WJEC GCSE Digital Technology

Unit 1: The digital world (Block 1: Data)

Resources provided:

- Each lesson provided is for first-time teaching and they include the following components:
  - Starter activity – The starter is designed for knowledge retrieval, many people believe (including myself) that revision should start from the very first lesson. So each lesson the starter activity will include questions from previous topics to improve memory recall.
  - Exam practise – As much as we would like students to be great at exams, they need considerable practise and guidance to master the art. Each lesson includes a 'walk and talk' style exam question that students can work through and self-assess using the mark scheme provided.
  - Concept map – A concept map provides students with an overview of the topic and establishing the relationship it has with other concepts taught throughout the course.
  - Keywords – Each lesson will include a set of key words students will come across throughout the lesson. The really important key terms will include a definition and meaning which they can refer back to throughout the lesson.
  - New information – New concept is introduced and, in most cases, a video is provided which students watch and then answer a set of questions based around it. This is designed to provide some in-class discussion before moving onto the main activity.
  - Activity – Each lesson will include at least one activity that allows students to be more independent and dig a little deeper into the new concept. All activity sheets include answers.
  - Self-checker tool – This is a useful AFL tool in which students can check their understanding. The lesson could include a multiple-choice quiz which was built in Microsoft Forms.
- AFL (Knowledge capture):
  - This document is very versatile. It can be used as a plenary at the end to check understanding, could be used as a homework to consolidate learning, a starter for retrieval practice or saved for some revision.
  - It includes a RAG rating for students to complete with some exam-style questions. The answers/mark scheme to these exam-style questions also been included.
- Review:
  - An accelerated writing activity to encourage students to go into more detail and demonstrate a deeper understanding of certain concepts. This could be converted into a bingo card and each box they complete they get a reward, works well with low ability students who need some extra motivation.
- Knowledge organisers
  - There are some question marks as to whether these really have an impact but I know a decent proportion of students find them useful so for me that's a win. Most lessons will include a knowledge organiser that can be used as future revision. Completed copy and a blank version will be provided in case you wanted students to complete them.
- Workbooks
  - These are condensed versions of topics taught and act as a useful revision guide for students to complete in preparation for an exam.
  - It's quite flexible and could easily be used for anyone who prefers to go down the 'flipped learning' approach.
  - It's also good to set students who may be absent from lesson.
- End of block assessment
  - This is a short exam-style paper on the first block. It's out of 40 marks and a mark scheme has been included.

Lesson breakdown

Lesson	Topic	Structure

1	Digital images	• Starter activity introduces students to binary and what it means.
		• In-class activities on Slide 7,8, 9, 11 and 12.
		• The lesson consists of three activities:
		  ○ Activity 1 is all basic exercise in which students identify the binary values based on certain colours. The final task they get to complete a bitmap image which colours in order to present an image. An alternative copy of this has been provided as an excel file just in case.
		  ○ Activity 2 is about understanding the memory requirements and how much space is required to store a digital image on a computer.
		  ○ Activity 3 is a compression activity. Students are provided with an image in lossless form in which they have to compress to lossy. They will look to identify any differences they spot in quality and size. The original image is a PSD so Photoshop is required. However, it might work using www.photopea.com which is a free online graphics editor. An alternative has been provided as a PNG because TES won't let me upload PSD's. So, if you wanted the PSD version then you can request it off me via e-mail.
		• Self-checker tool
		  ○ A quiz in Microsoft Forms have been provided. Teachers can create a duplicate copy so they can pass it on to students.
		  ○ Knowledge capture acts as a skills audit in which students can check their level of understanding and test it against exam-style questions.
		• Knowledge organisers
		  ○ Three organisers are part of this lesson: Bitmap, Vector and Compression.
		• Revision workbook
		  ○ Teacher copy with answers and blank student version provided.

2	Digital Sound	• Starter activity on retrieval practice.
		• Students practise an exam-style question based on last weeks learning. The mark scheme has been provided with some guidance on better understanding the command words used.
		• In-class activities on Slide 9 and 10.
		• The lesson consists of two activities
		  ○ The first activity is just about understanding the difference between an analogue and digital device and illustrating the ADC process (Analogue to Digital conversion)
		  ○ The second activity is quite practical and allows students to change sample rates to see if they notice any differences in quality and sound. If students are to participate, they will need headphones and access to Audacity. The sample track has been provided as part of the resources.
		• Self-checker tool
		  ○ A quiz in Microsoft Forms have been provided. Teachers can create a duplicate copy so they can pass it on to students.
		  ○ Knowledge capture acts as a skills audit in which students can check their level of understanding and test it against exam-style questions.

