

Introduction to Multimedia Applications CT801-4-0-OIMA



A · P · U
ASIA PACIFIC UNIVERSITY
OF TECHNOLOGY & INNOVATION

Graphics

Topic & Structure of the lesson



Definition of Graphics



Sources of Graphics



Types of Graphics



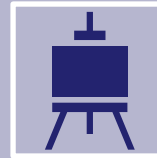
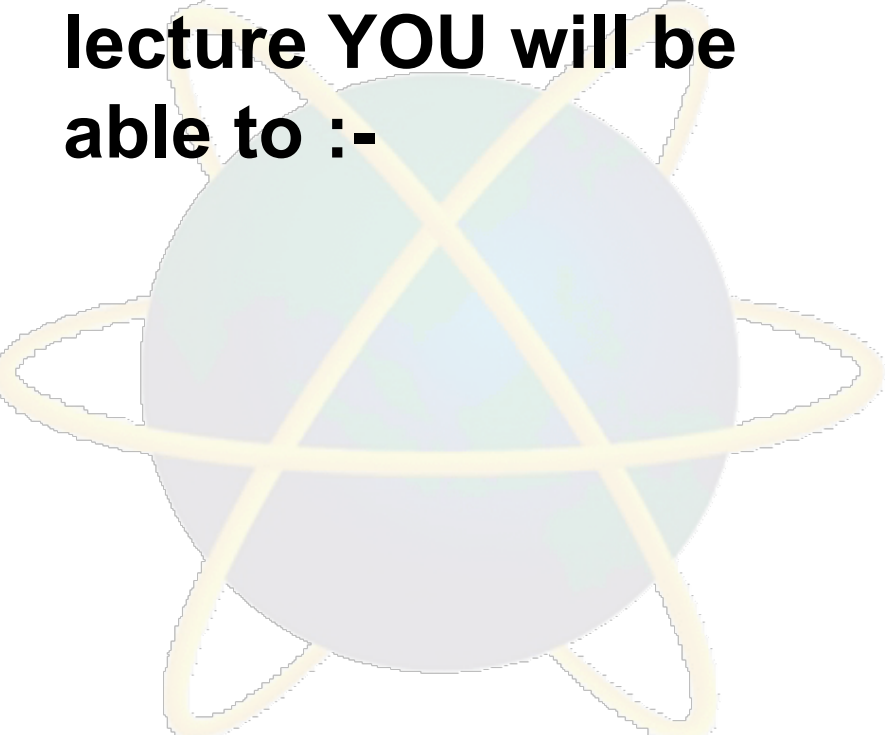
Graphic File Size Calculation



Graphic File Formats

Learning Outcomes

**At the end of this
lecture YOU will be
able to :-**



Identify graphic concepts and formats.



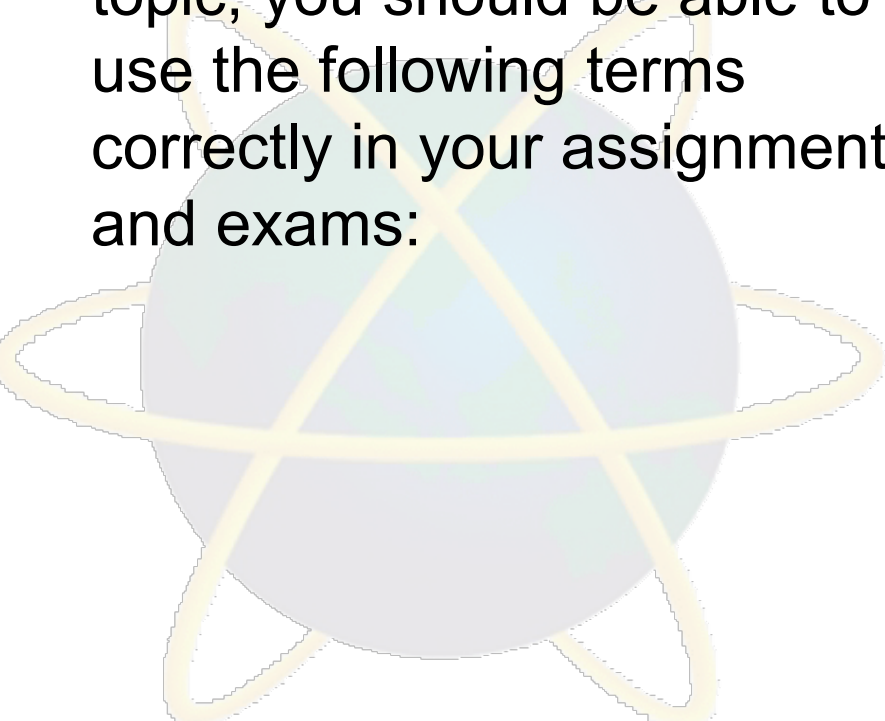
Discuss the use of multimedia graphic elements such as: background, Buttons, signage and presentation elements.



