlling machines to perform difficult or dangerous tasks. Computer Aided Manufacturing (CAM) uses computers to control robots and machines that can perform dangerous tasks such as welding and lifting heavy objects. This helps to avoid injuries to factory workers.

**4. What is desktop publishing software?**

Desktop publishing software is a type of application software. It is used to produce documents like banners, books, greeting cards, and posters. Desktop publishing enables us to combine text and graphics to produce informative and attractive documents. It also helps us to produce such documents in less time.

**5. What is a database? Why should it be well-organized?**

A database is a collection of organized data. It helps people like business managers to search for important data and use it to make decisions. It is important for a database to be well-organized because it helps people to find data quickly and easily. They can then make quick decisions to solve problems.

**E. Give descriptive answers for the following questions.**

**1. A student wants to collect information about World War II and write a report for her class. Which application software should she use to complete this task? Give reasons.**

The student should use Microsoft Word to prepare her report. The reasons are given below.

Microsoft Word includes several options for preparing reports such as formatting options and font styles. The user can write the report and edit it before making a printout. Features such as spell-check and grammar check can be used to remove common mistakes from the report. Information can be organized in the form of headings, bullets, and numbering to improve the appearance of the report.

**2. A photographer is considering installing graphics software on his computer but does not know how it can help him. What would you explain to the photographer?**

Graphics software has several uses for photographers. The main uses are explained below.

The photographer can scan and edit photographs for different documents such as brochures, flyers, or postcards. In addition, the photographer can edit the pictures to remove unwanted spots and objects from the image. He can also add design elements such as borders and frames to photographs using graphics software.

**3. How is database management software used at your school?**

Database management is mainly used to store information about teachers, students, and the educational program. It is used to store student information such as their names, roll numbers, education records, school fees details, etc. The names of all teachers, their educational qualifications, salary details, and subjects taught are stored on a database. The list of textbooks for all classes and syllabus for the term are stored on the school database.

**F. Lab exercise**

For the teacher: It is important to have at least one educational software package installed on each computer in the lab prior to this activity. Encourage students to explore the contents of the computer and discover educational software such as dictionaries, encyclopedias, games, quizzes, etc. It would help to brainstorm examples of educational software in the classroom before taking students to the lab. You could also ask students to specify the computer number and the location (folder or drive) of each software package in their lists. Compile the lists prepared by the students into a single list and put it up on the notice board in the lab for easy reference.

## G. Project

For the teacher: It is a good idea to brainstorm different processes that are carried out in a car factory. You could bring in pictures of different operations. (These can be downloaded from the Internet and printed on a colour printer.) Encourage students to use the Internet to search for the names of software used in the car industry. Simply ask them to name the different software as further detail is likely to be beyond their comprehension.

## Additional information for the teacher

- The different types of application software are designed to perform various functions such as writing letters, creating databases, and connecting to the Internet. Dedicated software packages are used to serve each purpose and they serve different markets. Expert systems serve the business market while chat software is primarily designed for home users.
- As opposed to system software, application software normally do not come in a single software suit and need to be purchased separately. Common software for a computer system includes web browsers, communication software, entertainment software, etc.
- Microsoft Internet Explorer is a popular web browser owned by Microsoft. It is more popular than other browsers because it is included in each MS Windows software pack. Web browsers enable us to access different websites. They also enable us to search for information on the Web, visit particular websites, access net resources/libraries, and so on.
- Another feature of web browsers is that they enable us to access **search engines** where we can find information and resources on almost any subject or topic.
- **Chat software** is another software class that comes within communication software. Chat applications and **messenger services** are popular types of chat software. They enable us to maintain online contacts and carry out discussions and share information. People can keep themselves updated about how their friends are doing.
- Chat software is also available online from websites. Users can just download them and start using them. They can then regularly download updated versions of the software.
- Decision-making software serves particular business functions. These software utilize available data to draw conclusions and suggest the best course of action. Besides DSSs and ESs, **Knowledge Work Systems** and **Transaction Processing Systems** are two additional types of decision-making software. The TPS is a particularly simple DMS which uses input data to perform simple processes like billing, creation of invoices, etc. Within a school setting, a simple TPS would be used to create and issue fee vouchers and receipts.

# Activity Sheet

## I. What is...?

1. What is computer-aided learning?

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2. What is the benefit of computer-aided design (CAD)?

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3. What is the function of a slide show?

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4. What is the difference between graphics software and DTP software?

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5. What is a media player?

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6. What is meant by database management?

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## II. Complete each sentence by circling the correct words in the brackets.

1. Design software is used by (engineers/teachers).
2. Word processors are used to (calculate/edit) data.
3. (Graphics/Presentation) software is used for creating special effects in films.
4. A codec (increases/reduces) the size of an audio file.
5. (Microsoft Access/Microsoft Excess) is a popular database management software.
6. Decision-making software help to make decisions according to (choice/criteria).



# Test Sheet

**I. Tick five boxes to show which five of these statements are most likely to be true.**

**(5 marks)**

1. Application software is used to perform routine tasks on a computer.
2. Interactive software makes it possible to receive an immediate response from the computer.
3. Design software is used to control machines in factories.
4. Microsoft Word is a type of educational software.
5. Good presentations contain detailed information about a topic.
6. We can make changes to photographs by using graphics software.
7. Desktop publishing software offers us several options for page layout.
8. Entertainment software enables us to listen to music and play games.
9. A database is a collection of the most recent data.
10. Decision-making software helps managers save time.

**II. Complete the following statements by filling in the blanks with the correct terms.**

**Each word or phrase can be used only once.**

**(6 marks)**

aided	tutorials	codec
animation	System	Publisher

1. \_\_\_\_\_ software is used to run and maintain a computer.
2. Educational CDs include quizzes and \_\_\_\_\_.
3. CAD stands for computer-\_\_\_\_\_ design.
4. A slide show combines text, graphics, and \_\_\_\_\_.
5. Microsoft \_\_\_\_\_ is an example of desktop publishing software.
6. A \_\_\_\_\_ helps to store audio files on a computer.

**III. List four types of application software that might be used by a newspaper publisher.**

**(4 marks)**

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## Answers to activity sheet

### I. What is...?

1. Computer-aided learning (CAL) is the use of educational software to help educate people.
2. Computer-aided design (CAD) makes it easier to create detailed designs for products quickly and accurately.
3. A slide show is used to provide information on a topic. It mainly uses visual information.
4. Graphics software helps us to create visual images while DTP software combines both text and graphics.
5. A media player is an application that enables us to play audio and video files.
6. Database management is a set of activities for collecting, organizing, and maintaining data in a database.

### II. Complete each sentence by circling the correct words in the brackets.

1. Design software is used by (engineers/teachers).
2. Word processors are used to (calculate/edit) data.
3. (Graphics/Presentation) software is used for creating special effects in films.
4. A codec (increases/reduces) the size of an audio file.
5. (Microsoft Access/Microsoft Excess) is a popular database management software.
6. Decision-making software help to make decisions according to (choice/criteria).

## Answers to test sheet

### I. Tick five boxes to show which five of these statements are most likely to be true.

2. Interactive software makes it possible to receive an immediate response from the computer.
3. Design software is used to control machines in factories.
6. We can make changes to photographs by using graphics software.
8. Entertainment software enables us to listen to music and play games.
10. Decision-making software helps managers save time.

### II. Complete the following statements by filling in the blanks with the correct terms. Each word or phrase can be used only once.

- |                  |                  |                  |
|------------------|------------------|------------------|
| <b>aided</b>     | <b>tutorials</b> | <b>codec</b>     |
| <b>animation</b> | <b>System</b>    | <b>Publisher</b> |
| 1. System        | 2. tutorials     | 3. aided         |
| 4. animation     | 5. Publisher     | 6. codec         |

### III. List four types of application software that might be used by a newspaper publisher.

(Possible answers)

1. Productivity software
2. Desktop publishing software
3. Word processing software
4. Graphics software
5. Database management software



### Teaching objectives

The objectives of this chapter are to:

- introduce different viewing and formatting options
- explain the functions of the Undo, Redo, Find, Replace, and Print commands
- explain how inserting the date, time, and page numbers helps in organizing several documents
- explain how symbols, page breaks, section breaks, footnotes, and endnotes can be inserted in a document
- explain how a document can be previewed.

### Learning outcomes

After completing this chapter, students should be able to:

- compare different viewing modes
- apply various formatting commands to a document
- insert text, date, time, and page numbers in a document
- explain the importance of referencing by using footnotes and endnotes
- explain the importance of previewing a document.

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### Introduction for the teacher

This chapter builds on students' knowledge from two sources: their understanding of application software from the previous chapter and their knowledge of word processing from Book 1. This chapter describes Microsoft Word as one specific type of application software and provides information about the formatting options available.

The discussion should begin with an explanation of the different modes of viewing a document. This should be followed by an explanation of the Zoom and Split features. It should be explained that viewing a document in several ways helps to edit and format it better.

Once this has been understood, students should learn how to insert text on a document. They should learn to use the Undo and Redo commands to correct errors. They should also learn how to insert the date, time, and page numbers on a document. They should then learn to use the Word Count feature. They should also learn the use of the Find and Replace commands.

Next, students should be introduced to some advanced features. They should learn how to insert symbols, page breaks, section breaks, footnotes, and endnotes on a document. They should learn the function of these items of information.

Finally, students should learn how to preview and print a document.



By the end of the chapter, students should be able to create, edit, format, and print a document using Microsoft Word on their own.

## **Number of allocated periods: 3**

### **Period 1**

#### **Sample lesson plan for a 40-minute period**

##### **Starter activity (5 minutes)**

Ask students the following questions:

*How do we format a Word document?*

*What is a database?*

*How can we organize our documents?*

##### **Reading and explanation (lab session) (30 minutes)**

Discuss sections 5.1 to 5.5 on pages 49 to 51 of the textbook.

These sections focus on the different ways in which a Word document can be viewed. They prepare the ground for the discussion of formatting options discussed later in the chapter (except for section 5.4 which explains the procedure for inserting text in a document). Therefore, allow students to become fluent with the different viewing modes by encouraging them to view a document on the computer in different layouts, under different zoom settings, and by splitting a window.

While explaining each feature, remember to explain the advantages of these features. Explain that these features make it easy to view different parts of a document at the same time. This helps us to check whether formatting is consistent throughout the document. We can then make changes to the formatting to make it consistent.

It would be useful if a two-to-three-page document were prepared and saved on each computer beforehand. This would help to avoid time being wasted by students typing a lengthy document before they start viewing it in the different modes.

If too few computers are available, you could guide students by asking them to observe the screenshots shown on pages 49 to 51 of the textbook.

By the end of the lesson, students should be well-versed in the different viewing features. They should be able to explain how these features help us to format a document more appropriately.

##### **Homework assignment (5 minutes)**

Assign questions 1 and 2 from section D (page 60) as homework. Clarify what is required of students in their answers. You should stress that reproducing from the textbook is not desirable.

### **Period 2**

##### **Starter activity (5 minutes)**

##### **Reading and explanation (lab session) (30 minutes)**

Discuss sections 5.6 to 5.11 on pages 51 to 54 of the textbook.

##### **Homework assignment (5 minutes)**

Assign question 3 from section D (page 60) as homework. Clarify what is required of students in their answers. You should stress that reproducing from the textbook is not desirable.

### Period 3

#### **Starter activity (5 minutes)**

#### **Reading and explanation (lab session) (20 minutes)**

Discuss sections 5.12 to 5.15 on pages 54 to 57 of the textbook.

#### **Classroom activity (10 minutes)**

Assign sections A, B, and C on pages 59 and 60 to be completed in the classroom.

#### **Homework assignment (5 minutes)**

Assign questions 4 to 6 from section D, section E (page 60), and section G (page 61) as homework. Clarify what is required of students in their answers. You should stress that reproducing from the textbook is not desirable.

### **Suggested answers to end-of-chapter questions on pages 59 to 61**

#### **A. Fill in the blanks.**

1. Status                      2. Split                      3. Ctrl + Z                      4. Insert                      5. Zoom

#### **B. State whether the following statements are true or false. Rewrite the false statements to make them true.**

1. False. Print Layout displays a document as it would appear on a printout.
2. True.
3. True.
4. False. The Symbol feature should be used to insert symbols that are not found on a keyboard.
5. False. The Word Count feature can be accessed from the Review tab.
6. True.
7. True.

#### **C. Select the correct option for each question.**

1. b                      2. b                      3. a                      4. a                      5. b

#### **D. Answer the following questions.**

##### **1. What is the advantage of viewing a document in different ways?**

Viewing a document in different ways allows us to see how it would appear in different formats. It enables us to see how the same document would appear in the form of a book or as a web page.

##### **2. How does the Split feature help us format a document?**

The Split feature helps us format a document by enabling us to view two parts of a single document in two different windows. We can scroll down one part of a document while viewing another part in a separate window. This helps us identify formatting errors in the document.

##### **3. Describe the steps involved in replacing a word in a document.**

To replace a word in a document, we can follow these steps:

- Go to the Editing group on the Home tab and select Replace.
- In the Find what window, type the word to be replaced.
- In the Replace with window, type the new word.

- Click on Find Next. The word becomes selected on the document.
- Click on Replace to replace the word. Click on Find Next to move to the next point in the document where the word appears.
- Click on Replace All to replace the word throughout the document.
- Click on Cancel or Close to return to the document.

