UNIT9

Multimedia

STARTER **1** Match the multimedia terms in Column A to the activities in Column B. More than one match is possible.

Column A	Column B
MIDI	watching movies
MP3	composing music on a PC
DVD	downloading music from the Internet
MPEG	using reference works like encyclopaedias

2 Study this diagram which explains MP3. Answer these questions:

1 How does MP3 reduce the size of music files?
2 What can you obtain from www.mp3.com?
3 How can you listen to MP3 files?

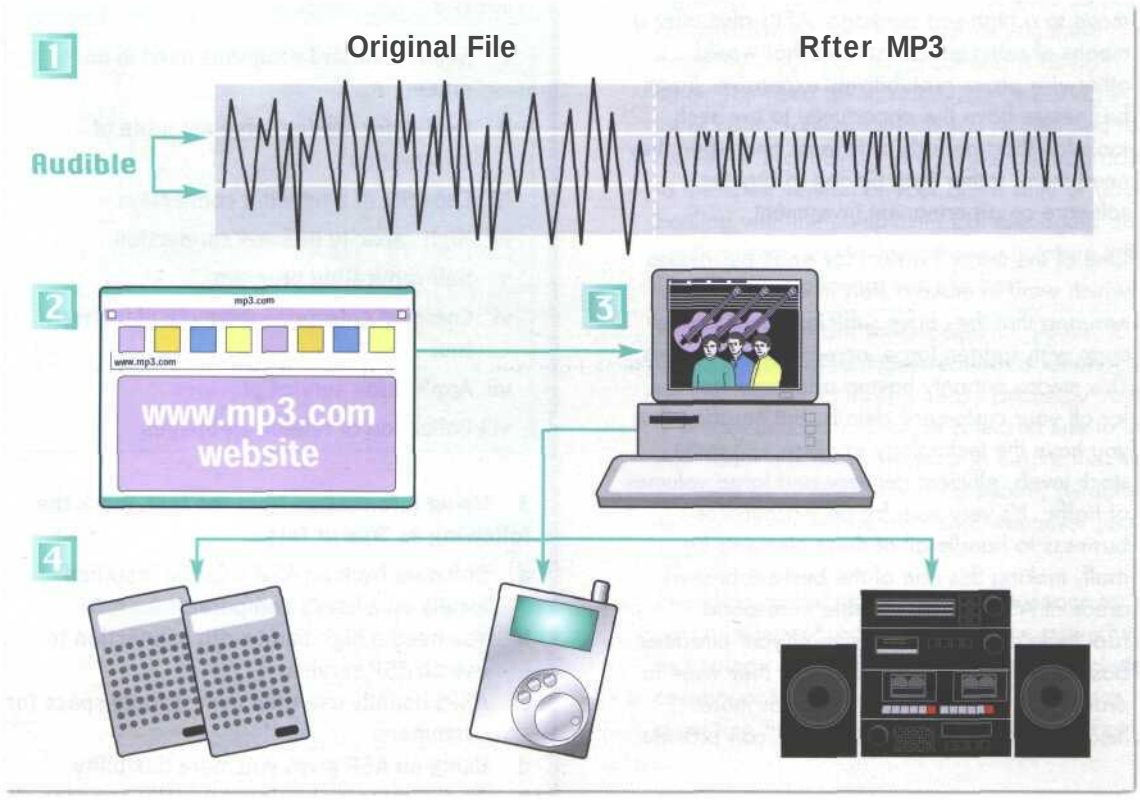


Fig 1
How MP3 will transform music

3 Match these captions to the pictures in Fig 1. Consider again your answers to Task 2.

a Once you've paid by credit card (unless it's one of the millions of free files), music is downloaded to your PC.

b The original music file is stripped of anything that is inaudible to the human ear. After MP3 has done its work, the file is reduced to roughly one twelfth that of the original recording.

c MP3 files can be listened to on your PC, a dedicated MP3 player, or your hi-fi.

d MP3 files are put on a website, where browsers can listen to samples and buy a single track or album... or even create their own compilation.

READING **4** Read this text to find the answers to these questions.

1 What does MP3 stand for?
2 What is the difference between MP3 and WAV files?
3 What kind of sound does MP3 strip out?
4 What kind of information is included in the tag?

Understanding MP3

The name comes from MPEG (pronounced EM-peg), which stands for the Motion Picture Experts Group. MPEG develops standards for audio and video compression. MP3 is actually MPEG Audio Layer 3.