Calculate a compressed graphic file size.

Key Terms you must be able to use

If you have mastered this topic, you should be able to use the following terms correctly in your assignments and exams:



Bitmap Graphic

Vector Graphic

Graphic Resolution

Graphic File Format

Definition

Graphics

Also called still image

Contains no movement or animation.

Underlies the display of text and animation

Means text is a type of graphic

Means animation is made up of many graphics

Source

Sources of Graphics:

- Pictures exist in non-digital medium, and digitized by a scanner (Scanning).
- Captured from external world by a digital camera.
- Created on a computer by an illustrator using graphics software.
- Collections from CD-ROM (Clipart, PhotoCDs)
- From commercial and amateur Web sites (Internet)
- Graphics generated by a computer program operating on some data, mapping it to a simple visual representation (Charts, Flow Charts, pie-chart)

Types of Graphics



Bitmap graphic:

**Also called
Dots graphic,
or Raster
graphic**



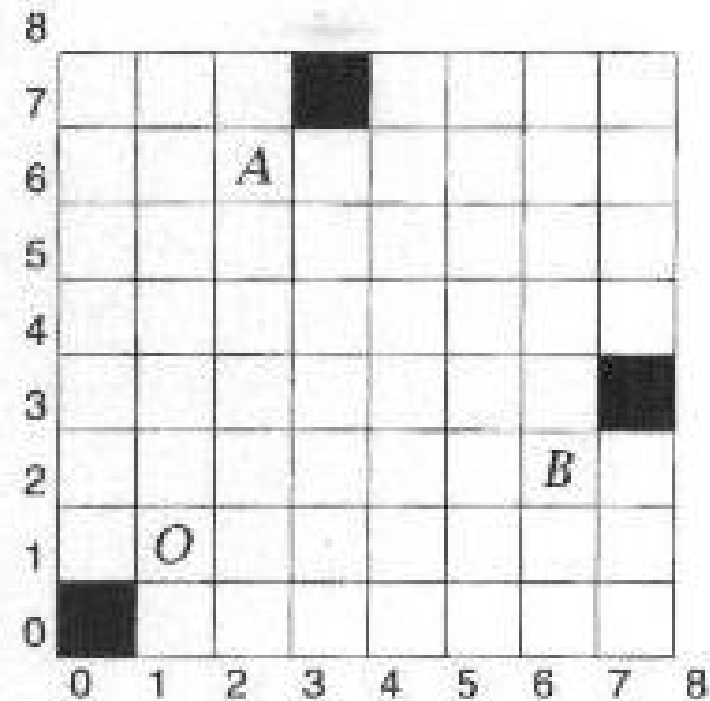
Vector graphic:

**Also called
Line graphic, or
Object-Oriented
graphics**

Bitmap Graphic

Bitmap Graphic

- Made up of many dots that are arranged in a matrix and in a specific order to form an graphic. These dots are also called pixels (***P*icture *E*lements**).