**4. List the different options available for inserting section breaks.**

The options available for inserting section breaks are listed below:

1. Next page
2. Continuous
3. Even page
4. Odd page

**5. What is the difference between a footnote and an endnote?**

A footnote appears at the bottom of every page whereas an endnote appears at the end of a document.

**6. Under separate headings, list the commands and features that can be accessed from the View tab and the Home tab.**

View Tab	Home Tab
Full Screen Reading Layout	Font size
Print Layout	Paste
Web Layout	Cut
Outline	Copy
Draft	

**E. Write paragraphs to answer the following questions.**

**1. What type of errors can be detected while using Print Preview?**

Print Preview can be helpful in detecting many types of errors before a document is printed. It can help to detect excessive empty space on some pages of the document. It can also help us correct the size of text that is too small or too large for comfortable reading. Accurate and consistent line and paragraph spacing, document formatting, borders, etc. can be checked to ensure the final document matches our requirements.

**2. What word processing features can help to give a professional appearance to a document?**

Some important features can help give a professional appearance to a document. Font type and size has options to select an appropriate font type and size. Normally Times New Roman with font size 12 is used for professional documents. Appropriate page borders and title page can be inserted to improve the presentation of a document. To avoid copying of the content, the footer and header can show the writer's information. A watermark can also be used.

**3. You receive two reports—one with footnotes and endnotes and one without. Which of these would you prefer? Why?**

I would prefer the report containing footnotes and endnotes. The reason is that this document is more authentic than the other one. I can cross-check the information from the source quoted and use it to do my own research. I can also verify if the report is based on correct information.

## Additional information for the teacher

- Microsoft Word comes equipped with multiple options that make document creation and formatting extremely easy. The options are placed within easy reach and a variety of shortcut keys enable one to make quick changes to documents. These features can also be understood by pressing the F1 key or by using the **Help** option.
- Microsoft Word includes several tabs and groups that contain various functions. The **Home tab** contains options with respect to the font, paragraph, styles, and editing. The first two options enable modification of the respective items with respect to size, alignment, colour, etc. The **Styles** option enables content to be displayed in different ways.
- The **Clipboard** contains features like Cut, Copy, and Paste. These options help one to edit a document quickly and efficiently.
- The **Insert tab** contains features that enable referencing information to be inserted in a document. The date, time, page numbers, comments, footnotes, and endnotes allow important information to be enable located within a document. The **Header & Footer group** enables standard elements to be inserted on a document. This feature is useful when composing a letter. Attention lines, subject lines, and closing lines can be inserted in a letter.
- The **References tab** includes features with respect to citations. This enables one to enhance the reliability of documents and enables easy referencing of material.
- The **Mailings tab** is helpful in creating envelopes and mailing documents to several recipients. One example is the **Mail Merge** feature which enables the sender to deliver the same letter with some modification (such as the recipient's address) to multiple recipients.
- The **View tab** shows or hides additional features in MS Word like toolbars and rulers.

## Activity Sheet

### I. What is...?

1. What is the function of Web Layout?

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2. What are the shortcut keys for the Undo and Redo commands?

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---

3. What is page number alignment?

---

---

4. What is a section break?

---

---

5. What is meant by referencing?

---

---

6. What is the advantage of previewing a document before printing it?

---

---

### II. Complete each sentence by circling the correct words in the brackets.

1. The default view in Microsoft Word is (Normal/Print Layout).
2. It is possible to set a (percentage/fraction) for zoom settings.
3. To reunite windows that have been split, we use the (Remove Split/Undo Split) feature.
4. The Insert key allows us to replace text to the (left/right) of the cursor.
5. The Word Count feature can be accessed from the (Insert/Review) tab.
6. A/An (footnote/endnote) is placed at the bottom of a page.

# Test Sheet

## I. Tick five boxes to show which five of these statements are most likely to be true.

(5 marks)

1. The simplest view is Print Layout.
2. Zooming in makes the text appear larger.
3. The Split feature is accessed from the View tab.
4. The Insert key allows us to add symbols in a document.
5. We can replace a word in a document by using the Find command.
6. The Page break feature enables us to tell the computer where to start the next page.
7. The Print Preview icon is found on the Home tab.
8. The Zoom icon helps us to format a document.
9. It is possible to view two or more pages at the same time while previewing a document.
10. The default setting for paper size is A4.

## II. Complete the following statements by filling in the blanks with the correct terms.

Each word or phrase can be used only once.

(4 marks)

paragraphs      Full Screen Reading      reverse      currency  
 number      Replace All      preview      Page

1. \_\_\_\_\_ Layout enables us to see how a document would appear in a book.
2. The Undo command enables us to \_\_\_\_\_ the last action performed.
3. The Word Count feature enables us to find out the number of words, lines, and \_\_\_\_\_ in a document.
4. \_\_\_\_\_ \_\_\_\_\_ enables us to replace one word or phrase with another throughout a document.
5. The Symbol feature allows us to insert \_\_\_\_\_ symbols.
6. Column break is a \_\_\_\_\_ break option.
7. Each footnote and endnote is given a reference \_\_\_\_\_.
8. We can \_\_\_\_\_ a document before printing it.

# Test Sheet

III. Why is the following information useful?

(6 marks)

1. Date

---

2. Page numbers

---

3. Endnotes

---

## Answers to activity sheet

### I. What is...?

1. Web Layout enables us to see how a document would appear as a web page.
2. Undo command (Ctrl+Z), Redo command (Ctrl+Y)
3. Page number alignment is the placement of the page number on the page. It can be aligned to the left or right of the page. It can also be aligned centrally, inside, or outside.
4. Section break is a feature that allows us to divide a document into sections.
5. Referencing is the method of pointing to relevant or important information in a document.
6. Previewing a document before printing it enables us to identify and correct any mistakes before printing it.

### II. Complete each sentence by circling the correct words in the brackets.

1. The default view in Microsoft Word is (Normal/**Print Layout**).
2. It is possible to set a (**percentage**/fraction) for zoom settings.
3. To reunite windows that have been split, we use the (**Remove Split**/Undo Split) feature.
4. The Insert key allows us to replace text to the (left/**right**) of the cursor.
5. The Word Count feature can be accessed from the (Insert/**Review**) tab.
6. A/An (**footnote**/endnote) is placed at the bottom of a page.

## Answers to test sheet

### I. Tick five boxes to show which five of these statements are most likely to be true.

2. Zooming in makes the text appear larger.
3. The Split feature is accessed from the View tab.
6. The Page break feature enables us to tell the computer where to start the next page.
9. It is possible to view two or more pages at the same time while previewing a document.
10. The default setting for paper size is A4.

### II. Complete the following statements by filling in the blanks with the correct terms. Each word or phrase can be used only once.

- |                              |                                            |                            |                          |
|------------------------------|--------------------------------------------|----------------------------|--------------------------|
| <b>paragraphs<br/>number</b> | <b>Full Screen Reading<br/>Replace All</b> | <b>reverse<br/>preview</b> | <b>currency<br/>Page</b> |
| 1. Full Screen Reading       | 2. reverse                                 | 3. paragraphs              | 4. Replace All           |
| 5. currency                  | 6. Page                                    | 7. number                  | 8. preview               |

### III. Why is the following information useful?

1. **Date**  
It helps us to arrange our documents in order of time.
2. **Page Numbers**  
They help us to arrange pages in a document.
3. **Endnotes**  
They identify where the writer of a document got his information.

### Teaching objectives

The objectives of this chapter are to:

- explain the procedures for changing row height and column width
- explain the procedures for inserting new rows and columns
- explain the importance of using formulas and functions
- explain the necessity of inserting charts on a spreadsheet.

### Learning outcomes

After completing this chapter, students should be able to:

- adjust row height and column width on a spreadsheet software
- explain the importance of using formulas
- differentiate a function from a formula
- insert the SUM, AVERAGE, MIN, and MAX functions on a spreadsheet
- insert charts on a spreadsheet to represent data pictorially.

---

## Introduction for the teacher

Like the previous chapter, this chapter also builds on students' understanding of application software and the corresponding chapter on Microsoft Excel in Book 1. Students should be familiar with the components of a worksheet. They should also be able to navigate around a worksheet and insert data at appropriate points on a spreadsheet. This chapter tries to extend that knowledge by explaining how spreadsheets can be used to analyze and interpret data.

Since students are familiar with the use of rows and columns, they should now learn to modify row height and column width according to their needs. Students should learn these operations by using the mouse as well as by accessing the relevant options. In addition, they should also learn how to insert new rows and columns on a worksheet to incorporate additional data.

Next, students should be introduced to the use of formulas in Microsoft Excel. They should understand that a formula helps us to process data on a spreadsheet. The elements of a formula should be described. Students should be encouraged to write several formulas in order to become fluent with different operations.

Students should also be introduced to the use of functions. It should be explained that functions help to simplify formulas. The SUM, AVERAGE, MIN, and MAX functions should be explained. Students should then be encouraged to create formulas with several functions.

Finally, students should learn how to insert charts on a spreadsheet. They should understand that charts enable us to analyse and interpret data more easily. Charts also enable us to present data in an attractive way.

By the end of the chapter, students should be able to insert data on a spreadsheet, process it with the help of relevant formulas and functions, and present it in the form of a chart.

## **Number of allocated periods: 3**

### **Period 1**

#### **Sample lesson plan for a 40-minute period**

##### **Starter activity (5 minutes)**

Ask students the following questions:

*What is a spreadsheet?*

*What type of data do we process in Microsoft Excel?*

*Are there ways in which numbers can be made easier to understand?*

##### **Reading and explanation (lab session) (30 minutes)**

Discuss sections 6.1 to 6.3 on pages 63 to 65 of the textbook.

Ask students to recall the functions of a spreadsheet from Book 1. They should be able to describe a spreadsheet as a format for presenting and analysing numerical data. They should be able to recall the division of a spreadsheet into cells, rows, and columns. They should also be able to identify some of the purposes for which a spreadsheet might be used.

After students have identified the rows and columns on a spreadsheet, explain that the row height and column width can be changed according to one's requirements. Introduce the concepts of points and number of characters for row height and column width, respectively. Explain the procedures given in the textbook. Ask students to follow the steps on their computers. Once students have become familiar with the steps, explain the procedure for doing the same with the help of a mouse. Give students sufficient time for practice until they become fluent with the procedures.

In the final part of the session, explain the procedure for adding new rows and columns on a worksheet. Once again, read out the instructions from the textbook while performing them on a computer. Ask students to follow the instructions on their computers. Make sure each student has an opportunity to practise the procedures. Also, make sure that students are clear about which rows and columns they should select if they want the new rows and columns to appear at a particular place on the spreadsheet.

##### **Homework assignment (5 minutes)**

Assign questions 1 to 3 from section D (page 73) as homework. Clarify what is required of students in their answers. You should stress that reproducing from the textbook is not desirable.

### **Period 2**

##### **Starter activity (5 minutes)**

##### **Reading and explanation (lab session) (30 minutes)**

Discuss sections 6.4 to 6.5 (The AVERAGE function) on pages 65 to 68 of the textbook.

##### **Homework assignment (5 minutes)**

Assign question 4 from section D (page 73) as homework. Clarify what is required of students in their answers. You should stress that reproducing from the textbook is not desirable.

### **Period 3**

#### **Starter activity (5 minutes)**

#### **Reading and explanation (lab session) (20 minutes)**

Discuss sections 6.5 (The MIN function) to 6.6 on pages 68 to 70 of the textbook.

#### **Classroom activity (10 minutes)**

Assign sections A, B, and C on page 72 to be completed in the classroom.

#### **Homework assignment (5 minutes)**

Assign question 5 from section D and section E (page 73) as homework. Clarify what is required of students in their answers. You should stress that reproducing from the textbook is not desirable.

### **Suggested answers to end-of-chapter questions on pages 72–73**

#### **A. Fill in the blanks.**

1. 15                      2. Home                      3. equals                      4. SUM                      5. Insert

#### **B. State whether the following statements are true or false. Rewrite the false statements to make them true.**

1. True.
2. True.
3. False. The Hide option hides a row or column on the worksheet.
4. False. Up to 255 characters can be inserted in a single cell.
5. False. New columns are always inserted to the left of the selected column.

#### **C. Select the correct option for each question.**

1. a                      2. b                      3. c                      4. d                      5. c

#### **D. Answer the following questions.**

##### **1. Describe the steps involved in changing row height.**

To change row height, we can follow these steps:

- Click on the row number/s in the frame to select the row or rows.
- Select Row Height from the Format button on the Cells group on the Home tab.
- Enter the new height in the box opposite Row height.
- Click on OK.

##### **2. What is the function of the AutoFit Selection feature?**

The AutoFit Selection feature enables us to increase or decrease the column width according to the amount of data in the column. In this way, the data completely fills the column and there is no waste of space.

##### **3. What is a formula? Describe the elements of a formula.**

A formula expresses the relationship between several terms. Each term in a formula is represented by a symbol. We use formulas in Excel to perform calculations. Such formulas contain some standard elements. These are described below:



- Bracket contain the range of cells on which the operation is to be performed. They are represented as ().
- Operators represent the type of operation that is to be performed on the data. Operators are represented by the symbols +, -, \*, /, ^, <, >, and =.
- Cell references indicate the cells that contain the data on which an operation is to be performed. They may be represented as A2:I2.
- Functions are pre-written formulas that help us to perform specific calculations. Some common functions are SUM, AVERAGE, MIN, and MAX.
- Values include numerical data such as 10, 5.4, and so on.
- Text includes data in the form of letters and characters. Lahore, Asif, and Total are examples of text.

