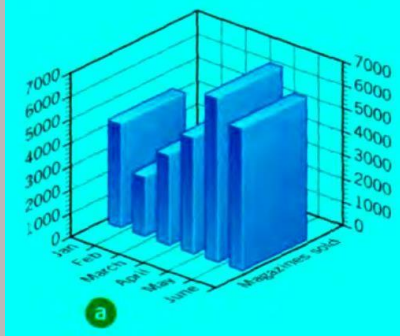
Chapter 2: Graphics and Design

I/ Warm up

* What is Graphics and Design?
* Have you ever used a software to design a car or a house?

A **In pairs, look at the computer graphics (a–d) and discuss these questions.**

1 Which of these computer graphics are three-dimensional (3-D)?
2 What are the advantages of creating 3-D images?
3 Which types of professional might use the computer graphics (a–d)?
4 Who else uses computer graphics in their job? How do they use them?



a

b


c


d

B/ Read the following text to check your answers.

Computer graphics

Computer graphics are pictures and drawings produced by computer. There are two main categories:

Raster graphics, or **bitmaps**, are stored as a collection of pixels. The sharpness of an image depends on the density of pixels, or **resolution**. For example, text or pictures that are scaled up – that is, made bigger – may show **jagged** edges. Paint and photo-editing programs like Adobe Photoshop focus on the manipulation of bitmaps. Popular raster formats are **JPEG**, **GIF** and **TIFF**.

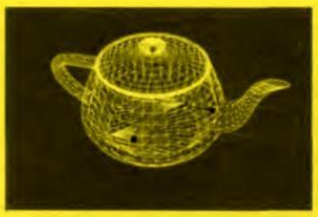
Vector graphics represent images through the use of geometric objects, such as lines, curves and polygons, based on mathematical equations. They can be changed or scaled without losing quality. Vector data can be handled by drawing programs like Adobe Illustrator, Corel Draw or Macromedia Freehand. **EPS** is the most popular file format for exchanging vector drawings.

◁ *Bitmap graphics are composed of pixels, each of which contains specific colour information*

Vector graphics consist of points, lines and curves which, when combined, can form complex objects ▷

Almost all computer users use some form of graphics. Home users and professional artists use image-editing programs to manipulate images. For example, you can add **filters** (special effects) to your favourite photos, or you can **composite** images. Compositing is combining parts of different images to create a single image. Graphic artists and designers use drawing programs to create freehand drawings and illustrations for books or for the Web. Businesspeople use presentation graphics to make information more interesting visually – graphs and diagrams can be more effective ways of communicating with clients than lists of figures. Electrical engineers use graphics to design circuits in order to present data in a more understandable form. Mechanical engineers use **CAD** (**C**omputer **A**ided **D**esign) software to develop, model and test car designs before the actual parts are made. This can save a lot of time and money.

CAD is also used in the aerospace, architecture and industrial sectors to design everything from aeroplanes and buildings to consumer products. Designers start a project by making a **wireframe**, a representation showing the outlines of all edges in a transparent drawing. They then specify and fill the surfaces to give the appearance of a 3-D solid object with volume. This is known as **solid modelling**. Next, they add paint, colour and filters to achieve the desired 'look and feel': this is called **texturing** the object. Finally, they **render** the object to make it look real. Rendering includes lighting and shading as well as effects that simulate shadows and reflections.



◁ *A wireframe model of a teapot*

Smooth shading – part of the rendering process ▷

Computer art, or **digital art**, is used in adverts and TV programmes. Artists and scientists use special graphic applets to create amazing **fractals**. Fractals are geometrical patterns that are repeated at small scales to generate irregular shapes, some of which describe objects from nature. Government agencies use **GIS** (**Geographic Information Systems**) to understand geographic data and then plan the use of land or predict natural disasters. Cartographers use GIS to make detailed maps. Animators use **computer animation** software to create animated cartoons or add effects in movies and video games.

A fractal

C Read the text again and answer these questions.

1 What are the differences between *raster* graphics and *vector* graphics?
2 Which graphics file formats are mentioned?
3 What is *compositing*?
4 What does CAD stand for?
5 What are the benefits of using graphics in the car industry?
6 What type of graphics software is used to make maps or 3-D models of the Earth?
7 Who uses computer animation? How?

D Match the words (1–6) with the definitions (a–f).

1	resolution	a	special effects that can be applied to pictures
2	jagged	b	a technique that generates realistic reflections, shadows and highlights
3	filters	c	geometrical figures with special properties
4	wireframe	d	irregular or uneven
5	rendering	e	the number of pixels in an image
6	fractals	f	the drawing of a model by using features like edges or contour lines

E In pairs, discuss which application of computer graphics you think is the most important or useful. Give reasons for your answers.

2 Language work: the -ing form

A. Look at the HELP box and decide if the –ing forms in these sentences are gerunds, present participles or adjectives. Write g, pp or a.

1. PCs generate graphics performing mathematical calculations data……
2. Business people use graphics to make information more interesting visually……
3. Graphics and diagrams can be more effective ways of communicating with clients than figures……

4. She is designing a logo for the company…….
5. If you need to make a presentation, I suggest using Powerpoint…….

HELP box

The *-ing* form

We use the **-ing** form in three ways:

1 ***Rendering*** *includes* ***lighting*** *and* ***shading****.*
2 We are ***designing*** *a new car on computer.*
3 They use special applets to create ***amazing*** *fractals.*

- In 1, **rendering** is a gerund (see below), acting as the subject. **Lighting** and **shading** are also gerunds, acting as the objects. *A gerund refers to an activity or process.*
- In 2, **designing** is a present participle. This is used in continuous tenses (in the above example, the present continuous) and reduced relative clauses.
  … a representation ***showing*** *the outlines of all edges.*
  (= which shows the outlines …)
- In 3, **amazing** is an adjective.