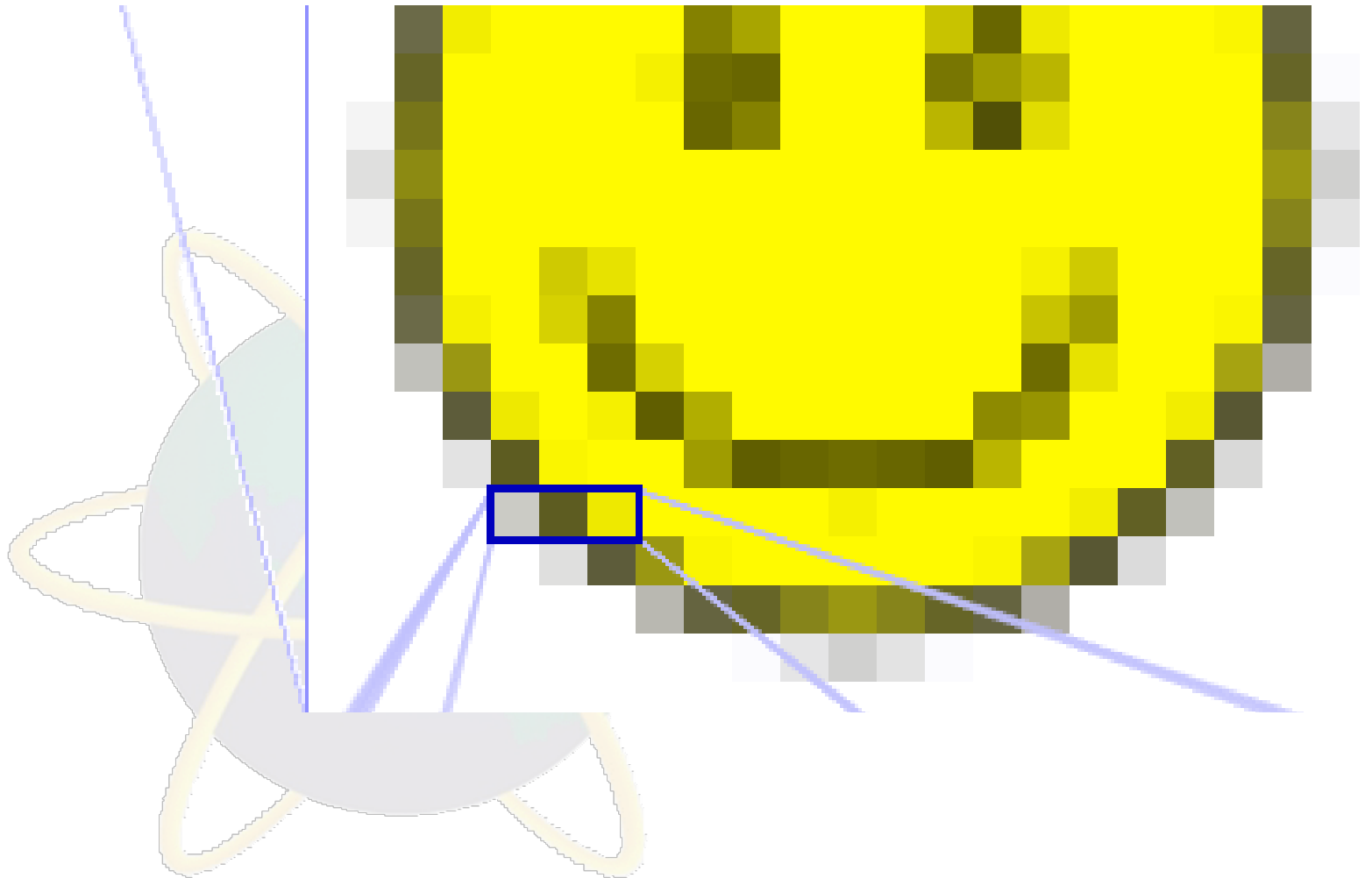
Pixel coordinates

Bitmap Graphic

Each of these pixels record Red, Green and Blue, or RGB.

All these pixels merge optically to produce the impression of continuous tones (give the impression of graphics)

Example



Bitmap Graphic (Resolution)

The quality of bitmap graphic is highly affected by Resolution.

Resolution: A measure of how finely a device approximates continuous graphics using finite pixels.