**4. What is the advantage of using functions? Answer with the help of an example.**

The advantage of using functions is that they help us to avoid entering lengthy formulas. They enable us to perform a specific operation on a large range of cells. We do not need to enter an operator repeatedly. This helps us to save time and avoid making mistakes.

To find the total of values in the cells B4, C4, D4, E4, F4, we might use the formula

=B4+C4+D4+E4+F4.

We could also use the SUM function by typing

=SUM(B4:F4).

In this way we do not have to enter each cell reference separately.

**5. Why do we use charts on a worksheet?**

We use charts on a worksheet because they present data in an interesting and attractive way. Charts use visual forms such as lines, bars, and diagrams to help us read and analyse data. Charts also allow people to form a general idea about the data without having to read a lot of data. They help us to know whether data is increasing or decreasing with time.

**E. Write paragraphs to answer the following.**

**1. Identify two situations where the AVERAGE function would be useful.**

The AVERAGE function would be most useful for a teacher who wants to calculate the average percentage of the whole class. If the class contains 20 students then their individual percentage marks will give the average of the whole class. This can show the students whose performance is above average, average, and below average. The AVERAGE function can also be used to find the average monthly expenditure on food, bills, fuel, etc. by a family in a year. The expenditure for 12 months can be added up and divided by 12 to find the average monthly expenditure.

**2. How might the MAX and MIN functions be helpful to your teacher?**

The MAX and MIN function can instantly tell a teacher who the top and bottom scorers in the class are. The same rule can be applied for each subject, e.g. Amina is the top scorer in mathematics with 95% marks and Haider is the bottom scorer with 52% marks.

**F. Lab exercise**

For the teacher: Allow students time to enter the data on the Excel sheet for both the activities. Let the students enter the functions on their own. Some students may find entering a function daunting and might enter the formula for the operation. Keep a watch on such students and gently encourage them to recall and insert the correct functions.

### G. Project

For the teacher: Encourage students to discuss what they have learnt in class with their parents and friends at home. This will enable them to translate their classroom learning to the real environment. Students may also need to consult their parents for information about their allergies, medication, and doctors as they may not possess this information. Before students can collect the data, ask them to think about how the final spreadsheet will help them and their classmates. Print out the final spreadsheet and put it up on the classroom notice board.

### Additional information for the teacher

- An electronic spreadsheet is an application program that enables text, numbers and formulas to be entered into a grid of rectangular cells. Electronic spreadsheets organize data and perform calculations. They are a particularly good choice of software when a task involves working with numerical data and displaying results in graphs.
- Common applications of spreadsheet software include finance-related tasks such as budgeting and forecasting. Teachers can use spreadsheet software to record grades, while marketing professionals can use them to record and evaluate sales trends.
- Generally, Microsoft Excel can be understood as a combination of four aspects:
- **Worksheets** enable data in the form of numbers and text to be entered, organized, analysed, and presented in a variety of ways.
- **Charts** enable data to be presented in pictorial form. The Chart Wizard makes this process simple, saves time, and minimizes errors. Bar charts, line graphs, pie charts, and scatter diagrams are some of the charts that are commonly used to present data. Data can also be represented in the form of two-dimensional and three-dimensional charts.
- **Databases** manage data entered on a worksheet. Once data has been entered on a worksheet, Excel can sort the data, search for specific data required by the user, and select data that meets given criteria.
- Microsoft Excel also offers **Web support**. This feature enables Excel to save a workbook or part of a workbook in HTML format so that it can be viewed and manipulated using a web browser.



## Activity Sheet

### I. What is...?

1. What is the function of the Hide feature?

---

---

2. What is the default column width?

---

---

3. What is a function?

---

---

4. What is the purpose of the SUM function?

---

---

5. What is the purpose of the AVERAGE function?

---

---

6. What is a legend?

---

---

### II. Complete each sentence by circling the correct words in the brackets.

1. We can change row height from the (Styles/Cells) group.
2. New columns are inserted to the (left/right) of the selected columns.
3. Values include (numerical/text) data.
4. The (Autofill/Copy) handle enables us to copy a formula.
5. We can create charts by going to the (View/Insert) tab.

# Test Sheet

## I. Tick five boxes to show which five of these statements are most likely to be true.

(5 marks)

1. Row height is measured in points.
2. Column width can range from 0 to 255 characters.
3. To view a hidden column, we use the View Again feature.
4. Operators indicate what type of operation is to be performed.
5. 6A is a valid cell reference.
6. A formula begins with a + sign.
7. We use the MIN function to find the smallest value in a range of cells.
8. A cell range may be specified by A5:A15.
9. Charts make information difficult to understand.
10. A chart can only be inserted on a separate worksheet.

## II. Write the formulas for performing the following operations.

(10 marks)

1. Finding the total of values in cells A1, A2, A3, A4, and A5

---

2. Finding the average of values in cells C8, C9, C10, C11, and C12

---

3. Finding the largest of the values in cells E21, E22, E23, E24, and E25

---

4. Finding the smallest of the values in cells B1, B2, B3, B4, and B5

---

5. Finding the total of values in cells G1, G5, G6, H9, and K3

---

## Answers to activity sheet

### I. What is...?

1. The Hide feature is used to prevent a row or a column from being visible on the worksheet.
2. The default column width is 8.43 characters.
3. A function is a pre-written formula for a specific operation.
4. The SUM function is used to calculate the total of a set of values.
5. The AVERAGE function is used to find the average value of a set of data.
6. A legend is a key that explains what the different bars, lines, and colours on a chart represent.

### II. Complete each sentence by circling the correct words in the brackets.

1. We can change row height from the (Styles)/(Cells) group.
2. New columns are inserted to the (left)/right) of the selected columns.
3. Values include (numerical)/text) data.
4. The (Autofill)/Copy) handle enables us to copy a formula.
5. We can create charts by going to the (View)/(Insert) tab.

## Answers to test sheet

### I. Tick five boxes to show which five of these statements are most likely to be true.

1. Row height is measured in points.
2. Column width can range from 0 to 255 characters.
4. Operators indicate what type of operation is to be performed.
7. We use the MIN function to find the smallest value in a range of cells.
8. A cell range may be specified by A5:A15.

### II. Write the formulas for performing the following operations.

1. =SUM(A1:A5)
2. =AVERAGE(C8:C12)
3. =MAX(E21:E25)
4. =MIN(B1:B5)
5. =G1+G5+G6+H9+K3

## Teaching objectives

The objectives of this chapter are to:

- explain the importance of programming
- explain the advantage of creating step-by-step instructions in the form of an algorithm
- explain the benefits of creating a flow chart to solve a problem
- explain the functions of different flow chart symbols
- introduce the selection problem
- explain the terms condition, true, not true, and testing
- explain the purpose of the IF...THEN and IF...THEN...ELSE statements
- explain the function of the decision symbol in solving a selection problem.

## Learning outcomes

After completing this chapter, students should be able to:

- explain the stages involved in problem-solving
- explain the necessity of creating algorithms to solve problems
- identify different flow chart symbols and explain their functions
- create algorithms and flow charts to solve simple mathematical problems
- explain the selection problem with the help of examples from real life
- explain the role played by conditional statements in solving selection problems
- compare IF...THEN and IF...THEN...ELSE statements
- create algorithms and flow charts to solve problems using conditional statements.

---

## Introduction for the teacher

Before writing a computer program, one must be clear about the processing steps to be performed by the computer. To produce an effective computer program, one must plan the logic first. This chapter deals with how to carry out a sequence of instructions in order to achieve desired results with the help of flow charts.

This chapter offers a systematic approach to problem-solving through the use of algorithms and flow charts. This approach should serve as a foundation for the discussion of programming at later stages. It should also help students to reflect on all that they have learnt in this textbook. They should think about how different types of computer hardware, and software might improve over time.

Students should be introduced to the terms **selection** and **condition**. Common situations from everyday life involving selection should be described. Students should understand that selection problems involve making a choice from



two or more alternatives. They should further understand that to make a selection, we often set a condition that has to be met for a particular alternative to be satisfactory. The concept of testing a condition should be explained.

Next, the IF...THEN statement should be introduced. It should be explained that this statement involves a condition that has to be satisfied. If the condition is satisfied, a particular action is performed. Otherwise, the previous action is repeated until the condition is satisfied. Students should be able to identify problems from everyday life where they have to make such decisions.

Finally, the IF...THEN...ELSE statement should be introduced. It should be explained by differentiating it from the IF...THEN statement discussed previously. Students should understand that the IF...THEN...ELSE statement provides instructions for performing one action if the condition is satisfied, and another action if the condition is not satisfied. Again, students should be able to identify situations from everyday life that involve such decision-making.

## **Number of allocated periods: 4**

### **Period 1**

#### **Sample lesson plan for a 40-minute period**

##### **Starter activity (5 minutes)**

Ask students the following questions:

*How do programmers write programs?*

*What is a flow chart?*

##### **Reading and explanation (35 minutes)**

Discuss sections 7.1 to 7.2 on pages 75 to 76 of the textbook.

Explain what a program is. Explain that a program is difficult to write and, like every difficult activity, it becomes easier to write if it is done in steps.

Introduce the algorithm as the first step in writing a program. Describe it as the simplest way of understanding what a program is supposed to accomplish. Identify the benefits of algorithms. One benefit is that they help in early detection of errors. Encourage students to write algorithms in simple words for some activities that they perform on a daily basis.

### **Period 2**

##### **Starter activity (5 minutes)**

##### **Reading and explanation (30 minutes)**

Discuss section 7.3 on pages 77 to 79 of the textbook.

##### **Homework assignment (5 minutes)**

Assign questions 1 and 2 from section E (page 85) as homework. Clarify what is required of students in their answers. You should stress that reproducing from the textbook is not desirable.

### **Period 3**

##### **Starter activity (5 minutes)**

##### **Reading and explanation (25 minutes)**

Discuss sections 7.4 and 7.5 on pages 79 to 81 of the textbook.

##### **Classroom activity (5 minutes)**

Assign questions 1 and 2 of section D (page 85) to be completed in the classroom.

### Homework assignment (5 minutes)

Assign questions 3 to 5 from Section D and Section E on page 85. Clarify what is required of students in their answers. You should stress that reproducing from the textbook is not desirable.

### Period 4

#### Starter Activity (5 minutes)

#### Reading and explanation (25 minutes)

Discuss section 7.6 on pages 81 and 82 of the textbook.

#### Classroom activity (5 minutes)

Assign question 7 on page 85 to be completed in the classroom.

#### Homework assignment (5 minutes)

Assign question 6 and sections A, B, and C on pages 84 and 85 as homework.

## Suggested answers to end-of-chapter questions on pages 84 and 85

### A. Fill in the blanks.

1. steps                      2. Selection                      3. true                      4. testing                      5. IF...THEN

### B. State whether the following statements are true or false. Rewrite the false statements to make them true.

1. True.
2. False. A flow chart is a pictorial representation of an algorithm.
3. False. The Input/Output box represents data entry and output display.
4. True.
5. True.

### C. Select the correct option for each question.

1. b                      2. a                      3. d                      4. d                      5. a

### D. Answer the following questions.

#### 1. Why do we have to make selections? Explain with examples.

We have to make selections because there are many occasions where we have to choose from two or more actions. For example, when we want to buy clothes, we have to select from several styles and designs. Similarly, when we compose a document on a word processor, we have to select which font colour or font size to use.

#### 2. What is a condition?

A condition is a state that must be achieved for a certain event to take place. It is a necessary requirement for an action. A condition describes the things that must happen before we can take an action. A condition should be worded in the form of a question that has a Yes or No answer. If the condition is not satisfied, we cannot perform the specific action.

#### 3. When is a condition true? When is it not true?

A condition should be worded in the form of a question that has a Yes or No answer. A condition is true when we can answer Yes to the question. A condition is not true when the answer to the question is No.



**4. How does the IF...THEN statement help us in making a selection?**

The IF...THEN statement helps us in making a decision by specifying a condition and telling us what to do if the condition is true. If the condition is not true, we continue with the previous action.

**5. What is the difference between the IF...THEN statement and the IF...THEN...ELSE statement?**

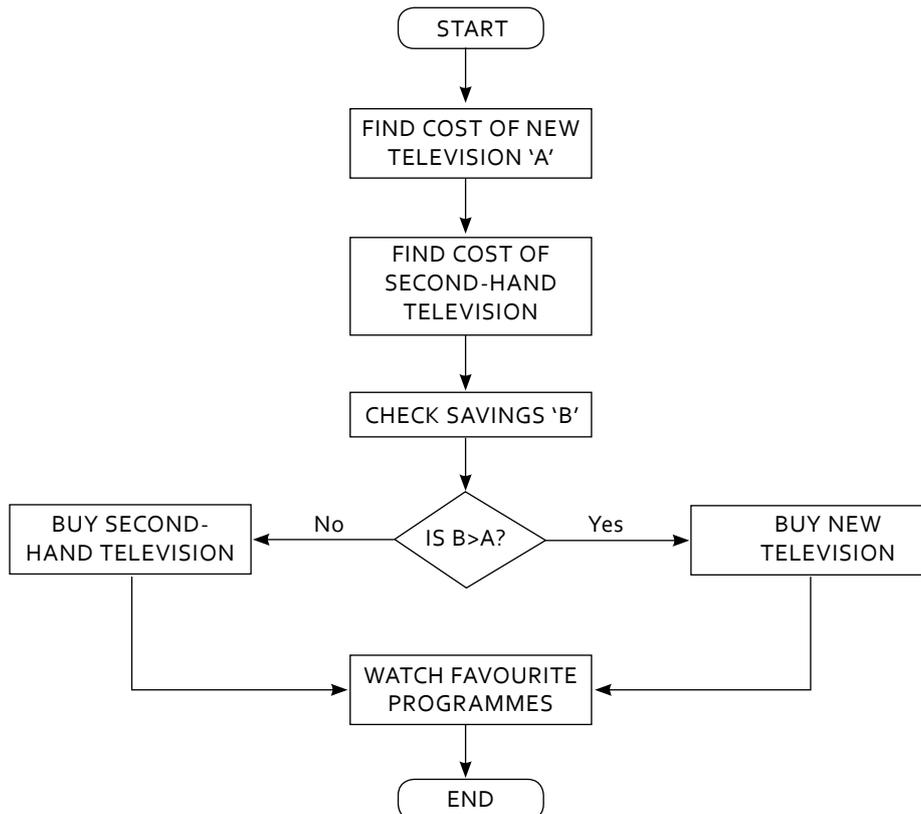
The difference between the IF...THEN statement and the IF...THEN...ELSE statement is that the IF...THEN statement only tells us what to do if a condition is true. It does not tell us what to do if the condition is not true. However, the IF...THEN...ELSE statement tells us both what to do if a condition is true and what to do if the condition is not true.