MP3 competes with another audio file format called WAV. The key difference is that MP3 files are much smaller than WAV files. An MP3 file can store a minute of sound per megabyte, while a WAV file needs 11 or 12 megabytes to hold the same amount. How does MP3 achieve this compression? CDs and audio files don't reproduce every sound of a performance. Instead, they sample the performance and store a discrete code for each sampled note. A CD or WAV file may sample a song 44,000 times a second, creating a huge mass of information.

By stripping out sounds most people can't hear, MP3 significantly reduces the information stored. For instance, most people can't hear notes above a frequency of 16kHz, so it eliminates them from the mix. Similarly, it eliminates quiet sounds masked by noise at the same frequency. The result is a file that sounds very similar to a CD, but which is much smaller. An MP3 file can contain spoken word performances, such as radio shows or audio books, as well as music. It can provide information about itself in a coded block called a tag. The tag may include the performer's name, a graphic such as an album cover, the song's lyrics, the musical genre, and a URL for more details.

5 Read the rest of this text to find the answers to these questions:

1 How do you play MP3 files?
2 What does the Windows Media Player file do with an MP3 file?
3 What is a standalone player?
4 What special features can players offer?
5 What information can you obtain by clicking on the track info button?
6 What does a skin enable you to do?
7 How do you play music from a CD-ROM on an MP3 player?
8 What hardware and software do you need to make your own audio CDs?

Play MP3 Files

Most machines today have enough processing power and memory to play MP3s immediately. Simply download an MP3 file like any other and click on it in Windows Explorer. The Windows Media Player will decode the file and route the signals to your soundcard and then to your speakers.

Other MP3 features include:

Players.

Most standalone players have many features beyond Windows' default Media Player. To control what music you play, players let you group songs into playlists and randomize the selections. To control how the music sounds, they offer spectrum analyzers, graphic equalizers, and frequency displays.

Track info.

A track info button gives you the information on the MP3 file's tag. Other buttons may take you to a music library where you can organize your MP3 files by performer or genre.

Skins or themes.

These programs are designed to change the appearance of the most popular players. They're akin to the wallpaper that alters the look of the Windows desktop. With a skin, a player can become a jukebox, a car dashboard, or a Star Trek tricorder. Think of them as easily interchangeable faceplates.

Rippers and encoders.

A ripper is a program that rips songs from a CD in your CD-ROM drive and turns them into WAV files. An encoder converts WAV files into MP3 files or vice versa. Many MP3 players incorporate rippers and encoders and can do both steps in one.

Recorders.

With a writeable CD-ROM drive, a recorder program lets you create your own audio CDs.

LANGUAGE WORK *-ing* clauses (2) cause and effect

Study this sentence.

1 Using MIDI, computers can communicate with synthesisers.

It contains two clauses. An *-ing* clause:

Using MIDI

and a main clause:

computers can communicate with synthesisers

We can use an *-ing* clause, as in example 1, to explain how something happens. The *-ing* clause explanation can be placed before, or after the main clause as in example 2.

2 DVD drives read DVD disks *(by) using blue laser light.*

We can also use *-ing* clauses to link a cause and effect.

3 A WAV file may sample a song 44, 000 times a second, [cause] *creating a huge mass of information.* [effect]

6 Match each cause and effect. Then link them with an *-ing* clause.

Cause	Effect
1 Computers with MIDI interface boards can be connected to MIDI instruments.	a This permits extra information to be stored on the performer and other track details.
2 Each side of a DVD can have two layers.	b You can create your own compilation.
3 MP3 removes sounds we can't hear.	c This allows you to sample a new group before buying their CD.
4 You can download single tracks.	d This gives an enormous storage capacity.
5 Each MP3 file has a tag.	e This allows the music being played to be stored by the computer and displayed on the monitor.
6 MP3 players contain several devices.	f This enables you to change the appearance of your player.
7 You can download a skin program.	g These allow you to control the way the music sounds.
8 You can legally download some music.	h This produces much smaller files.

7 Explain how each of these actions happen. The explanations are available in Tasks 2, 3 and 4.

1 MP3 reduces the information stored.
2 You can alter the look of your MP3 player.
3 You can 'rip' the audio information from a CD.
4 You can convert a WAV file to MP3 format.
5 You can view the lyrics, notes and author data.
6 You can control how the music sounds.
7 You can access many free and legal music files for downloading.
8 You can play MP3 files through your sound system.

SPEAKING **8** Work in pairs, A and B. With the help of the notes provided, explain to your partner one aspect of multimedia.

Student A Your notes are on page 185.
Student B Your notes are on page 191.

Link your notes into a text describing one aspect of multimedia. Choose either the Student A or the Student B notes.

WRITING **9** Study the diagram, Fig 2, which illustrates how MIDI operates. Then link each set of sentences into one complex sentence to form a continuous paragraph. You may add, omit and change words.

