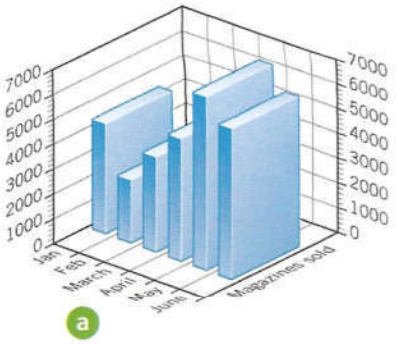
Unit 20 Graphics and design

1 Computer graphics

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

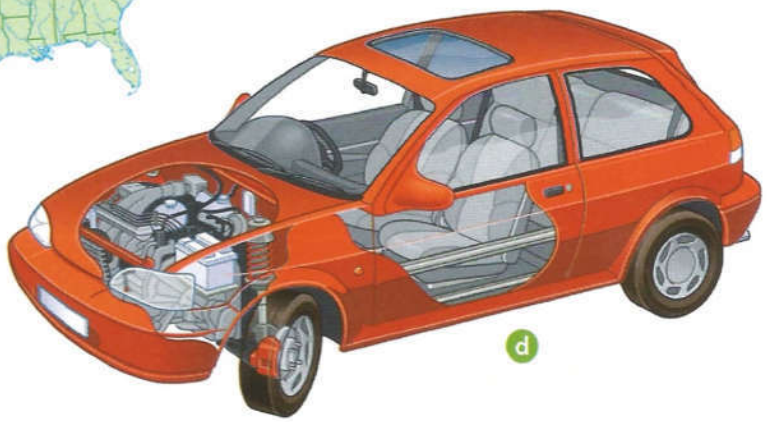
1 Which of these computer graphics are three-dimensional (3-D)?
2 What are the advantages of creating 3-D images?
3 Which types of professional might use the computer graphics (a–d)?
4 Who else uses computer graphics in their job? How do they use them?



a

b


c


d

B **Read the text on page 101 and check your answers to 3 and 4 in A.**

C **Read the text again and answer these questions.**

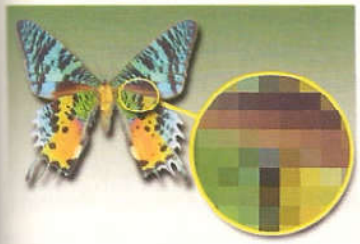
1 What are the differences between *raster* graphics and *vector* graphics?
2 Which graphics file formats are mentioned?
3 What is *compositing*?
4 What does CAD stand for?
5 What are the benefits of using graphics in the car industry?
6 What type of graphics software is used to make maps or 3-D models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

Computer graphics

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

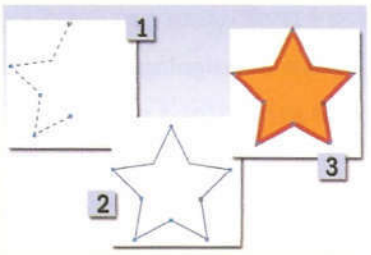
Raster graphics, or **bitmaps**, are stored as a collection of pixels. The sharpness of an image depends on the density of pixels, or **resolution**. For example, text or pictures that are scaled up – that is, made bigger – may show **jagged** edges. Paint and photo-editing programs like Adobe Photoshop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



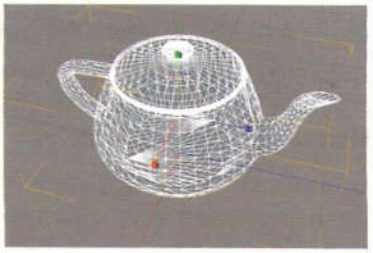
◁ *Bitmap graphics are composed of pixels, each of which contains specific colour information*

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

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 by performing mathematical calculations on data. .....
2 Businesspeople use graphics to make information more interesting visually. .....
3 Graphs and diagrams can be more effective ways of communicating with clients than lists of figures. .....
4 She is designing a logo for the company. .....
5 If you need to make a presentation, I suggest using PowerPoint. .....
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 objects 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.

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**)