**6. Write an algorithm using an IF...THEN statement for deciding whether to refuel a car while driving along the motorway.**

1. Check fuel level.
2. IF fuel level is close to EMPTY, THEN refuel car.
3. Drive on.

**7. Create an algorithm and a flow chart for deciding whether to buy a new television or a second-hand one.**

1. Find out cost of new television.
2. Find out cost of second-hand television.
3. Check family savings.
4. IF family savings > cost of new television, THEN buy new television, ELSE buy second-hand television.
5. Watch favourite programmes.



**E. Write paragraphs to answer the following questions.**

- 1. Do only computers need step-by-step instructions? Describe three situations where you might need someone to give you step-by-step instructions. What would these instructions be like?**

Humans also require step-by-step instructions, because our brain processes information in steps and it is easier to remember. Step-by-step instructions can be helpful when one is following directions to a new or unfamiliar place. Applications like Google Maps make such activities easier. Step-by-step instructions are also helpful when taking an exam. Instructions such as 'Write your name and roll number on the answer sheet' are helpful for a student. Step-by-step instructions are also helpful when checking in for a flight and reaching the departure lounge.

- 2. Create an algorithm and flow chart for adding 37 and 64.**

Answers may vary.

**F. Lab exercise**

For the teacher: It is advisable to first assign a task on a Word document. Ask the students to first plan out the steps they will take to complete the task. Next, ask the students to write an algorithm and draw a flow chart based on their plan. You could then ask students to exchange their algorithms and flow charts with others and follow the instructions.

**G. Project**

For the teacher: Not all students may have access to the knowledge required for this project. If possible, invite parents of any student to explain the process in simple terms to the students. Alternatively, you could show an online video to the students describing the bank process before asking students to start work on the project.

## Additional information for the teacher

- Problems can be solved by applying a set of rules called **criteria**. We might arrange items alphabetically or according to their use. But we should also keep in mind that there might be more than one criterion for arranging data. We might sort a set of fruits according to colour, but we might also sort them according to size. Similarly, we might sort a list of names alphabetically. We might also sort the names by listing the boys' names first, followed by the girls' names. We might also list their names according to their ages. Whenever we face a problem, we should identify all the different ways in which that problem can be solved. We should then select the best solution to solve the problem.
- We can solve problems faster and in a better way if we try to solve them with a step-by-step approach. Let's discuss these steps one by one.
- Whenever we face a problem, we need to look around to find out what might have caused the problem. This can be done by studying the environment.
- It is very important to **define the problem**. Many people confuse the source of the problem with the result of the problem. Defining the problem helps us to differentiate between the source and the result. We can then find a solution to solve the problem at the source.
- It is important to set **standards** for the solution we want. It is also important to consider available resources.
- Once we have set the standards for the ideal solution, we can then search for all the possible solutions. These possible solutions are called **options**. It is important to search for as many options as possible, so that we can choose the best one.
- After listing all the options, we should see how well they meet our standards. What level of resources would be required for each option? Which option would give us the type of results we want? These questions help us decide which option to select.



- After evaluating all the options, we might then select the one that best matches our standards. This option is called the **solution**. We have now made a sound decision.
- After selecting the best option, we have to use our resources to apply it. This is called **implementing** the solution. Unless we implement the solution, the problem will not be solved.
- After implementing the solution, it is important that we see whether it is producing the expected results. This is called **monitoring** the system. It helps us verify whether we made a sound decision or not.

## Activity Sheet

**I. Attempt the following question.**

1. An examination consists of three papers, each marked out of 100. If a candidate obtains 80 or more marks on any paper, he is awarded a 'Distinction'. If he fails to be awarded a distinction, but the sum of his marks is 150 or more, he is awarded a 'Pass'. If none of these conditions is met, his paper is marked 'Fail.'

Draw a flow chart for a computer program to process and grade the examination results for the candidates appearing for this examination.



## Test Sheet

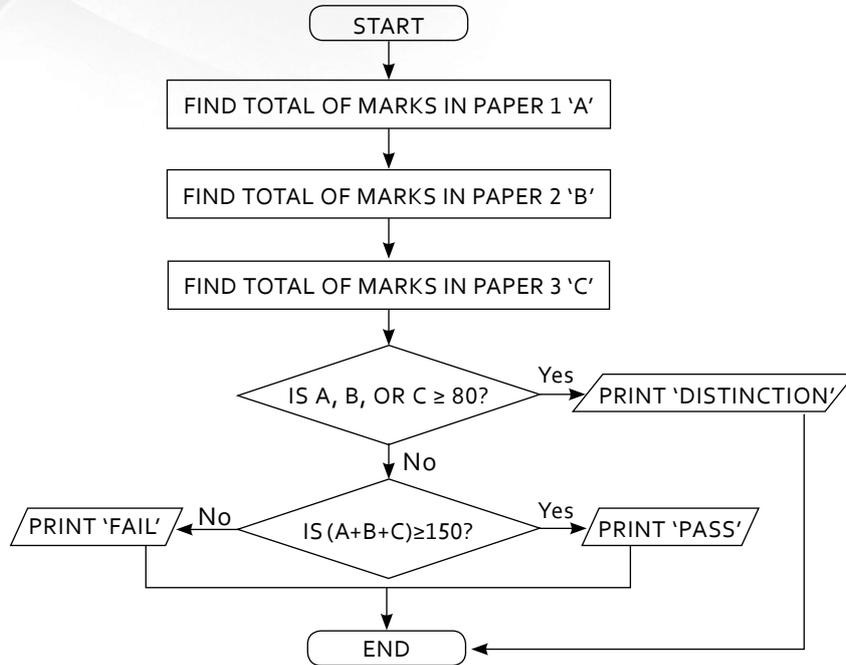
- I. Attempt the following question. (10 marks)
1. Draw a flow chart based on the following description of the cost of insuring a car. The basic cost of the annual insurance for a car is Rs 30,000 for full insurance or Rs 20,000 if full insurance is not required. If the driver is under the age of 21 and has not passed the driving test, the cost is increased by a further Rs 15,000. However, if he has passed his test the cost will be increased by only Rs 5000.



## Answers to activity sheet

I. Attempt the following question.

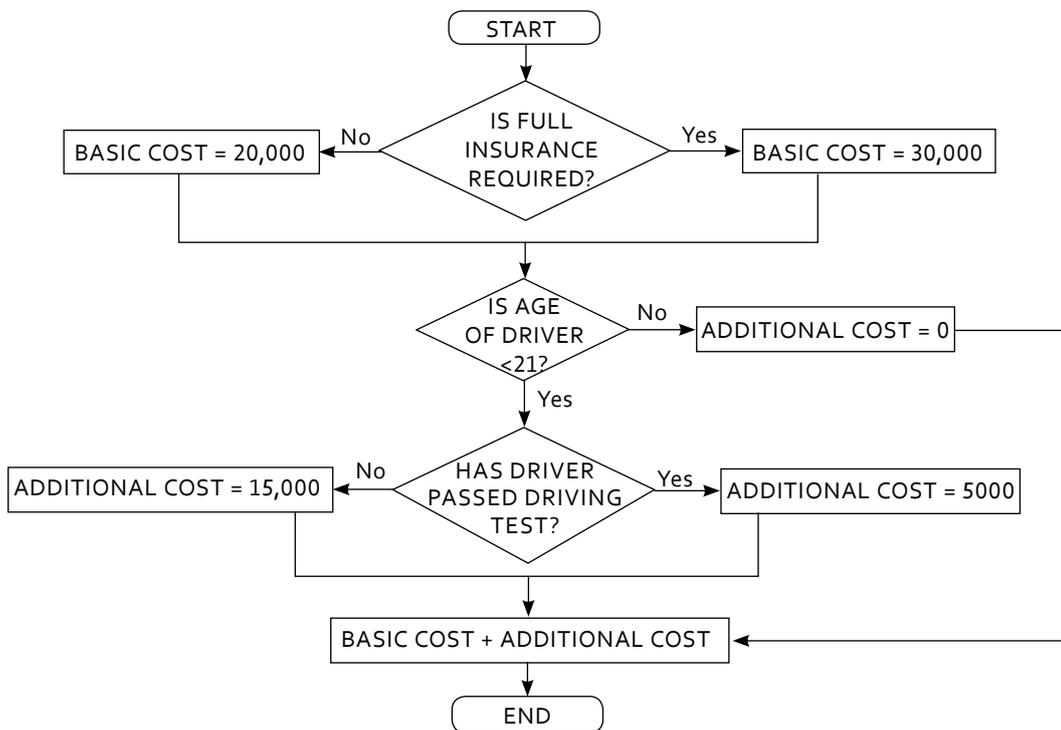
1.



## Answers to test sheet

I. Attempt the following question.

1.



## Teaching objectives

The objectives of this chapter are to:

- introduce the concept of programming languages
- explain the evolution of programming languages
- explain low-level and high-level languages
- explain the roles of assemblers, compilers, and interpreters
- introduce BASIC as a user-friendly and easy-to-learn programming language.

## Learning outcomes

After completing this chapter, students should be able to:

- define the terms program and programming language
- compare low-level and high-level languages
- explain the functions of assemblers, compilers, and interpreters
- explain why BASIC is a user-friendly language.

---

## Introduction for the teacher

The purpose of this chapter is to introduce students to programs and the different types of programming languages. The content of this chapter builds on students' knowledge of programs and programming languages from Book 1. At the same time, this chapter also acts as an extension of the previous chapter where students learned to create algorithms and flow charts to solve problems from everyday life.

The chapter begins by explaining the importance of step-by-step instructions. This section should be used to revise the concepts of algorithms and flow charts. At the same time, this section leads to the concepts of programs and programming languages.

Students should then be introduced to the concept of programs. It would be useful to remind students of the various application software that they have used. It should then be explained that these software function under the control of a program. The program provides instructions that enable the computer to follow the commands that we enter on a word processor or an electronic spreadsheet.

Next, it should be explained that programs are written in special languages called programming languages. The classification of programming languages into low-level and high-level languages should be explained. The basis for such classification should also be explained to students. Furthermore, the classification of programming languages into generations should also be explained. Students should understand that the more advanced programming languages are more user-friendly than the earlier languages based on assembly language.

Next, the functions of assemblers, compilers, and interpreters should be explained. At this point, students should be asked to recall the concepts of binary code and assembly language. They should also be asked to explain the difference between the two.

Finally, BASIC should be introduced as a simple programming language. Students should be given a general idea about the programming language. They should understand that one of the major reasons for its popularity is its user-friendliness. This section should build the foundation for a more detailed discussion on GW-BASIC in Book 3.

By the end of this chapter, students should be able to describe the different types of programming languages and their classification. They should also be able to identify the characteristics of high-level programming languages.

## Number of allocated periods: 3

### Period 1

#### Sample lesson plan for a 40-minute period

##### **Starter activity (5 minutes)**

Ask students the following questions:

*What does a computer need in order to work smoothly?*

*How do we give instructions to a computer system?*

##### **Reading and explanation (30 minutes)**

Discuss sections 8.1 to 8.3 on pages 87 to 89 of the textbook.

Begin by asking students to recall the advantages of step-by-step instructions. Students should be able to state that step-by-step instructions make it simpler to solve problems. In addition, they make it easier to identify errors in the solution. This helps to avoid costly corrections later. Once students have given their responses, ask them why a computer might need step-by-step instructions. They should be able to state that since the computer is not an intelligent machine, it cannot make decisions on its own. Therefore, it needs to be given step-by-step instructions to work efficiently.

Ask students if they remember what a program is. They should be able to define it as a set of step-by-step instructions given to a computer. Describe some types of programs that are used by different types of computers. This should help students appreciate the diverse applications of computer programs.

Ask students how they would write instructions for a friend. Next, ask them how the instructions would be different if they were being given to a person who does not speak English. Lead students towards making a distinction between the use of different languages. Explain that computers understand different types of languages and need to be given instructions in languages that they can understand.

Describe machine language and high-level languages. Describe the term **user-friendly languages**. In addition, describe how low-level languages are different from high-level languages.

##### **Homework assignment (5 minutes)**

Assign questions 1 and 2 from section D (page 95) as homework. Clarify what is required of students in their answers. You should stress that reproducing from the textbook is not desirable.