1 Most modern music is mixed.
This uses computers.

2 Musicians record their music into a computer system.
This system is called a Musical Instrument Digital Interface (MIDI).

3 MIDI was developed as a standard interface.
MIDI is for linking music synthesisers and instruments together.

4 Computers can be connected to MIDI instruments.
These computers are fitted with MIDI interface boards.
This allows the music to be stored on computer.
This allows the music to be displayed on the monitor.
The music is being played.

5 The music can be displayed as a musical score.
The music can be edited.
This uses all the features of a mixing desk.

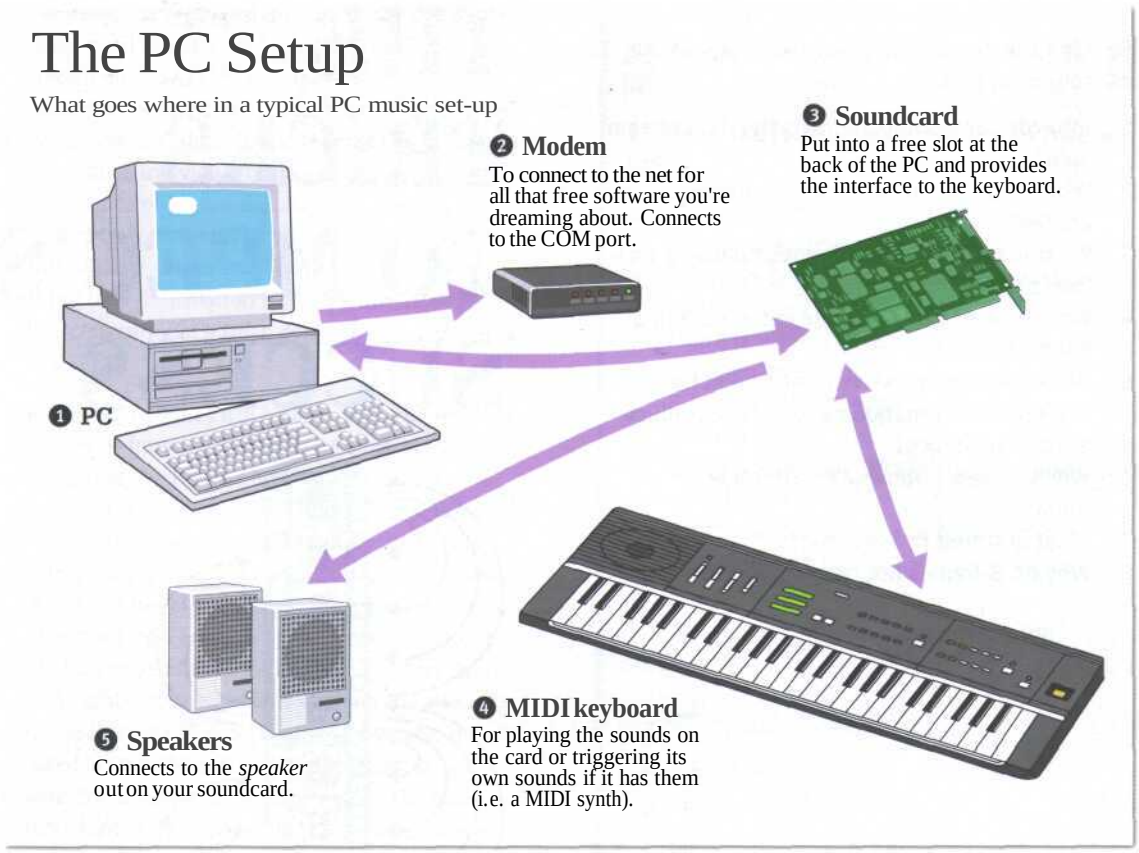


Fig 2
What is MIDI?

6 The music can also be printed out from the computer.
The music is being played.

7 MIDI doesn't transmit any sound.
It transmits simple binary information.

8 The information is called a MIDI message.
The message encodes sound as 8-bit bytes of digital information.

9 The most common messages consist of instructions.
These instructions tell the receiving instrument to play a note for a specific duration of time.

