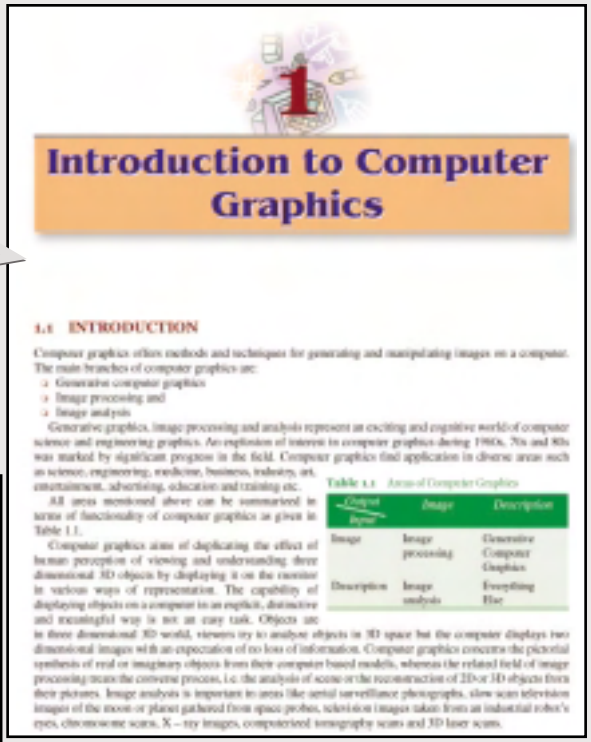
Visual Guide

1. Introduction
The chapter introduction provides a quick look into the concepts discussed in the chapter.



1

Introduction to Computer Graphics

1.1 INTRODUCTION

Computer graphics offers methods and techniques for generating and manipulating images on a computer. The main branches of computer graphics are:

- Generative computer graphics
- Image processing and
- Image analysis

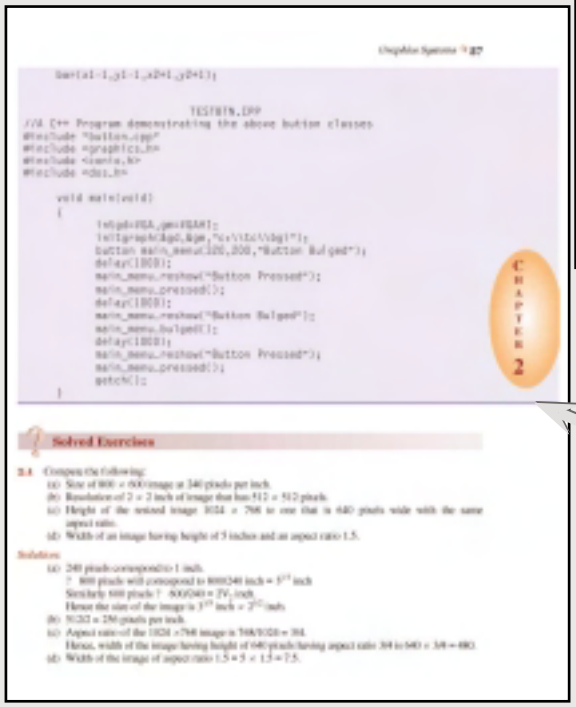
Generative graphics, image processing and analysis represent an exciting and cognitive world of computer science and engineering graphics. An explosion of interest in computer graphics during 1960s, 70s and 80s was marked by significant progress in the field. Computer graphics find application in diverse areas such as science, engineering, medicine, business, industry, art, entertainment, advertising, education and training etc.

Table 1.1 Areas of Computer Graphics

Output / Input	Image	Description
Image	Image processing	Generative Computer Graphics
Description	Image analysis	Everything Else

All areas mentioned above can be summarized in terms of functionality of computer graphics as given in Table 1.1.