### Period 2

##### **Starter activity (5 minutes)**

##### **Reading and explanation (30 minutes)**

Discuss sections 8.4 and 8.5 on pages 89 to 91 of the textbook.



**Homework assignment (5 minutes)**

Assign questions 3 and 4 from section D (page 95) as homework. Clarify what is required of students in their answers. You should stress that reproducing from the textbook is not desirable.

**Period 3****Starter activity (5 minutes)****Reading and explanation (25 minutes)**

Discuss sections 8.6 and 8.7 on pages 91 and 92 of the textbook.

**Classroom activity (5 minutes)**

Assign questions 5 and 6 from section D on page 95 be completed in the classroom.

**Homework assignment (5 minutes)**

Assign sections A, B, and C (page 94) as homework. Also assign section E. Clarify what is required of students in their answers. You should stress that reproducing from the textbook is not desirable.

**Suggested answers to end-of-chapter questions on pages 94 and 95****A. Fill in the blanks.**

1. binary                      2. programmer                      3. third                      4. interpreter                      5. user

**B. State whether the following statements are true or false. Rewrite the false statements to make them true.**

1. True.
2. False. BASIC stands for Beginners' All-purpose Symbolic Instruction Code.
3. False. High-level languages make the computer slower because the instructions have to be translated into machine code.
4. True.
5. False. The earliest programming languages were used to run Jacquard's loom.
6. False. High-level languages are user-friendly.
7. True.

**C. Select the correct option for each question.**

1. b                      2. a                      3. a                      4. c                      5. b

**D. Answer the following questions.****1. What is the importance of step-by-step instructions in problem solving?**

Step-by-step instructions are important in problem solving because they can be easily understood by all types of people. Step-by-step instructions help people to perform difficult tasks by breaking them down into simple steps. Errors can also be avoided when instructions are given in simple steps.

**2. a. What is a program?**

A program is a set of instructions given to a computer. A program tells a computer how to perform an activity or a task quickly and accurately.

**2. b. What is a programming language?**

A programming language is a language that is used to write programs. Not all programming languages can be understood by ordinary people.

**3. What is the difference between machine language and assembly language?**

The difference between machine language and assembly language is that instructions written in machine language can be directly processed by a computer. On the other hand, instructions written in assembly language have to be converted into machine language before a computer can process them.

**4. Identify two third-generation languages.**

Two common third-generation languages are COBOL and FORTRAN. COBOL stands for COMmon Business Oriented Language. Programs written in COBOL are used widely by business organizations. FORTRAN stands for FORMula TRANslation. Programs written in FORTRAN are used by organizations that do scientific work.

**5. Why do we need assemblers and compilers?**

We need assemblers and compilers because they convert programs into machine language so that they can be processed by a computer. Assemblers convert instructions written in assembly language into machine code. Similarly, compilers convert instructions written in high-level languages into machine code.

**6. What does BASIC stand for? Why is it widely used in education?**

BASIC stands for Beginners' All-purpose Symbolic Instruction Code. It is widely used in education because it uses words from common English and has a simple syntax. This makes it a user-friendly language that young students can easily learn.

**E. Write paragraphs to answer the following questions.**

**1. Explain the benefits of high-level languages over low-level languages.**

High-level languages have a number of benefits over low-level languages. High-level languages are closer to natural languages like English, which makes programming in high-level languages easier. Low-level languages are based on binary digits 0s and 1s and are more difficult to learn. Programmers can detect errors more easily in programs written using high-level languages.

**2. Find out about a programming language that is not used nowadays. What was it used for and which language has replaced it? What are the improved features of the new language?**

B language was a programming language used for designing applications and language software. It was used to write code quickly and was better than assembly languages. B language was superseded by C language. C language was created in 1970s. It had an improved syntax and was used with the ASCII code.

**3. Write about two possible applications of programs based on artificial intelligence.**

Programs based on artificial intelligence can be used to develop computer games such as a chess game which contains knowledge of thousands of possible moves, e.g. Deep Blue. These programs can also be used by scientists to study how the brain thinks and makes decisions.

**F. Project**

For the teacher: You can help students get started on this project by suggesting a few programming languages such as UNIX. You can also suggest online resources and websites from where students can collect information about programming languages. It would help to bring in copies of technology magazines that contain the required information.



## Additional information for the teacher

- Assembly language uses **mnemonics** to simplify the process of giving instructions to a computer. A mnemonic is a key that makes it easy to remember things. For example, VIBGYOR is a mnemonic for remembering the colours in a rainbow.
- The set of mnemonics for assembly language has codes for more than 200 commands. Some commonly-used mnemonics are A for addition, S for subtraction, M for multiplication, and D for division.
- **Ada** was one of the first programming languages. It was named Ada in honour of Lady Ada Augusta Lovelace. Lady Lovelace wrote instructions for Charles Babbage's analytical engine.
- **PASCAL** is a high-level programming language that is named after Blaise Pascal, the French mathematician and philosopher. **PASCAL** is not restricted to particular types of organizations. It has scientific as well as business applications.
- Fourth-generation languages are more efficient than third-generation languages. They enable programmers to provide in a single line, instructions that would have to be given in more than forty lines. This has made it very easy for programmers to write programs. However, programmers who write programs in fourth-generation languages tend to have less knowledge about the minute details of programming.
- Fourth-generation languages are used for extracting data from a database. They enable users to search for relevant data from a large database by specifying the criteria for their search.



# Activity Sheet

## I. What is...?

1. What is meant by execution?

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2. What is a user-friendly language?

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3. What is a programmer-friendly language?

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4. What is Fortran?

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5. What is an assembler?

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## II. Complete each sentence by circling the correct words in the brackets.

1. Listing tasks in (steps/points) makes it easier to follow them completely and accurately.
2. A computer needs to be programmed because it is an (intelligent/unintelligent) machine.
3. The earliest programming instructions were in the form of a series of (punched holes/punched cards).
4. (Low-level/High-level) languages are both user-friendly and programmer-friendly.
5. (COBOL/BASIC) is used in business organizations.

# Test Sheet

## I. Tick five boxes to show which five of these statements are most likely to be true.

(5 marks)

1. Step-by-step instructions help us write useful programs.
2. Step-by-step instructions do not help to reduce errors.
3. Machine language is based on two digits: 0 and 1.
4. High-level languages are user-friendly languages.
5. First-generation and second-generation languages are high-level languages.
6. COBOL is a second-generation language.
7. Third-generation programming languages can be used to write programs for specific types of activities.
8. Fourth-generation languages are used to write programs based on artificial intelligence.
9. A compiler converts instructions from machine language into assembly language.
10. GW-BASIC is the most popular version of BASIC.

## II. Complete the following statements by filling in the blanks with the correct terms.

Each word or phrase can be used only once.

(5 marks)

**Fortran      fourth-generation      directly      executed      user-friendly**

1. When a program runs, it is said to be \_\_\_\_\_ by the computer.
2. It is difficult for programmers to correct mistakes in a program written in a \_\_\_\_\_ language.
3. BASIC is a \_\_\_\_\_ language.
4. Programs written in \_\_\_\_\_ are used by engineers and scientists.
5. Instructions in low-level languages \_\_\_\_\_ affect the working of the computer.

## Answers to activity sheet

### I. What is...?

1. Execution is the stage where a computer carries out instructions.
2. A user-friendly language is one that can be easily understood by ordinary computer users.
3. A programmer-friendly language is a programming language in which computer programmers can easily write programs.
4. Fortran stands for formula translation. It is a high-level language that is used to write programs for organizations that do scientific work.
5. An assembler is a program that converts instructions written in assembly language into machine language.

### II. Complete each sentence by circling the correct words in the brackets.

1. Listing tasks in ((steps)/points) makes it easier to follow them completely and accurately.
2. A computer needs to be programmed because it is an (intelligent/unintelligent) machine.
3. The earliest programming instructions were in the form of a series of ((punched holes)/punched cards).
4. (Low-level/High-level) languages are both user-friendly and programmer-friendly.
5. ((COBOL)/BASIC) is used in business organizations.

## Answers to test sheet

### I. Tick five boxes to show which five of these statements are most likely to be true.

1. Step-by-step instructions help us write useful programs.
3. Machine language is based on two digits: 0 and 1.
4. High-level languages are user-friendly languages.
7. Third-generation programming languages can be used to write programs for specific types of activities.
10. GW-BASIC is the most popular version of BASIC.

### II. Complete the following statements by filling in the blanks with the correct terms. Each word or phrase can be used only once.

- | Fortran     | fourth-generation    | directly         | executed | user-friendly |
|-------------|----------------------|------------------|----------|---------------|
| 1. executed | 2. fourth-generation | 3. user-friendly |          |               |
| 4. Fortran  | 5. directly          |                  |          |               |

### Teaching objectives

The objectives of this chapter are to:

- justify the need for a computer network
- explain the different components of a computer network
- explain the different types of networks based on technology
- explain different network topologies.

### Learning outcomes

After completing this chapter, students should be able to:

- define a computer network
- identify sending devices, receiving devices, and different types of cable
- differentiate between LAN, MAN, and WAN
- compare bus, ring, and star topologies
- explain intranets and extranets.

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## Introduction for the teacher

Since students are now familiar with the various programs run on computers, they should learn about the ways in which different computers can share data. The aim of this chapter is to explain the role played by networks to improve coordination among different computer users. After explaining the functions of computer networks, the components of a computer network should be described. The terms **sending device, receiving device, transmission medium, communication device, network card, hub, switch, and router** should be explained.

The different types of computer networks should also be described. Networks should be described according to the number of users and the presence or absence of a server. Peer-to-peer networks and client/server networks should be described. Next, LANs, MANs, WANs, the Internet, intranet, and extranet should be described.

Finally, students should understand the different ways in which computers in a network can be arranged. The term **network topology** should be introduced. Bus, ring, and star topologies should be explained. Their different features should be compared with each other so that students can evaluate their applicability in specific situations.

By the end of the chapter, students should appreciate the role played by computer networks in sharing resources between several computer users. They should also be able to describe the components of a network and the different types of computer networks.

## Number of allocated periods: 3

### Period 1

#### Sample lesson plan for a 40-minute period

##### **Starter activity (5 minutes)**

Ask students the following questions:

*Can a person working on one computer use the data stored on another computer?*

*Can you name some devices that we use to share messages?*

*How are those devices connected to each other?*

##### **Reading and explanation (30 minutes)**

Discuss sections 9.1 to 9.3 on pages 97 to 100 of the textbook.

After collecting students' responses to the starter questions, ask them how we keep in touch with our family members when we are away from home. The students should be able to identify the role of the telephone. Next, ask the students how telephones are connected to each other. The students should now state the role of wires or cables. At this point, explain that computers can also be connected to one another in a similar way.

Using the example of a telephone, introduce the terms **sending device**, **receiving device**, and **transmission medium**. Describe the three types of transmission media. Explain that computers also act as sending and receiving devices connected by a transmission medium. Introduce the concept of a communication device. Ask students to recall the difference between analog and digital signals. Explain that the communication device interconverts data in these two forms so they can be transmitted over transmission media and be processed by the computer. Next, introduce the function of the network card.

Now that students understand how computers connected in the form of a network can share resources, explain that two or more networks can also be connected to share data. Describe the functions of the hub, switch, and router.

If resources allow, you might conduct this lesson in the computer lab where students could be shown the various network components. If this is not feasible, you might bring the devices into the classroom and display those to the students. You might also make use of the photographs and illustrations on the relevant pages of the textbook.

##### **Homework assignment (5 minutes)**

Assign questions 2 and 3 from section D (page 105) as homework. Clarify what is required of students in their answers. You should stress that reproducing from the textbook is not desirable.

### Period 2

##### **Starter activity (5 minutes)**

##### **Reading and explanation (30 minutes)**

Discuss section 9.4 on pages 100 to 101 of the textbook.

##### **Homework assignment (5 minutes)**

Assign questions 4 and 6 from section D (page 105) as homework. Clarify what is required of students in their answers. You should stress that reproducing from the textbook is not desirable.

### Period 3

#### **Starter activity (5 minutes)**

#### **Reading and explanation (20 minutes)**

Discuss section 9.5 on pages 101 and 102 of the textbook.

#### **Classroom activity (10 minutes)**

Assign section F on page 105 to be completed in the lab.

#### **Homework assignment (5 minutes)**

Assign sections A, B, and C and questions 1 and 5 from section D as homework. Clarify what is required of students in their answers. You should stress that reproducing from the textbook is not desirable. Section E should also be assigned as homework.

### **Suggested answers to end-of-chapter questions on pages 104 and 105**

#### **A. Fill in the blanks.**

1. modem                      2. ring                      3. transmission                      4. stand-alone                      5. peer-to-peer

#### **B. State whether the following statements are true or false. Rewrite the false statements to make them true.**

1. True.
2. True.
3. True.
4. True.
5. False. A router is used to connect two or more networks.

#### **C. Select the correct option for each question.**

1. c                      2. c                      3. a                      4. a                      5. c

#### **D. Answer the following questions.**

##### **1. What is a network? Describe three types of networks.**

A network is an arrangement where several computers are connected to each other through a transmission medium. Other devices like printers, scanners, and servers are also part of a network.

Three types of networks are LAN, MAN, and WAN.

LAN stands for local area network. It is a computer network in which all the connected computers and devices are located in the same building.

MAN stands for metropolitan area network. A MAN is larger than a LAN and can connect computers located in different parts of a city.