		• Knowledge organisers
		  ○ One organiser provided on analogue and digital data and the concept of sampling.
		• Revision workbook
		  ○ Teacher copy with answers and blank student version provided.

3	Measuring and storing data	• Starter activity on retrieval practice.
		• Students practise an exam-style question based on last week's learning. The mark scheme has been provided with some guidance on better understanding the command words used.
		• In-class activities on Slide 9 and 10.
		• This lesson consists of one activity:
		  ○ This will get students to understand different units of digital data and their sizes.
		  ○ An additional activity will require students to convert a file size into a different unit (e.g. MB to GB)
		• Self-checker tool
		  ○ A quiz in Microsoft Forms have been provided. Teachers can create a duplicate copy so they can pass it on to students.
		  ○ Knowledge capture acts as a skills audit in which students can check their level of understanding and test it against exam-style questions.
		• Knowledge organisers
		  ○ One organiser provided.
		• Revision workbook
		  ○ A short topic which wouldn't be enough to cover and entire workbook so this content will be added to the workbook that precedes this lesson. (Solid-state storage)

4	Solid-state storage	• Starter activity on retrieval practice.
		• Students practise an exam-style question based on last week's learning. The mark scheme has been provided with some guidance on better understanding the command words used.
		• In-class activities on Slide 9.
		• This lesson consists of one activity:
		  ○ This will get students to investigate different types of solid-state storage and how much they cost (good for them when it comes to understanding cost per GB)
		  ○ They will also look into the pros and cons to using each device and this helps them to understand that each device will serve a particular purpose.
		• Self-checker tool
		  ○ A quiz in Microsoft Forms have been provided. Teachers can create a duplicate copy so they can pass it on to students.
		  ○ This same quiz has been repeated for the next two lessons which is good for repetition.
		  ○ Knowledge capture acts as a skills audit in which students can check their level of understanding and test it against exam-style questions.
		• Knowledge organisers
		  ○ One organiser provided.
		• Revision workbook
		  ○ Teacher copy with answers and blank student version provided.

5	Magnetic storage	• Starter activity on retrieval practice.
		• Students practise an exam-style question based on last week's learning. The mark scheme has been provided with some guidance on better understanding the command words used.
		• In-class activities on Slide 9.
		• This lesson consists of one activity:
		  ○ This will get students to investigate different types of magnetic storage and how much they cost (good for them when it comes to understanding cost per GB)
		  ○ They will also look into the pros and cons to using each device and this helps them to understand that each device will serve a particular purpose.
		• Self-checker tool
		  ○ A quiz in Microsoft Forms have been provided. Teachers can create a duplicate copy so they can pass it on to students.
		  ○ This same quiz has been repeated for the next two lessons which is good for repetition.
		  ○ Knowledge capture acts as a skills audit in which students can check their level of understanding and test it against exam-style questions.
		• Knowledge organisers
		  ○ One organiser provided.
		• Revision workbook
		  ○ Teacher copy with answers and blank student version provided.

6	Optical Storage	• Starter activity on retrieval practice.
		• Students practise an exam-style question based on last week's learning. The mark scheme has been provided with some guidance on better understanding the command words used.
		• In-class activities on Slide 9.
		• This lesson consists of two activities:
		  ○ Activity 1 - This will get students to investigate different types of optical storage and how much they cost (good for them when it comes to understanding cost per GB)
		  ○ They will also look into the pros and cons to using each device and this helps them to understand that each device will serve a particular purpose.
		  ○ Activity 2 – This is designed to test their understanding of each characteristic and now they've been taught all the different types of storage, they'll be given a scenario in which they have to compare the two suggested and come up with a balanced discussion into what might be the most suitable type of storage for this situation.
		  ○ Attached to will be an 8-mark template with a guidance strip on the left on how to answer the question.
		  ○ Mark scheme and exemplar model answer has also been included.
		• Self-checker tool
		  ○ A quiz in Microsoft Forms have been provided. Teachers can create a duplicate copy so they can pass it on to students.
		  ○ This same quiz has been repeated for the next two lessons which is good for repetition.
		  ○ Knowledge capture acts as a skills audit in which students can check their level of understanding and test it against exam-style questions.