We use gerunds in the following ways:

- As the subject of a verb
  Compositing *is combining parts of different images to create a single image.*
- As the complement of the subject
  Compositing is ***combining*** *parts of different images …*
- As the object of a verb
  I ***enjoy editing*** *pictures.*
- After a preposition
  Designers start a project ***by making*** *a wireframe.*
- As the complement of a verb
  This course ***involves painting*** *and* ***drawing*** *in various media.*
- Some verbs are followed by the gerund, not by the infinitive (e.g. **avoid**, **fancy**, **finish**, **give up**, **hate**, **imagine**, **involve**, **keep**, **look forward to**, **mind**, **suggest**, **enjoy**)

6. The internet is a network linking other networks…….

B. Correct the mistakes in these sentences. There___ are seven mistakes in total.

1. Computer animation is the process of create objeets which move across the screen.
2. Texturing involves add paint, colour and filters to drawings and designs.
3. You can open the colour palette by click on the corresponding icon.
4. CAD programs are very fast at to perform drawing functions.
5. A lot of time and money is saved by test a car design before to make the product.
6. To render refers to the techniques used to make realistic images.

3 The toolbox

A Listen to an extract from an online tutorial about graphics programs and answer these questions.

1 What is a *toolbox* in graphics software?
2 What are graphics *primitives*?
3 What sort of *attributes*, or characteristics, can be used in graphical objects?
4 What does *translation* mean?

B Listen again and complete this extract from the web version of the tutorial.

Graphics programs usually have a *toolbox* – a collection of drawing and (1) _____ tools that enable you to type, (2) _____, draw, paint, edit, move, and view images on the computer.

The basic shapes which are used to (3) _____ graphical objects are called *primitives*. These are usually geometric, such as lines between two points, arcs, circles, polygons, ellipses and even text. Furthermore, you can specify the *attributes* of each primitive, such as its colour, line type, fill area, interior style and so on.

The various tools in a toolbox usually appear together as pop-up icons in a menu or palette. To use one, you activate it by (4) _____ on it. For example, if you want to (5) _____ a rectangle, you activate the rectangle tool, and the pop-up options give you the possibility of (6) _____ rectangles with square or rounded corners.

You can transform an object by translating, (7) _____ or scaling it. *Translation* means moving an object to a different location. *Rotation* is (8) _____ the object around an axis. For example, you may need to rotate an object 90 or 180 degrees to fit the drawing. (9) _____ is making the object larger or smaller.

C Match the tools from the Photoshop toolbox (1–10) with the functions (a–j).

1 Marquee select tools
2 Move tool
3 Crop tool
4 Paintbrush, pencil
5 Eraser
6 Paint bucket
7 Type tool
8 Colour picker (Eyedropper)
9 Zoom
10 Colour tools and palette

a cut down the dimensions of a picture
b select a particular part of an image (you can choose different shapes for selection)
c fill in an area with a colour
d control the foreground and background colour
e select a specific colour in a photo
f magnify areas of an image when you are doing close, detailed work
g delete the part of the picture you drag it over
h insert text into your document
i draw and paint in different shapes and patterns
j move a selection or entire layer by dragging it with your mouse

4 Choosing graphics software

Work in pairs. Student A chooses a task from the list (1–6) and describes it. Student B chooses the most appropriate graphics software for the task (a–f) and gives reasons for his or her choice. Swap roles. Look at the text on page 101 and the *Useful language* box to help you.

1 to edit and retouch photos
2 to create illustrations and drawings for a magazine
3 to prepare slideshows for training sessions or conferences
4 to make mechanical designs and architectural plans
5 to create dynamic simulations and special effects for films, TV, advertisements and games
6 to analyse geographic data and make maps

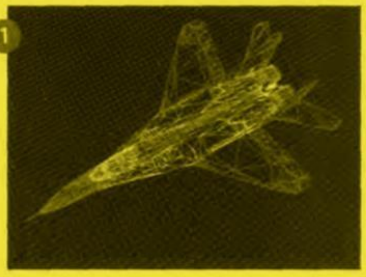
a Computer animation software, for example 3-D Studio Max
b GIS software, for example ArcView
c Presentation software, for example PowerPoint
d A CAD package, for example AutoCAD
e Vector graphics software, for example Freehand
f A paint and image-editing program, for example Photoshop

Useful language

If I need to …, what software would you recommend?
For that kind of task, the best thing would be …
It allows you to … and …
I wouldn't recommend … because …
A good program of this type is …

5 Describing graphics

Look at the images (1–4), which show the stages involved in drawing a plane using computer software. Write a short description of stages 2, 3 and 4. Look at the text on page 101 and the *Useful language* box to help you.



Wireframe

This first image shows a wireframe model, probably made using CAD software. A wireframe is a drawing with edges and contour lines. The parts of the plane are shown in different colours (violet, green, blue, etc.).

Useful language

This picture shows …
In this (next) stage …
The designer has used …
This stage is called …
Rendering techniques include …
As a finishing touch, …

Solid modelling

Texturing the model

Rendering