WAN stands for wide area network. It can connect several LANs and MANs into a larger network.

##### **2. What is a transmission device?**

A transmission device is a medium that is used to carry data across a computer network. Wires and cables are examples of transmission devices.

**3. Describe the three main types of cable used to link computers in a network.**

The three main types of cable used to link computers in a network are coaxial cable, twisted-pair cable, and fibre-optic cable.

Coaxial cable is the simplest type of cable. It consists of a copper core covered by an insulating cover. Signals travel along the copper wire. The insulating cover prevents signals from escaping from the wire.

Twisted-pair cable consists of wires twisted around each other. This helps to reduce interference.

Fibre-optic cable is made of glass fibres and enables data to be carried in the form of light signals. It is very efficient but can break easily.

**4. How is an intranet different from a LAN? How is it different from a WAN?**

An intranet is different from a LAN because it uses Internet technology to connect several computers. It is not restricted to a single building. An intranet is different from a WAN because it is restricted to a single organization. It is a single network, and not a combination of smaller networks.

**5. Describe bus, ring, and star topologies.**

A bus topology consists of computers and devices connected to a server by a single cable called the backbone. Data needed by one computer is sent to every computer on the network. However, bus topologies cannot function when there is a problem with the backbone.

A ring topology consists of computers and devices connected in a loop. Each computer and device is called a node. Data passes through the loop and is received only by the relevant computer. Ring topologies cannot function when any one of the computers breaks down.

In a star topology, each computer and device is connected to the server by a separate cable. The network keeps working even when some computers or cables break down.

**6. Differentiate between a hub and a switch.**

A hub or repeater receives messages from each computer on the network and then directs the signal to every computer on the network. This wastes time. A switch sends messages only to the targeted computers by first identifying them by their network address.

**E. Write paragraphs to answer the following questions.**

**1. What are the advantages of Wi-Fi connectivity?**

Wi-Fi connectivity enables us to connect multiple devices to the same hotspot. A mobile phone, laptop, and tablet can be connected to the network at the same time. Wi-Fi enables instant connectivity on the go. We can access Wi-Fi services through USB devices while traveling or at home. It reduces costs because cables and routers are not needed.

**2. A manager wants to connect the computers in her office with the computers in other branches. Which type of network would this be?**

An intranet would be used for this purpose as it is suitable for use by employees in branches in different cities. Information and files can be shared easily because the intranet uses Internet technology. There will be less risk of data going outside the organization.

**3. Which network topology is the best for keeping computers connected to the network most of the time?**

The ideal topology would be the star topology because each computer is connected to the hub through a separate cable. If one connection breaks down, then the others can still work unhindered.

## F. Lab exercise

For the teacher: It is important to maintain order for this activity to avoid accidents in the lab or damage to the equipment. It is advisable that you organize a guided tour of the lab along with the lab manager. Walk the students through the lab and explain how the network has been set up. After this, allow students to explore the environment independently as by now their curiosity is likely to be satisfied to some extent. Time this activity so that students have sufficient time to complete their drawings.

## G. Project

For the teacher: For this activity, you can bring in photographs of actual office environments collected from magazines or the Internet. Discuss the ways in which computers have been organized to use space economically. This should give students ideas to design their own computer network for the project.

## Additional information for the teacher

- Data can be transmitted on a network by wired or wireless connections.

**Wired connections** use a solid medium to connect sending and receiving devices. These include telephone lines and fibre-optic cables. Telephone lines have been the standard transmission medium for years for both voice and data. However they are now being replaced by more technologically-advanced media.

Fibre-optic cables transmit data as pulses of light through thin tubes of glass. They are fast and immune to electronic interference. As a result they are a more reliable means of transmitting data.

**Wireless connections** do not use a solid medium to connect sending and receiving devices. They use air instead. Examples of wireless connections are microwave communications that use high-frequency radio waves, mobile phones that use microwaves, satellite communication, and infrared waves.

- Fax machines can also be connected to a computer network. Fax is a fast method of sending and receiving scanned documents over telephone lines or the Internet. A document that is photocopied and sent by post might take several days to reach its destination. However, a fax machine enables a copy to be sent to a recipient located at a distant location within seconds.
- Another means by which data or messages can be sent from one computer to another on a network is through email. **Email** stands for electronic mail and enables messages to be sent from one computer to another instantly.

## Activity Sheet

### I. What is...?

1. What is a server?

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2. What is crosstalk?

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3. What is a network card?

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4. What is a router?

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5. What is a client?

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6. What is a node?

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### II. Complete each sentence by circling the correct words in the brackets.

- Two computers can be connected to each other by a (transmission/transportation) medium.
- (Coaxial cables/Fibre-optic cables) are the fastest transmission medium.
- A (cable/modem) is a communication device.
- A hub is also called a (repeater/sender).
- In a (ring/bus) topology, computers are connected to the server by a single cable.

# Test Sheet

**I. Tick five boxes to show which five of these statements are most likely to be true.**

**(5 marks)**

1. A computer that sends a request is called the sending device.
2. A communication device converts digital signals into analog signals so that they can be transmitted along telephone lines.
3. A computer that is part of a network is called a stand-alone computer.
4. A switch sends a message to all computers on a network.
5. A local area network is larger than a metropolitan area network.
6. The Internet is a worldwide network.
7. In a star topology, messages are passed from one computer to another.
8. Ring topologies transmit data more slowly than bus topologies.
9. An extranet enables a company to connect with its suppliers.
10. There is no server in a peer-to-peer network.

**II. Draw diagrams for the following:**

**(10 marks)**

**A. A client/server network**

**B. A local area network**

# Test Sheet

C. A wide area network

D. A ring topology

E. A star topology



## Answers to activity sheet

### I. What is...?

1. A server is the central computer on a network that stores data and important resources. All computers on a network are connected to the server.
2. Crosstalk is the disturbance caused during data transmission along coaxial cables.
3. A network card is an expansion card that enables a computer to be connected to a network.
4. A router is a network component that connects two networks.
5. A client is a computer that uses the data and resources stored on a server.
6. A node is a computer or a device that is connected to other devices in a ring topology.

### II. Complete each sentence by circling the correct words in the brackets.

1. Two computers can be connected to each other by a (transmission/transportation) medium.
2. (Coaxial cables/Fibre-optic cables) are the fastest transmission medium.
3. A (cable/modem) is a communication device.
4. A hub is also called a (repeater/sender).
5. In a (ring/bus) topology, computers are connected to the server by a single cable.

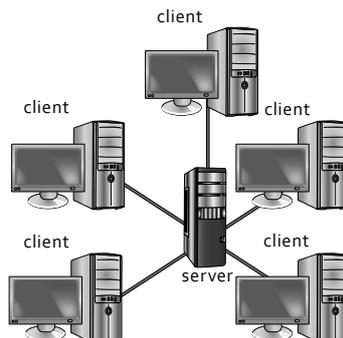
## Answers to test sheet

### I. Tick five boxes to show which five of these statements are most likely to be true.

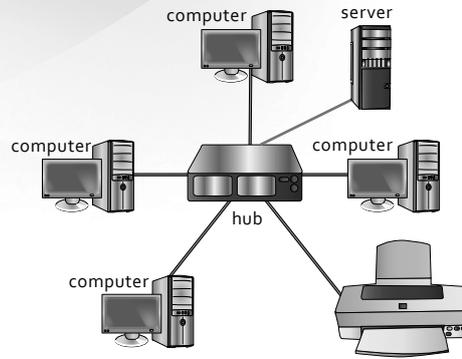
1. A computer that sends a request is called the sending device.
2. A communication device converts digital signals into analog signals so that they can be transmitted along telephone lines.
6. The Internet is a worldwide network.
9. An extranet enables a company to connect with its suppliers.
10. There is no server in a peer-to-peer network.

### II. Draw diagrams for the following:

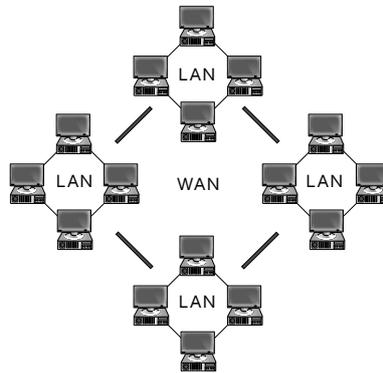
#### A. A client/server network



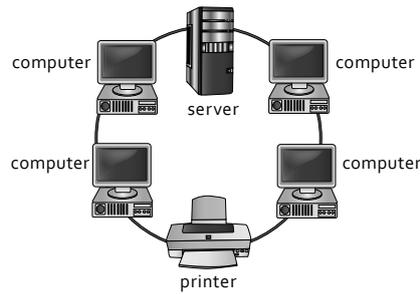
**B. A local area network**



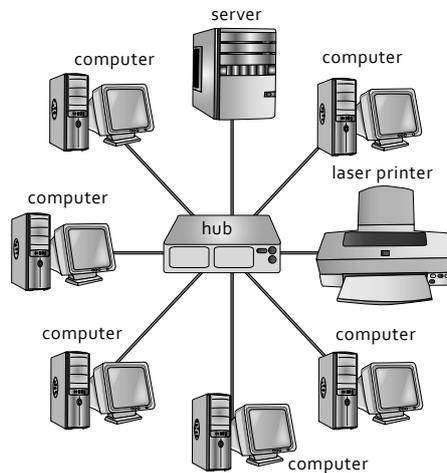
**C. A wide area network**



**D. A ring topology**



**E. A star topology**



### Teaching objectives

The objectives of this chapter are to:

- introduce the terms Internet and World Wide Web
- explain that information on the Web is organized in the form of websites and web pages
- explain the components of a worldwide network
- explain the function of a modem and its different types
- explain the function and features of an Internet browser.

### Learning outcomes

After completing this chapter, students should be able to:

- differentiate between the Internet and the World Wide Web
- identify various network components
- navigate the Internet using URLs, hyperlinks, search engines, the Favorites folder, and the History folder
- upload and download information from the Web
- explain the advantages of the Internet.

---

### Introduction for the teacher

Since students are now aware of the functions of a network and the different types of networks, they should be introduced to the **Internet**. The Internet should be introduced as one type of network that is capable of linking all the computers in the world into a worldwide network. The aim of this chapter is to explain the features and benefits of the Internet.

The Internet should then be differentiated from the **World Wide Web**. Next, the organization of the Web into web pages and websites should be described. The chapter then builds on the concept of the modem that was introduced to students in the previous chapter. Students should now be introduced to the terms **modulation** and **demodulation**. The different types of modems should also be described.

Other network components such as gateways, browsers, and ISPs should be described next. After students have become acquainted with the network components, they should then learn how information can be located using the Internet. The different elements of an Internet browser should be described. The concept of search engines should also be introduced.

Students should then be taught how to share information once they have located it. **Downloading** should be described as a means by which we can make use of information from the Web. **Uploading** should be described as a means of sharing information with other Internet users.



Finally, the benefits of using the Internet and World Wide Web should be explored. By the end of the chapter, students should be able to appreciate the importance of the Internet and its various applications.

## **Number of allocated periods: 4**

### **Period 1**

#### **Sample lesson plan for a 40-minute period**

##### **Starter activity (5 minutes)**

Ask students the following questions:

*How can we share data with a computer in a different country?*

*What type of information do we need to share?*

##### **Reading and explanation (lab session) (30 minutes)**

Discuss sections 10.1 to 10.4.1 on pages 107 to 109 of the textbook.

Ask students to recall what they remember about the Internet from the previous chapter. They should be able to describe the Internet as a network that is capable of linking all the computers in the world into a single network. Ask students what the likely benefits of such a network might be. They should be able to state sharing of information as one benefit.

Open a website on your computer. Ask students to note the information presented by the website. Identify this as one page of a website. Go to another web page on the same website. Ask students to note the information displayed there. Explain that the web pages are like the pages of a book. They contain information about a particular topic. Next, describe a website as a collection of web pages about a certain subject or topic.

Point to the modem on your computer. Ask students if they remember what a modem is. They should be able to describe its function. Introduce the terms **modulation** and **demodulation**. Describe the three types of modems and compare them with one another in terms of speed and bandwidth.

If a lab session is not possible, you could bring the different types of modems into the classroom for the students. You could also use the screenshots and photographs on the relevant pages of the textbook for description.

##### **Homework assignment (5 minutes)**

Assign questions 1 and 3 from section D (page 116) as homework. Clarify what is required of students in their answers. You should stress that reproducing from the textbook is not desirable.

### **Period 2**

##### **Starter activity (5 minutes)**

##### **Reading and explanation (lab session) (30 minutes)**

Discuss sections 10.4.2 to 10.5.5 on pages 109 to 111 of the textbook.

##### **Homework assignment (5 minutes)**

Assign questions 2 and 4 from section D (page 116) as homework. Clarify what is required of students in their answers. You should stress that reproducing from the textbook is not desirable.

### **Period 3**

##### **Starter activity (5 minutes)**

##### **Reading and explanation (lab session) (20 minutes)**

Discuss sections 10.5.6 to 10.7 on pages 111 to 114 of the textbook.

**Classroom activity (10 minutes)**

Assign sections A, B and C on pages 115–116 to be completed in the classroom.

**Homework assignment (5 minutes)**

Assign questions 5 and 6 from section D and section E (page 116) as homework. Clarify what is required of students in their answers. You should stress that reproducing from the textbook is not desirable.

**Period 4****Lab activity (40 minutes)**

Assign section F on page 117 to be attempted on the computer.