		• Knowledge organisers
		  ○ One organiser provided.
		• Revision workbook
		  ○ Teacher copy with answers and blank student version provided.

7	Cloud Storage	• Starter activity on retrieval practice.
		• Students practise an exam-style question based on last week's learning. The mark scheme has been provided with some guidance on better understanding the command words used.
		• In-class activities on Slide 8.
		• This lesson consists of one activity:
		  ○ Firstly, students will do some research into different cloud-service providers such as OneDrive, Google Drive and iCloud and make a comparison of the free storage they have on offer and their pricing for additional storage.
		  ○ Secondly, they can use the internet to come up with a range of pros and cons to using cloud storage.
		  ○ Finally, students are given a case study to consider. It's about Google Stadia who offer a cloud-based gaming service and they discuss whether this could lead to users not needing to buy/upgrade consoles/PC's anymore.
		• Self-checker tool
		  ○ Knowledge capture acts as a skills audit in which students can check their level of understanding and test it against exam-style questions.
		• Knowledge organisers
		  ○ One organiser provided and this could be expanded as cloud services are discussed further down the specification. For example, it could lead to the addition of scalability. (e.g. vertical and horizontal scaling)
		• Revision workbook
		  ○ This will be added to a future workbook when more content on cloud computing has been covered.

<u>Pricing</u>

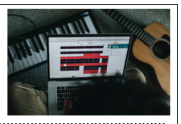
	TES	**PayPal**
Full lesson with worksheets	£49.00	£45.00
Knowledge organisers	£8.00	£5.00
Knowledge capture	£7.00	£5.00
Revision workbook (Student and Teacher copy)	£9.00	£6.00
End of block assessment	£8.00	£4.00
	£82.00	£65.00
Bundle (all of the above)	**£75.00**	**£55.00**

Resources

Exam starter

Exam prep!
The revision starts here!!

Look at the bitmap image (shown right)



State what is meant by the following terms:

a) The size of an image.

.....

.....

b) The resolution of an image.

.....

.....

[2]

State means to…

Give a specific name, value or other brief answer without explanation or calculation.

In this question, you get one mark for stating what is meant by the size of an image and one for resolution.

Use your answer slip from the booklet provided to write your answer.

Exam prep! – Mark scheme (including model answer)
The revision starts here!!

Look at the bitmap image (shown right)

State what is meant by the following terms:

a) The size of an image.

This refers to the height and width of the image which is measured in pixels.

b) The resolution of an image.

This refers to the number of pixels that can be stored per inch for example.

[2]

Size of an image:

- The height and width. ✓
- The height and width in pixels.

Resolution:

- Number of pixels per unit area of the display (per inch) ✓

Knowledge retrieval starter

Knowledge retrieval
How many points can you score?

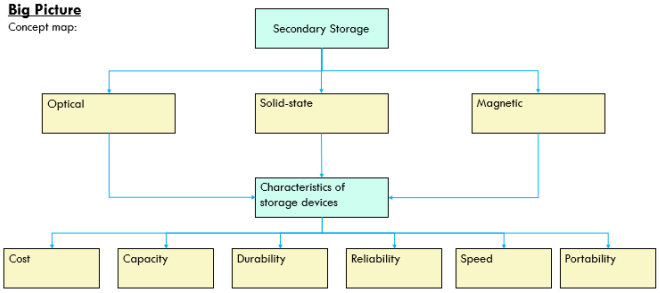
Question	Points	Answer
What is a bitmap image made up of?	3	
What is meant by resolution?	3	
What is a vector graphic made up of?	3	
Name two types of compression.	3	
What data is in the form of sound waves?	2	
What process is used to record analogue sound at regular intervals so it can be converted to digital?	2	
What format is digital data?	2	
Name two types of primary storage	1	
What type of storage is used to store files for long-term use?	1	
What term is used to describe data that is lost when the computer is switched off?	1	

Knowledge retrieval
How many points can you score?