2 Common ways of specifying resolution:

- **Dot per inch (dpi)**
- **Pixel dimension (e.g. 640 x 480 pixel)**

A graphic's resolution may be 600 dpi, means the graphic has 600 dots per inch.

Bitmap Graphic

The higher the resolution, the finer the image

However, the disadvantages of high resolution graphics:

- **Contain more pixels and thus occupy more disk space**
- **Take longer time to transfer over network**

Bitmap Graphic File Size Calculation

Calculating Graphic File Size:

- Graphic size (in bytes) = $(\text{height} \times \text{width} \times \text{color depth}) / 8$

Color depth:

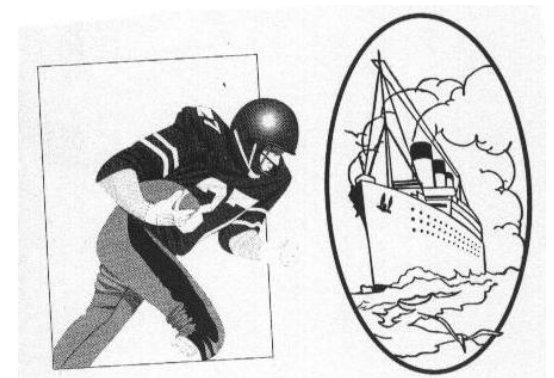
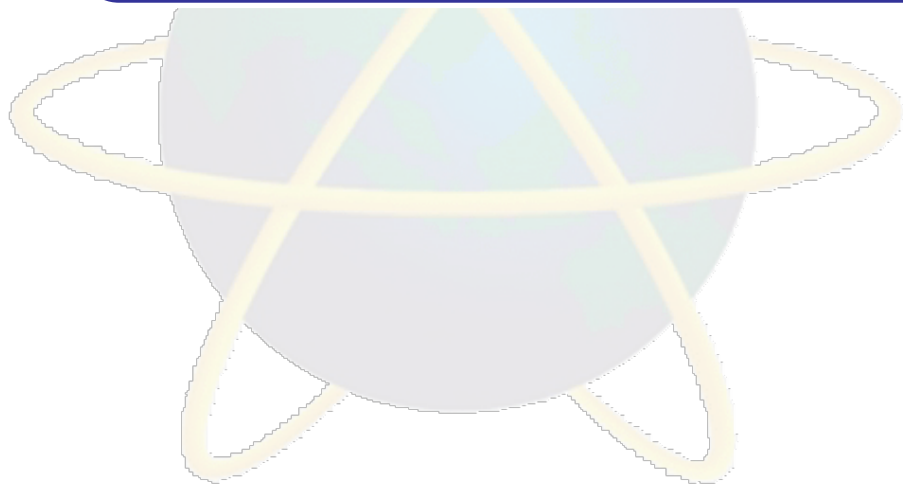
- Also called color resolution
- Measures the number of bits of stored information per pixel
- Means show how many colors can be displayed

A full screen graphic resolution (640 x 480 pixels) at an 8 bit color will yield the following file size: $(640 \times 480 \times 8) / 8 = 307200$ bytes