**Suggested answers to end-of-chapter questions on pages 115 to 117****A. Fill in the blanks.**

1. World Wide Web
2. Internet browser
3. website
4. tab
5. uniform resource locator
6. hyperlinks
7. modulation

**B. State whether the following statements are true or false. Rewrite the false statements to make them true.**

1. False. The term Internet is used to refer to the network of computers while Web refers to the content available on the Internet.
2. True.
3. True.
4. True.
5. False. We can view web pages visited earlier from the History folder.

**C. Select the correct option for each question.**

1. a
2. c
3. d
4. d
5. a

**D. Answer the following questions.****1. What is the difference between the Internet and the Web?**

The Internet is a network that can link all the computers in the world into a single network. It enables the computers on these smaller networks to share data and resources with one another. The Web consists of the files that can be shared over the Internet.

**2. Explain the following terms:****a. Internet Service Provider**

An Internet Service Provider is a company that maintains expensive web servers. These web servers store large amounts of data. Internet Service Providers enable computer users to be connected to their web servers.

**b. gateway**

A gateway enables a computer connected to a smaller network to be connected to the Internet.

**c. bandwidth**

Bandwidth is a measure of the amount of data that can be carried by a transmission medium. Fibre-optic cables have the greatest bandwidth.

**3. What is a modem? Describe the different types of modems.**

A modem is a device that modulates and demodulates data so that it can travel along a transmission medium. It converts digital signals into analog signals to send them over a transmission medium. It converts analog signals into digital signals to receive data being sent over a transmission medium. There are three types of modems.

A telephone dial-up modem converts digital data into analog data and *vice versa*. Data transmission is slow.

Digital Subscriber Lines transmit data at a greater speed. They enable the telephone and the Internet to be used at the same time.

A cable modem uses coaxial cables to transmit data. Cable modems are faster than telephone dial-up modems and DSL.

**4. Describe the function of the Favorites folder. How is it different from the History folder?**

The Favorites folder enables us to bookmark a web page to view it at a later time. We can save our preferred websites in the Favorites folder. It is different from the History folder because the URLs of all the websites we visit are stored automatically in the History folder.

**5. How can we find information on the Web with the help of a search engine?**

We can find information on the Web by entering keywords in a search engine. The search engine uses the keywords to search websites that contain those keywords. It then displays a list of those websites. We can then visit a relevant website by clicking on its URL.

**6. How can we download information from the Web?**

We can download information from the Web by clicking on the **Tools** button on the Internet browser. We can then click on **Save As** in the **File** menu. Finally, we can select a name and location for saving the file.

**E. Write paragraphs to answer the following questions.**

**1. You have found some informative web pages that you would like to view later. Which feature of the web browser would you use?**

I would bookmark the webpages (Ctrl+Shift+B) to view them later. If I have not bookmarked the pages, I will search for them in the History folder. I would also try to type part of the URL of the web page. This would display the URL of the web page that matches the words I had typed.

**2. Which keywords would you enter in a search engine to find information about cities in China?**

There are multiple keywords that I could use to find information about cities in China. I could enter 'Information about Chinese cities' or 'China-information of cities' in the search box. I could also type the names of some famous Chinese cities such as Beijing, Shanghai, and Tianjin.

**3. Describe how the Internet may be useful to your school librarian.**

The school librarian can use Internet to search for new books published in other countries that would interest students. The librarian could also order the books online from the publisher's website or from online sellers. The librarian can also read reviews of books online. He or she can communicate with other librarians and share books.



**F. Lab exercise**

For the teacher: You could divide the class into two groups and assign each group one of the two lab exercises. Be sure to keep an eye on students switching their groups to work on the activity of their choice. Maintain order and discipline in the lab by reminding students of the time required to complete the activity.

**G. Project**

For the teacher: It is advisable to send a note to parents advising them to assist their children with this project. Warn students against going to a restaurant, especially one they have not visited before, without a parent or responsible adult. Help the students draw up a questionnaire that they will use when meeting the restaurant manager.

**Additional information for the teacher**

- Information on the Web exists in the form of text, graphics, audio, and video. These files can be shared between servers and clients. There are certain rules that servers and clients should follow for sharing these files. Each network has different rules for sharing files. These rules are called **File Transfer Protocols** or **FTPs**. The most commonly used protocol is called **TCP/IP**.
- Each URL begins with **http://**. **HTTP** stands for **HyperText Transfer Protocol**. HTTP is a larger set of rules that can be used to share files across different smaller networks that use different rules like TCP/IP. HTTP creates uniformity in sharing files. With HTTP, a client on one of the smaller networks can access data stored on a different network. The **http://** in a URL tells us that the browser will use these rules to access the information on the server.
- The server is a powerful computer that houses the web page we need. Such a server is called a **host**. The browser carries information from the host and displays it on the browsing window. The first page of a website is called its **home page**.
- The **www** in a URL tells us that the information we need is stored on the World Wide Web. Hotmail is the name of the organization that we need information about. The final part of a URL is called a web extension. There are several web extensions like **.com**, **.edu**, **.gov**, etc. Below is a table that identifies different extensions and explains what they mean.

Extensions	What they mean
.com	.com indicates that the website belongs to a commercial organization. A commercial organization earns profits.
.org	.org indicates that the website belongs to an organization that might be non-commercial.
.edu	.edu indicates that the website belongs to a college or a university.
.net	.net usually indicates that the website belongs to an ISP.
.pk	.pk indicates that the website originates in Pakistan.

- Once we type the URL in the Address Box, the Internet browser sends a request to the host for the web page. The host accepts the request and sends instructions to the browser. These instructions are in a language called **HyperText Mark-up Language (HTML)**. The browser follows these instructions to display the web page in the browser window.

# Activity Sheet

## I. What is...?

1. What is a web page?

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2. What is meant by modulation?

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3. What is an Internet browser?

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4. What is meant by the term online?

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5. What is the function of the Navigation Bar?

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6. What is uploading?

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## II. Complete each sentence by circling the correct words in the brackets.

1. The (Internet/World Wide Web) is a network that links computers into a worldwide network.
2. A collection of related web pages is called a (website/web book).
3. A search engine uses (keywords/hyperlinks) to search for information on the Web.
4. Students can use online (databases/data pages) to search for information on specific subjects.
5. We can download information (from/to) the Web.

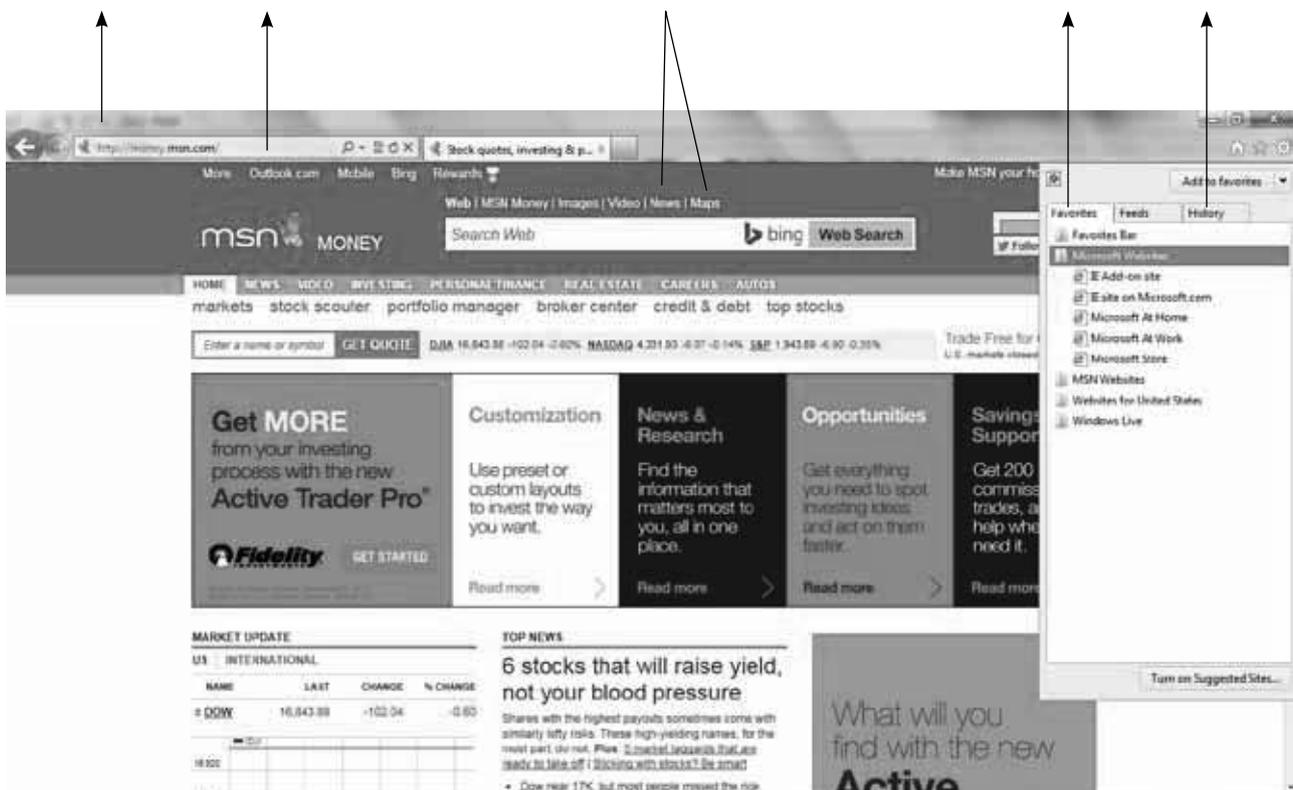


# Test Sheet

## I. Tick five boxes to show which five of these statements are most likely to be true. (5 marks)

1. A website is a collection of related web pages.
2. Bandwidth is the capacity of a transmission medium to carry data.
3. An Internet browser is a powerful computer.
4. We type the URL in the GOTO box.
5. A web page that we bookmark is stored in the History folder.
6. We can read books and articles on the World Wide Web.
7. A gateway is another name for an Internet browser.
8. Digital Subscriber Lines transmit digital data and voice signals at the same time.
9. ISPs issue each client a user id and a password.
10. The Internet is only beneficial to students.

## II. Label the elements of an Internet browser in the screenshot below. (5 marks)



## Answers to activity sheet

### I. What is...?

1. A web page is a part of the World Wide Web that contains information on a particular topic or subject.
2. The conversion of digital data into analog signals is called modulation.
3. An Internet browser is an application software that allows us to connect to the Internet and view information from the World Wide Web.
4. Online is a term used to describe the state of being connected to the Internet.
5. The Navigation Bar enables us to move around the Web and visit different web pages.
6. The process of transferring or copying information to the Web is called uploading.

### II. Complete each sentence by circling the correct words in the brackets.

1. The ((Internet)/World Wide Web) is a network that links computers into a worldwide network.
2. A collection of related web pages is called a ((website)/web book).
3. A search engine uses ((keywords)/hyperlinks) to search for information on the Web.
4. Students can use online ((databases)/data pages) to search for information on specific subjects.
5. We can download information ((from)/to) the Web.

## Answers to test sheet

### I. Tick five boxes to show which five of these statements are most likely to be true.

1. A website is a collection of related web pages.
2. Bandwidth is the capacity of a transmission medium to carry data.
6. We can read books and articles on the World Wide Web.
8. Digital Subscriber Lines transmit digital data and voice signals at the same time.
9. ISPs issue each client a user id and a password.

### II. Label the elements of an Internet browser in the screenshot below.



## Teaching objectives

The objectives of this chapter are to:

- introduce the concept of email
- explain the procedure for opening an email account
- explain how files can be attached to an email message
- explain the different email folders
- emphasize the need for caution when using the Internet or email services.

## Learning outcomes

After completing this chapter, students should be able to:

- define the terms email, email account, email address, user id, and password
- open an email account
- compose an email message and attach files
- explain the functions of the Inbox, Junk, Drafts, Sent, and Deleted folders
- list some precautionary measures to take when using the Internet and email.

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## Introduction for the teacher

This chapter builds on students' understanding of networks as a means of enabling people to communicate with one another. At the same time, the chapter relies on students' understanding of the Internet as a network to which every computer in the world could be connected. Therefore, the chapter aims to introduce email as a form of communication by sending messages over the Internet.

After introducing the concept of email, the chapter explains the procedure for creating and accessing an email account. It then describes the components of an email message. Once students are able to identify these components, the chapter then progresses towards explaining the procedures for composing, sending, and replying to email messages. The procedure for attaching a file to an email message is also explained.

A discussion on the various email folders follows. Students should learn to distinguish between the different types of email messages one might receive. The chapter then describes the procedure for signing out of an email account. Finally, the chapter lists some important precautionary measures that students should follow while using the Internet and email.

## **Number of allocated periods: 3**

### **Period 1**

#### **Sample lesson plan for a 40-minute period**

##### **Starter activity (5 minutes)**

Ask students the following questions:

*How do we send written messages to people living far away?*

*How much time does it take?*

*What would be a faster way to send such messages?*

##### **Reading and explanation (lab session) (30 minutes)**

Discuss sections 11.1 to 11.3 on pages 119 to 122 of the textbook.

After collecting students' responses to the starter questions, introduce the concept of email. Explain that email is short for electronic mail and is much faster than traditional mail. Explain that email consists of creating and sending messages over the Internet. This enables us to communicate with people in different parts of the world. Do not forget to mention that email also enables us to send electronic documents like spreadsheets and presentations to people in different parts of the world.