Computer graphics aims of duplicating the effect of human perception of viewing and understanding three dimensional 3D objects by displaying it on the monitor in various ways of representation. The capability of displaying objects on a computer in an explicit, distinctive and meaningful way is not an easy task. Objects are in three dimensional 3D world, viewers try to analyse objects in 3D space but the computer displays two dimensional images with an expectation of no loss of information. Computer graphics concerns the pictorial synthesis of real or imaginary objects from their computer based models, whereas the related field of image processing treats the converse process, i.e. the analysis of scene or the reconstruction of 2D or 3D objects from their pictures. Image analysis is important in areas like aerial surveillance photographs, slow scan television images of the moon or planet gathered from space probes, television images taken from an industrial robot's eyes, chromosome scans, X – ray images, computerized tomography scans and 3D laser scans.



Graphics Systems 27

```
Use(x1-1,y1-1,x2+1,y2+1);

                    TEST01.CPP
//A C++ Program demonstrating the above button classes
#include "button.cpp"
#include <graphics.h>
#include <conio.h>
#include <dos.h>

    void main(void)
    {
        int gd=DETECT,gm;
        initgraph(&gd,&gm,"c:\\tc\\bgi");
        button main_menu(100,200,"Button Bulged");
        delay(1000);
        main_menu.redraw("Button Pressed");
        main_menu.pressed();
        delay(1000);
        main_menu.redraw("Button Bulged");
        main_menu.bulged();
        delay(1000);
        main_menu.redraw("Button Pressed");
        main_menu.pressed();
        getch();
    }
```

CHAPTER 2

Solved Exercises

2.1 Compute the following:

(a) Size of 800 × 600 image at 340 pixels per inch.

(b) Resolution of 2 × 2 inch of image that has 512 × 512 pixels.

(c) Height of the restored image 1024 × 768 to one that is 640 pixels wide with the same aspect ratio.

(d) Width of an image having height of 5 inches and an aspect ratio 1.5.

Solutions

(a) 340 pixels correspond to 1 inch.
∴ 800 pixels will correspond to 800/340 inch = 2^{11} inch
Similarly 600 pixels ? 600/340 = 3V inch
Hence the size of the image is 2^{11} inch × $3^{1/2}$ inch.

(b) 512/2 = 256 pixels per inch.

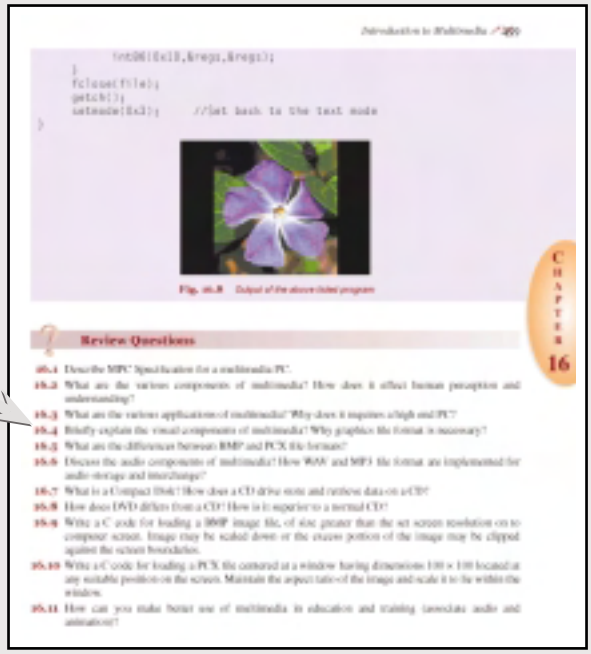
(c) Aspect ratio of the 1024 × 768 image is 768/1024 = 3/4.
Hence, width of the image having height of 640 pixels having aspect ratio 3/4 is 640 × 3/4 = 480.

(d) Width of the image of aspect ratio 1.5 = 5 × 1.5 = 7.5.

2. Solved Exercises
Every chapter contains worked-out examples which will guide the student in understanding the concepts and to solve the exercise problems.

3. Review Questions

The text contains many Review Questions for the students to work out and practice. This will hone their problem-solving skills to a great extent.