Vector Graphic

Graphic is stored as a mathematical formula

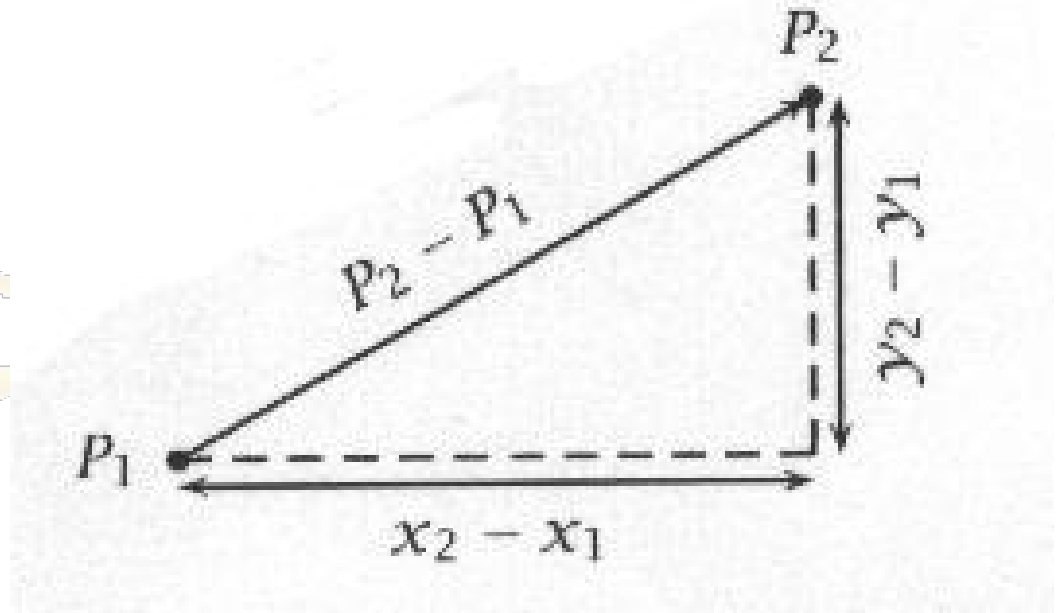
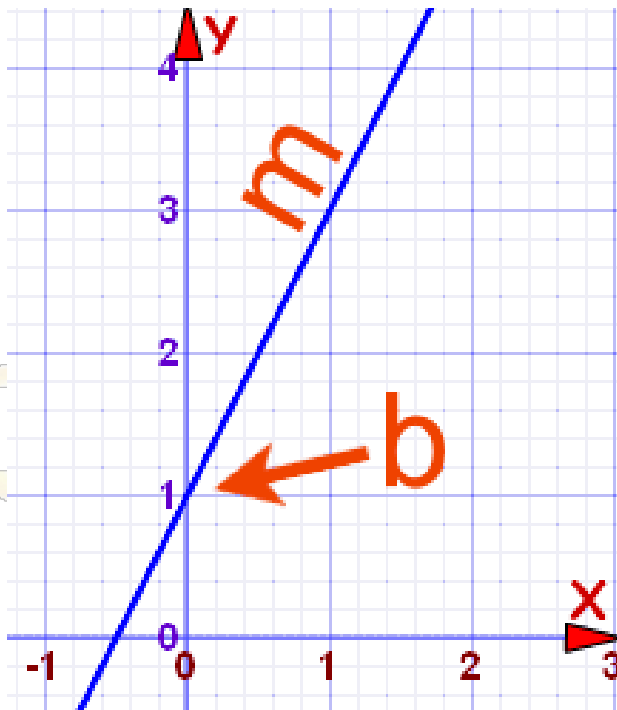
Displaying a vector graphic requires some computation to be performed in order to generate graphic.