Next, explain how email works. Ask students to recall the function of the Internet browser. Introduce the terms **email account** and **email address**.

Dividing students into reasonably-sized groups, use a computer to demonstrate the steps involved in creating an email account. You might ask the remaining groups to follow the instructions given on pages 121 and 122 of the textbook as you describe them. Allow each group to create an email account of its own.

##### **Homework assignment (5 minutes)**

Assign questions 1 and 2 from section D (page 131) as homework. Clarify what is required of students in their answers. You should stress that reproducing from the textbook is not desirable.

### **Period 2**

##### **Starter activity (5 minutes)**

##### **Reading and explanation (lab session) (30 minutes)**

Discuss sections 11.4 to 11.7 on pages 122 to 125 of the textbook.

##### **Homework assignment (5 minutes)**

Assign questions 3 and 4 from section D (page 131) as homework. Clarify what is required of students in their answers. You should stress that reproducing from the textbook is not desirable.

### **Period 3**

##### **Starter activity (5 minutes)**

##### **Reading and explanation (30 minutes)**

Discuss sections 11.8 to 11.12 on pages 125 to 128 of the textbook.

Assign sections A, B, and C (pages 130–131) to be completed in the classroom.



**Homework assignment (5 minutes)**

Assign questions 5 and 6 from section D and section E (page 131) as homework. Clarify what is required of students in their answers. You should stress that reproducing from the textbook is not desirable.

**Suggested answers to end-of-chapter questions on pages 130–131****A. Fill in the blanks.**

1. courtesy copy      2. spam      3. password      4. Subject      5. Drafts

**B. State whether the following statements are true or false. Rewrite the false statements to make them true.**

1. True.
2. False. To reply to a message we click on Reply.
3. True.
4. False. Email can be sent over several computer networks like intranets, extranets, and the Internet.
5. True.
6. False. In computer terms, Cc stands for courtesy copy.
7. True.

**C. Select the correct option for each question.**

1. a      2. b      3. b      4. d      5. a

**D. Answer the following questions.****1. What is meant by email? What are the advantages of email?**

Email stands for electronic mail. It is a means of sending messages from one computer to another over the Internet and other networks. Email has several advantages. It is faster and cheaper than other modes of communication.

**2. What is the function of an email address?**

An email address identifies the sender and the receiver of an email message. Entering the receiver's email address enables the message to be sent to the right person. The sender's email address lets the receiver know who the message is from.

**3. Describe the procedure for attaching a file to an email message.**

A file can be attached to an email message by following the steps given below:

- Click on Attachments.
- Select the drive or folder where the file is located by using the Look in menu.
- Select the file by clicking on it.
- Click on Open.

**4. Why should we mention the subject of an email message?**

We should mention the subject of an email message because it tells the receiver what the message is about. The reader does not have to open every message to see what it contains.

**5. What does the Deleted folder contain? Can we recover a message that we have deleted?**

The Deleted folder contains email messages that have been deleted or removed from the Inbox. We can recover a message that we have deleted because deleted messages remain in the Deleted folder for a few days.



**6. What is the difference between Cc and Bcc?**

When we send an email message as Cc, all the recipients know that a copy has been sent to other people. However, when we send an email message as Bcc, the recipients do not know that copies have been sent to other people.

**E. Write paragraphs to answer the following questions.**

**1. What are the dangers of someone else finding out your email password?**

A person who finds out my email password can access and steal sensitive information like my account number details and other information sent by email. He or she can send viruses or malware to my email contacts. My account could be altered or even deleted, resulting in loss of important information.

**2. What are the safety measures taken by an email service provider?**

Email service providers guide users about password protection. When setting passwords, the email service provider indicates the strength of the password and how to improve it. Alphanumeric passwords with 8 or more characters including upper and lowercase letters are recommended. Email service providers use encryption techniques to protect email messages. They use spam filters to automatically send spam email to the Junk folder.

**3. List some precautions to be taken when using email.**

Some important precautions are:

- i) Keep your password secret and hard to guess.
- ii) Do not add people you do not know as your email contacts.
- iii) Do not share your email ID with suspicious websites because they could send continuous spam to your Inbox.

## Additional information for the teacher

- Email technology predates the introduction of the Internet. It was first used in around 1965 to enable users to log on to a mainframe computer and store files. It was further developed during the 1970s. Initially email communication was restricted to the users logged on to the same mainframe computer, i.e. employees belonging to the same organization.
- Other versions enabled users to share email across different organizations. These systems were called **host-based systems** and were the predecessor systems of LAN-based systems which dominated the 1980s. The idea was to use servers to enable a larger number of users to connect and share information within a networked environment. These systems were also applicable to different organizations as long as they shared the same protocols.
- The current email infrastructure allows substantial memory and advanced options for the user. An email account is like a personal letter box which can store thousands of messages. The latest search options enable users to recover messages which date back several years. Users can categorize email according to priority and senders.
- A complete list of **email companions** can be maintained. Entering their names in the Search option displays all the communication that has been conducted with them.
- Email accounts contain **personalization** options which enable users to specify rules for incoming and outgoing messages. Users can also create their own folders and sort email accordingly. They can change the theme of email folders and match options according to their requirement.
- Email messages can be written in **plain text** or in **HTML** format. Users can also include **signatures** in their messages.

## Activity Sheet

### I. What is...?

1. What is an email account?

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2. What is a password?

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3. What is an Inbox?

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4. What is an attachment?

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5. What is spam?

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### II. Complete each sentence by circling the correct words in the brackets.

1. To send email, we need to have an (email account/email web page).
2. To create an email account, we click on the (Sign in/Sign up) button.
3. Verification helps the website to identify (fake/many) email accounts.
4. To access our email account, we need to enter our (user id and password/subject and password).
5. The (Deleted/Drafts) folder contains messages that we no longer need.



# Test Sheet

I. Tick five boxes to show which five of these statements are most likely to be true. (5 marks)

1. Email stands for emergency mail.
2. We can open an email account by clicking on Computer.
3. An email address contains a user id.
4. A password should be known to everybody.
5. A security question is helpful when a person forgets his password.
6. To compose an email message, we click on Write.
7. Cc stands for coloured copy.
8. There are no spaces between words in an email address.
9. We can store unfinished messages in the Drafts folder.
10. We should not open email from strangers.

II. Complete the following statements by filling in the blanks with the correct terms. (3 marks)  
 Each word or phrase can be used only once.

- |       |          |     |
|-------|----------|-----|
| video | sign out | ZIP |
| dots  | Subject  | To  |

1. The \_\_\_\_\_ line conveys the purpose of the message.
2. The email address of the recipient is entered in the \_\_\_\_\_ line.
3. We can attach \_\_\_\_\_ files to an email message.
4. The \_\_\_\_\_ button is found on the top-right corner of the email screen.
5. Personal details include first names, last names, and \_\_\_\_\_ codes.
6. When we enter our password, it appears as a series of \_\_\_\_\_.

III. List four precautions that we should take when sending and receiving email. (2 marks)

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## Answers to activity sheet

### I. What is...?

1. An email account is storage space offered by a website. An email account is used to send and receive email messages.
2. A password is a code that we enter to access our email account. A password prevents other people from accessing our account without our permission.
3. An Inbox is an email folder that contains email messages that others have sent us.
4. An attachment is a file that can be sent together with an email message.
5. Spam is email that is not meant for us. It includes advertisements, jokes, and harmful messages.

### II. Complete each sentence by circling the correct words in the brackets.

1. To send email, we need to have an (email account/email web page).
2. To create an email account, we click on the (Sign in/Sign up) button.
3. Verification helps the website to identify (fake/many) email accounts.
4. To access our email account, we need to enter our (user id and password/subject and password).
5. The (Deleted/Drafts) folder contains messages that we no longer need.

## Answers to test sheet

### I. Tick five boxes to show which five of these statements are most likely to be true.

3. An email address contains a user id.
5. A security question is helpful when a person forgets his password.
8. There are no spaces between words in an email address.
9. We can store unfinished messages in the Drafts folder.
10. We should not open email from strangers.

### II. Complete the following statements by filling in the blanks with the correct terms. Each word or phrase can be used only once.

- |       |          |     |
|-------|----------|-----|
| video | sign out | ZIP |
| dots  | Subject  | To  |
1. Subject
  2. To
  3. video
  4. sign out
  5. ZIP
  6. dots

### III. List four precautions that we should take when sending and receiving email.

1. We should not share our password with others, except our parents.
2. We should open email messages only from people we know.
3. We should not mention personal details in email messages.
4. We should not email photographs of ourselves to strangers.

## Teaching objectives

The objectives of this chapter are to:

- introduce animation
- explain the use of animation tools such as the Hand, Magnifier, Line, and Lasso tools
- explain the techniques of creating objects and animation
- explain how the Timeline works

## Learning outcomes

After completing this chapter, students should be able to:

- identify and use the Stage, Tools Panel, Timeline, and Property Inspector
- use various tools to create objects, symbols, and animation
- create drawings in Merge Drawing and Object Drawing modes
- create animation using frame-by-frame animation and motion tweening

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## Introduction for the teacher

The purpose of this chapter is to explain the techniques of animation. The days of paper drawing and animation are almost over and the primary reason is the emergence of animation software. These software offer a vast range of options and incredible graphics. It is easy to make and even amateurs can prepare animated movies with ease. Since it is a form of presentation, animation can be used to communicate messages to audiences. Students should understand its ease of use and advantages.

The lessons will introduce students to the world of animation and present the basics for using animation tools.

## Number of allocated periods: 3

### Period 1

#### Sample lesson plan for a 40-minute period

##### **Starter activity (5 minutes)**

Ask students the following questions:

*How many drawings can you make in 5 minutes?*

*Do you know how many hand drawings are required to make one cartoon movie?*

*Can you think of easier ways to prepare animation?*



**Reading and explanation (lab session) (30 minutes)**

Discuss sections 12.1 to 12.2 on pages 133 to 135 of the textbook.

Animation is a very useful tool and can be learned at an early age. Students should be introduced to the purpose of animation and the general layout of the application. The session should ideally be carried out in a lab environment. Different animation tools such as Line, Lasso, Magnifier, etc. should be explained with the help of demonstrations using a data projector. Document properties and Property Inspector options should be explained specifically and students should be shown how to apply different features.

**Homework assignment (5 minutes)**

Assign questions 1 and 2 of section D as homework. Clarify what is required of students in the answers. It should be stressed that reproducing from the textbook is not desirable.

**Period 2****Starter activity (5 minutes)****Reading and explanation (25 minutes)**

Discuss sections 12.3 to 12.5 on pages 135 to 136 of the textbook.

Lab facility is necessary for this lesson. This lesson will focus on explanation of drawing modes and types of animation. Explain these different types on computer till students grasp the basic concept.

Students should become familiar with the concept of animation and timelines. Their use should be explained and students should be asked about famous animations to generate interest in the subject.

**Classwork assignment (5 minutes)**

Assign sections A, B, and C to be completed in the classroom.

**Homework assignment (5 minutes)**

Assign question 3 of section D as homework. Clarify what is required of students in the answers. It should be stressed that reproducing from the textbook is not desirable.

**Period 3****Reading and explanation (20 minutes)**

Discuss section 12.6 on pages 137 to 138 of the textbook.

The three types of animation should be explained along with examples of their use. Students should also be asked which type of animation they would use in specified cases, e.g. football game.

The classwork assignment will be used to gauge the understanding of students and their ability to use flash application.

**Classwork assignment (15 minutes)**

Perform the lab exercise in section F.

**Homework assignment (5 minutes)**

Assign sections E and G as homework.



## Suggested answers to end-of-chapter questions on pages 140 and 141

### A. Fill in the blanks.

1. Stage                      2. Hand                      3. freehand                      4. Property Inspector                      5. Modify

### B. State whether the following statements are true or false. Rewrite the false statements to make them true.

1. True.
2. True.
3. False. In the Merge Drawing mode, the overlapping area is erased.
4. True.
5. False. In a movie, an image is called a symbol.

### C. Select the correct option for each question.

1. c                      2. d                      3. d                      4. a                      5. b

### D. Answer the following questions.

#### 1. What is the Magnifier tool used for?

The Magnifier tool is used for zooming in and out on the window. It helps to view a drawing in greater detail.

#### 2. What is the function of the Property Inspector?

The Property Inspector is used to change the features of an object including shape, thickness, etc.

#### 3. What is the purpose of the Timeline?

The Timeline is used to control the animation as it shows the display of frames by movement of the playhead against Timeline.

### E. Write paragraphs to answer the following questions.

#### 1. Differentiate between the two drawing modes.

The two drawing modes are Merge Drawing mode and Object Drawing mode. The main difference between the two is that in the Merge Drawing mode the overlapping area between two shapes is erased. In the Object Drawing mode the objects and shapes are not erased when they overlap.

#### 2. Ahmed wants to create an animation where a ball drops from the top of a building to the ground. What type of animation should he use?

Ahmed should use motion tweening to show the ball dropping from top of building to ground. He only needs to create the first and last frame with required keyframes and apply motion tweening between them.

### F. Lab Exercise

For the teacher: Brainstorm and use the whiteboard and marker to help students visualize what they want to show on the screen. Help students to identify the tools and techniques they should use to achieve the desired animation effects.

### G. Project

For the teacher: Bring in a few greeting cards to the classroom and have students study the designs and styles of various cards. Ask them which elements of the designs they would want to incorporate in their cards. Ask them to find old greetings cards stacked away in their homes and use those to get more ideas.