Review Questions

16.1 Describe MPC Specification for a multimedia PC.

16.2 What are the various components of multimedia? How does it affect human perception and understanding?

16.3 What are the various applications of multimedia? Why does it requires a high end PC?

16.4 Briefly explain the visual components of multimedia? Why graphics file format is necessary?

16.5 What are the differences between BMP and PCX file formats?

16.6 Discuss the audio components of multimedia? How WAV and MP3 file format are implemented for audio storage and interchange?

16.7 What is a Compact Disk? How does a CD drive store and retrieve data on a CD?

16.8 How does DVD differs from a CD? How is it superior to a normal CD?

16.9 Write a C code for loading a BMP image file, of size greater than the set screen resolution on to computer screen. Image may be scaled down or the excess portion of the image may be clipped against the screen boundaries.

16.10 Write a C code for loading a PCX file centered at a window having dimensions 100 x 100 located at any suitable position on the screen. Maintain the aspect ratio of the image and scale it to be within the window.

16.11 How can you make better use of multimedia in education and training (associate audio and animation)?

4. Computer Codes

Every chapter contains Computer Codes to help in implementing the concepts learnt in the chapter.

Computer Codes

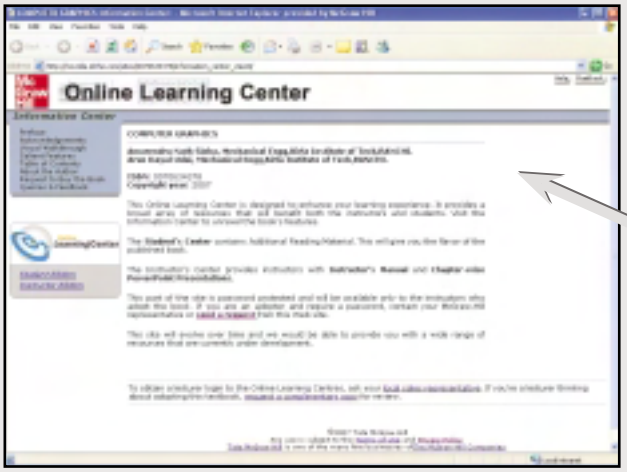
Program 5.1: Cohen Sutherland line clipping program to clip the line outside the window boundary.

Source code in C:

```
#include<conio.h>
#include<stdio.h>
#include<graphics.h>
#include<math.h>

typedef unsigned char BYTE;     // 0 to 255 or 0 to 1111-1111 i.e 0xFF

BYTE pointcheck(int x, int y);
BYTE bit1check(int p);
BYTE bit2check(int p);
BYTE bit3check(int p);
BYTE bit4check(int p);
int endprog(void);

int main (void)
{
    //Graphics mode initialization to 640x480 resolution
    int gdriver=DETECT,gmode;
```

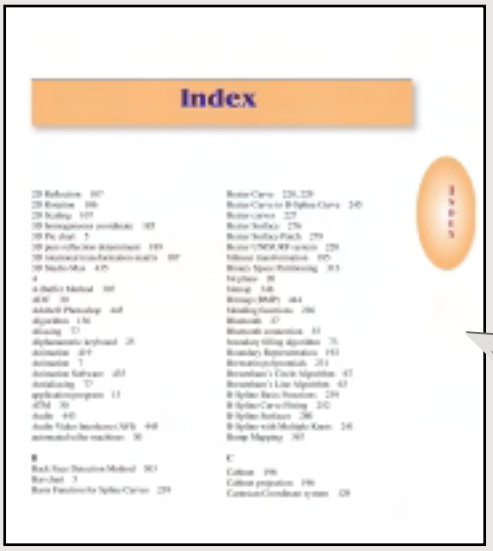
5. Figures
Figures are used exhaustively in the text to illustrate the concepts and methods described.

6. Summary
A summary gives the essence of each chapter in brief and will be helpful for a quick review before the examination.



7. Web Supplement: (http://www.mhhe.com/ansinha/cg)
This takes the user to the Online Learning Center of the book where the teachers and students can find valuable supplements available with the book.

8. Bibliography
An exhaustive Bibliography is present for additional readings.



9. Index
An Index provides a list of all the important terms discussed in the book.