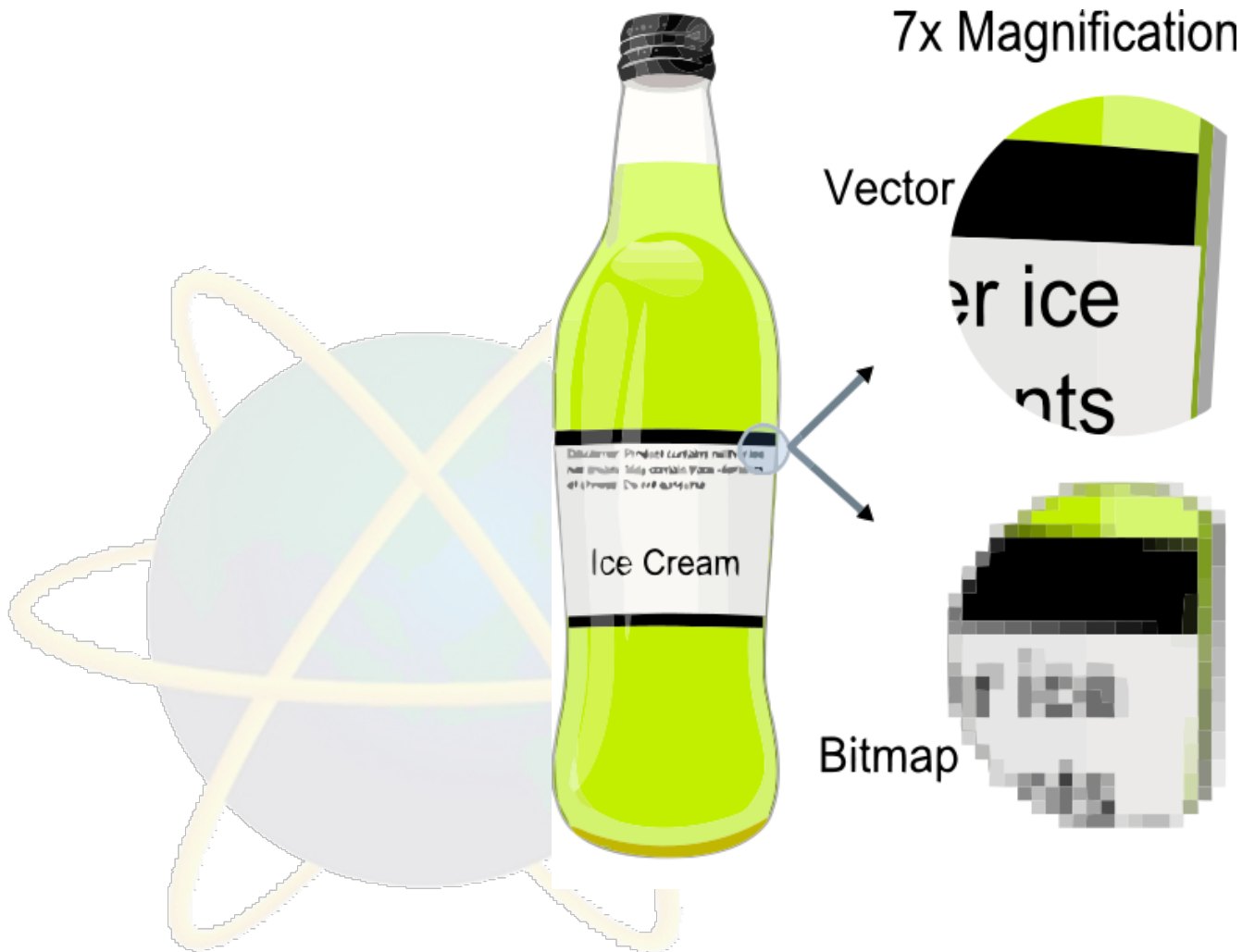


Vector Graphic - example

- The equation of straight line is written as $y = mx + c$. If the line passes through (x_1, y_1) and (x_2, y_2) , m is equal to $(y_2 - y_1) / (x_2 - x_1)$ and c is equal to $(x_2 y_1 - x_1 y_2) / (x_2 - x_1)$



Bitmap vs Vector



Bitmap vs Vector Graphic

Why Use **Bitmap Graphic**?

Can produce photo-realistic graphics

Can produce background textures.

Does not require special software player to read

Standard graphic format. Many software tools support Bitmap graphic like GIF and JPEG file

No processing is necessary before displaying bitmap graphic

Bitmap vs Vector Graphic

Disadvantage of **Bitmap Graphics**

Large size, lead to excessive download times

For 2-D graphics only

Resolutions of different devices do vary. Example, iMac has a resolution of 96 dpi and PC monitors have a resolution of 72 dpi. Bitmap graphics will exhibit different size when they are displayed on devices in different resolutions

Bitmap vs Vector Graphic

Why use Vector graphics?

Compact

Relatively small amount of data required to represent the graphic

Scaleable

Resolution-independent

Easy to edit

Vector techniques are mandatory for 3-D graphic

Bitmap vs Vector Graphic

Disadvantage of **Vector Graphic**:

Absence of standard format for vector graphics on the Web

Displaying vector graphic requires some software to translate it into a displayable form. For instance, to display Flash movie, Flash player is required to install onto the computer.

Limited level of detail can be represented.