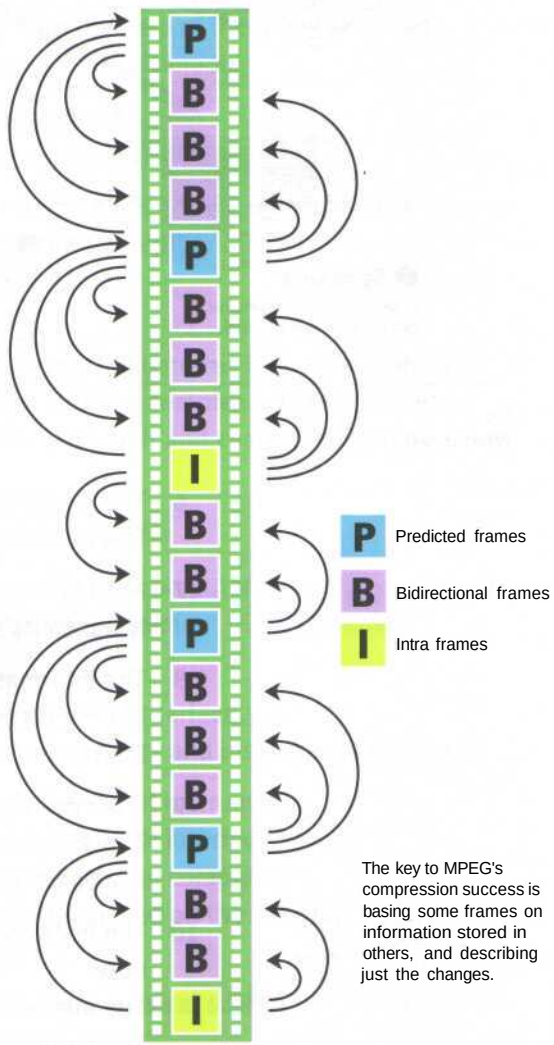
10 The instructions also contain details of how loud to play that note.
The instructions contain a number.
The number indicates which instrument to play.
Number 67 is a saxophone.

SPECIALIST READING

A **Find the answers to these questions in the following text.**

1 Into what two components is the data stream split?
2 What information does an Intra frame contain?
3 What is stored in the P-frames following an I-frame?
4 What is stored in a P-frame in the case of a bouncing ball?
5 What gives the massive reduction in the amount of information needed to reproduce a video sequence?
6 Why is a new I-frame used after a few P-frames?
7 What is stored in a B-frame?
8 Why do B-frames not propagate errors?

THE TRICKS TO MPEG'S SUCCESS



The key to MPEG's compression success is basing some frames on information stored in others, and describing just the changes.

The most common system for the compression of video is MPEG. It works like this. The single data stream off the CD-ROM is split into video and audio components, which are then decompressed using separate algorithms. The video is processed to produce individual frames as follows. Imagine a sequence of frames depicting a bouncing ball on a plain background. The very first is called an Intra Frame (I-frame). I-frames are compressed using only information in the picture itself just like conventional bitmap compression techniques like JPEG.

Following I-frames will be one or more predicted frames (P-frames). The difference between the P-frame and the I-frame it is based on is the only data that is stored for this P-frame. For example, in the case of a bouncing ball, the P picture is stored simply as a description of how the position of the ball has changed from the previous I-frame. This takes up a fraction of the space that would be used if you stored the P-frame as a picture in its own right. Shape or colour changes are also stored in the P-frame. The next P-frame may also be based on this P-frame and so on. Storing differences between the frames gives the massive reduction in the amount of information needed to reproduce the sequence. Only a few P-frames are allowed before a new I-frame is introduced into the sequence as a new reference point, since a small margin of error creeps in with each P-frame.

Between I and P-frames are bi-directional frames (B-frames), based on the nearest I or P-frames both before and after them. In our bouncing ball example, in a B-frame the picture is stored as the difference between the previous I or P-frame and the B-frame and as the difference between the B-frame and the following I or P-frame. To recreate the B-frame when playing back the sequence, the MPEG algorithm uses a combination of two references. There may be a number of B-frames between I or P-frames. No other frame is ever based on a B-frame so they don't propagate errors like P-frames.

Typically, you will have two or three Bs between Is or Ps, and perhaps three to five P-frames between Is.

[Adapted from 'The Tricks to MPEG's Success', Windows Magazine, March 1994]

B **Re-read the text to find the answers to these questions.**

1 Mark the following statements as True or False:

a JPEG is the most common compression system used for video.
b P-frames only store the changes in the image.
c There is always at least one P-frame between two I-frames.
d B-frames store the complete picture information.
e There can only be one B-frame between each I and P-frame.
f There are typically about four P-frames between each I-frame.

2 Match the words in Table A with the statements in Table B.

Table A

a Algorithm
b I-frame
c JPEG
d P-frame
e B-frame
f MPEG

Table B

i A common type of compression used for video data
ii A compressed video frame known as a predicted frame
iii A compressed video frame that stores changes between the frame before it and the frame after it.
iv A formula used for decompressing components of a data stream
v A type of compression used for bitmap images
vi A compressed video frame that contains the complete image information