

11.2 File Compression

Syllabus 2026 - 2028

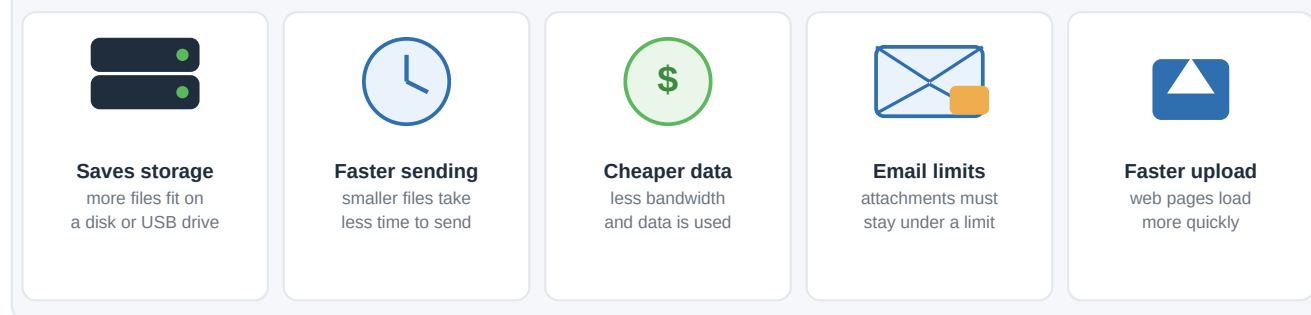
WHAT YOU NEED TO KNOW

- Reduce file sizes for storage or transmission where necessary using file compression, including .zip and .rar
- The need to reduce file sizes for storage or transmission

What file compression is

File compression reduces the size of a file by re-arranging the data so that it takes up less space. Several files can be compressed into a single **archive** such as a .zip or .rar file. The archive must be **extracted** (unzipped) before the files can be used.

Figure 51: Why file sizes are reduced

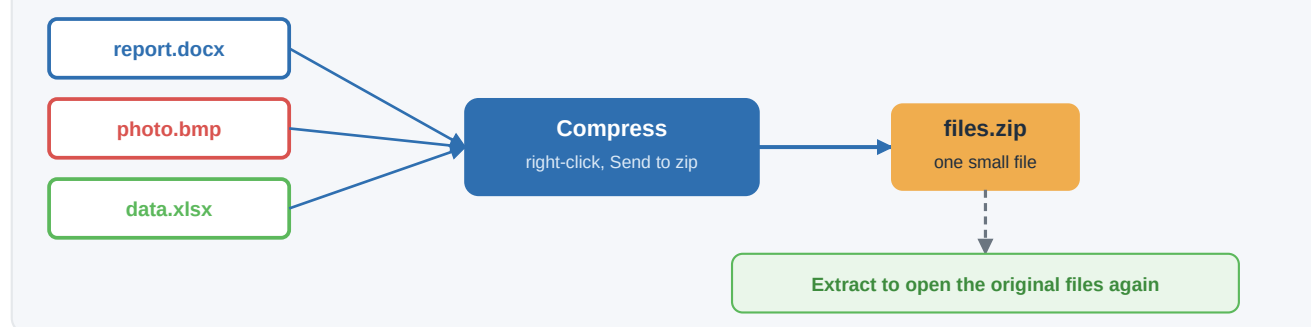


The need to reduce file sizes

Purpose	Why compression helps
Storage	More files fit on a hard disk, USB drive or cloud account, and backups are smaller
Transmission	Smaller files send faster over a network, use less bandwidth and cost less data
Email	Many email systems limit the size of attachments; compression helps fit under the limit
Web	Smaller images and files make web pages load quickly and give a better experience
Grouping	Many files can be combined into one archive for easy sending or downloading

Compressing files with zip and rar

Figure 52: Compressing and extracting files



- **.zip**: a common archive format that Windows can create and open without extra software
- **.rar**: an archive format that often compresses more, but needs software such as WinRAR to create files

- To **compress**: select the files, right-click, then choose Send to, Compressed (zipped) folder, or the archive tool
- To **extract**: right-click the archive and choose Extract All, then open the extracted files
- A password can protect an archive, and large files can be split across several parts

Lossless and lossy compression

Figure 53: Lossless and lossy compression

Lossless

no data is lost; the original can be restored

ZIP RAR PNG FLAC

text, programs, databases, documents

Lossy

some data is removed for good; much smaller

JPEG MP3 MP4

photographs, music and video

	Lossless	Lossy
Data	None lost; original can be rebuilt exactly	Some data permanently removed
File size	Reduced, but less than lossy	Much smaller
Quality	Same as original	Reduced, depending on the amount removed
Suitable for	Text, programs, spreadsheets, documents	Images, audio and video where small changes are hardly noticed
Examples	ZIP, RAR, PNG	JPEG, MP3, MP4

Advantages	Disadvantages
+ Saves storage space	- Takes time to compress and extract
+ Faster upload, download and sending	- Needs software to open some formats
+ Lower data costs	- Lossy loses quality permanently
+ Several files in one	- A damaged archive may lose all files
+ Lossless gives exact original	- Already-compressed files save little

EXAM TIP

Do not say that compression 'deletes' data. **Lossless** compression keeps all the data and the file can be restored exactly. **Lossy** removes data permanently. Always say **why** the file must be smaller, for example 'to fit under the email attachment limit'.

Key terms

Term	Meaning
File compression	Reducing the size of a file.
Archive	One file that holds one or more compressed files.
Extract	Unpack files from an archive.
ZIP	A common compressed archive format.
RAR	A compressed archive format that needs special software.
Lossless	Compression where no data is lost.
Lossy	Compression that permanently removes data.
Bandwidth	The amount of data a connection carries per second.

Practice questions

Answer each question in full sentences. Command words used: State (give a short answer), Describe (say what it is like), Explain (give reasons), Analyse (break it down and examine it), Suggest (apply your knowledge to a situation), Compare and contrast (similarities and differences), Evaluate (weigh up and reach a judgement).

No.	Question	Marks
1	State two reasons for reducing the size of a file before it is emailed.	[2]
2	Describe how a user can compress a group of files into a .zip file.	[3]
3	Explain why compression is useful when storing large numbers of files.	[3]
4	Compare and contrast lossless and lossy compression.	[4]
5	Suggest a suitable type of compression for a spreadsheet and for a photograph, giving a reason for each.	[4]
6	Analyse the effect of file compression on a school that uploads videos to its website.	[4]
7	Evaluate the advantages and disadvantages of using file compression.	[6]

Total: 26 marks