Graphic File Format (.gif)

Graphics Interchange Format

Developed by CompuServe in 1987

The most commonly used graphic format on the Web

Restricted to displaying 256 colors

Compressed to 20 to 25% of their original size with no loss in image quality

Most suitable graphics requiring fewer colors, such as clip art graphics, line art, logos, cartoon and icons

Less successful with photographic graphics

Support transparency

Support interlacing, which means that they can “fade in” gradually as graphic is loaded

Graphic File Format (.JPEG /.JPG Format)

Developed by Joint Photographic Experts Group

1992, became an ISO standard and an international standard

A 24-bit color graphic: can display full 16.7 million

A relatively small file size, smaller than GIF. There are also situations in which the GIF format has a smaller size, but as a general rule, JPEGs are smaller files

Can compress typical graphics from 1 / 10 to 1 / 50 of their uncompressed bit size without visibly affecting graphic quality

Can not use transparent colors

JPEG files are not interlaced, which means that they do not “fade in” gradually as do

Graphic File Format (.png)

Pronounced 'ping'

Published in 1996

Has a status of W3C (World Wide Web Consortium) Recommendation

Devised to supersede GIFs

Why want to supersede? Because the patent owner of GIF, Unisys charge license fee for any program that implements GIF compression and decompression

Can support up to 48-bit color

Offers more sophisticated form of transparency than GIF

Popularity slow

Supported by all major Web browser and graphics program

Graphic File Format (.swf)

Originally developed for vector animations using Macromedia's Flash

Now an open standard, is in wide use for vector graphics

SWF does not have the sanction of the W3C, but still widely supported by the market

A highly compact format

Can be rendered very quickly

Mostly used for animations

Use for still graphic is increasing

Quick Review Question

01

Define the
term graphics

02

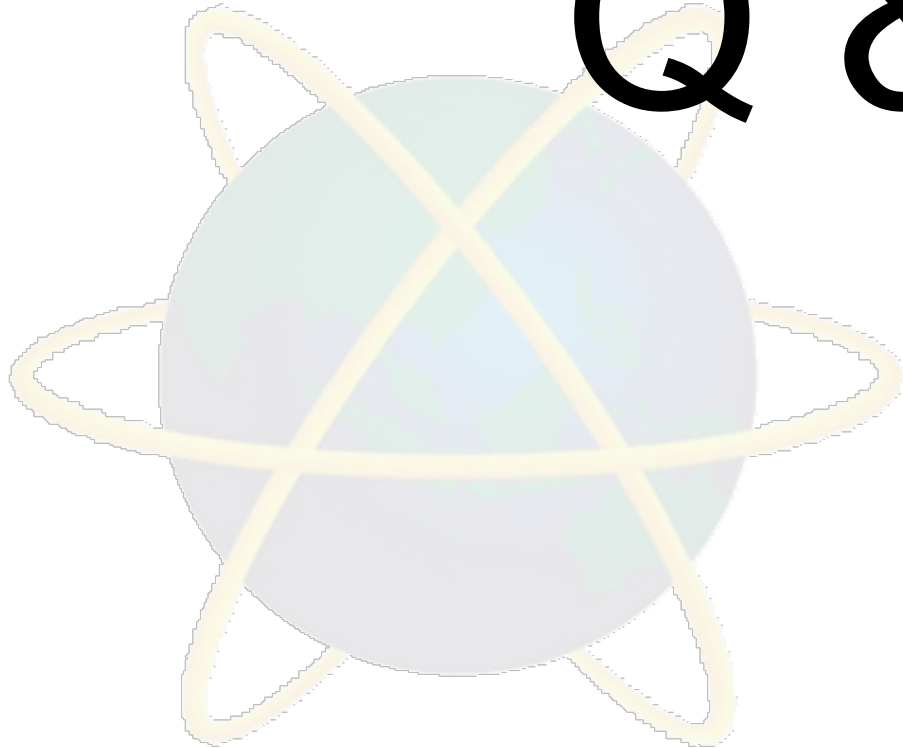
Identify and
explain the 2
type of
graphic

03

List 5
examples of
Graphic File
Formats

Question and Answer Session

Q & A



Next Session

Animation