Question	Points	Answer
What is a bitmap image made up of?	3	Pixel
What is meant by resolution?	3	Number of pixels stored per inch
What is a vector graphic made up of?	3	Lines and curves
Name two types of compression.	3	Lossy and Lossless
What data is in the form of sound waves?	2	Analogue
What process is used to record analogue sound at regular intervals so it can be converted to digital?	2	Sampling
What format is digital data?	2	Digital
Name two types of primary storage	1	RAM and ROM
What type of storage is used to store files for long-term use?	1	Secondary Storage
What term is used to describe data that is lost when the computer is switched off?	1	Volatile memory/data

Concept map

Big Picture
Concept map:



Keywords

Key terms

Important terms:
- Storage
- Optical
- Laser
- Characteristics

Key words	
Secondary storage	A type of non-volatile storage that allows data to be stored for long-term/later use.
Cost	How expensive per byte does it cost for the device?
Capacity	The amount of space available on the storage device.
Portability	How easy it is to transport from one place to another.
Durability	How resistant it is to external factors such as being dropped, scratched and how it responds to being in extreme conditions.
Speed	How quickly the data can be read and transferred from the storage device.
Reliability	This refers to longevity – how well does it maintain performance over time?

New information

Magnetic storage

Video
Click here

Magnetic storage has been one of the most reliable types of storage for decades, starting off as magnetic tapes up to hard drives.

Question:

1. How does magnetic storage work?
2. Identify some pros and cons to using magnetic storage.

Answer:

1. It consists of spinning magnetic platters on which data is stored a tiny head at the end of an actuator arm moves about to read and write data to different areas of the disk.
2. Pros: *Cost* per GB is low which gives you value for money.. Cons: *Speed*: it also consumes a fair amount of power and is not always as fast as you would like. *Durability*: the platter and mechanical mechanisms are also somewhat fragile and easily damaged

Activity

Activity 3

Below is a 3-bit bitmap image.

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	2	1	0	0	0
0	0	0	0	0	0	0	0	0	4	3	2	1	0	0
0	0	0	0	0	0	0	0	4	4	3	3	2	1	0
0	0	0	0	0	0	0	4	4	5	4	3	2	1	0
0	0	0	0	0	0	4	4	4	4	4	3	2	1	0
0	0	0	0	0	4	4	4	5	4	4	3	2	1	0
0	0	0	0	4	4	4	4	4	4	4	3	2	1	0
0	0	0	4	4	4	5	4	4	4	3	3	2	1	0
0	0	4	4	5	4	4	4	4	4	3	2	1	0	0
0	2	3	3	4	4	4	4	3	3	2	1	1	0	0
0	1	2	3	3	3	3	3	3	2	1	1	0	0	0
0	0	1	2	2	2	2	2	2	1	1	0	0	0	0
0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Key:

0		000
1		001
2		
3		
4		
5		
6		
7		

Self-checker tool

Questions | Responses

DT2 - Sound (7 Points)

1. Enter your first name and surname *

Enter your answer

2. What term is used to describe sound waves? *
(1 Point)

End of block assessment

Candidate name	Centre number	Candidate number

GCSE DIGITAL TECHNOLOGY
UNIT 1 THE DIGITAL WORLD
BLOCK 1: DATA
45 Minutes

INSTRUCTIONS FOR CANDIDATES
Answer ALL questions.

This paper consists of three section: Section A: Images, Section B: Sound and Section C: Measuring and storing data

Knowledge organiser

DT5: Secondary Storage

Definition/Meaning:
Secondary storage has the ability to store files even when the computer is switched off. Therefore, it's a non-volatile form of storage.

Magnetic Storage

Description
The most common example of magnetic storage is a **Hard Drive.** The hard drive contains a number of moving mechanical parts such as a spinning platter with a thin magnetic coating. A "head" moves over the platter, writing 0's and 1's on the platter.

Revision tip:
A common misconception is that secondary storage backs up data. If a duplicate copy is created then the device used to back it up would be classed as tertiary storage.

Review

Cost	Capacity	Reliability
Expensive from the outset, but cost per MB represents value for money.	Enough capacity to store different types of files. You can buy hard drives that can hold 4TB of data.	Can perform well for a long period of time but performance will eventually deteriorate.

Durability	Portability	Speed
If it's external then it can become damaged if dropped because it has moving parts.	Would have to be detached from the computer and it's heavy.	Uses a head that moves over a platter to read and write data so it's not instant.

Key terms:

Cost	How much the device costs per MB.
Capacity	How much space is available on the storage device.
Reliability	Longevity – how well it can maintain the same level of performance over time.
Durability	how resistant it is to external factors such as being dropped, scratched and how it responds to being in extreme conditions.
Portability	How easy is it to transport from one place to another.
Speed	How quickly the data can be read and transferred from the storage device.

Revision workbook

Optical storage

Key Questions:
Use the bars below to rank optical storage against the different storage characteristics. You must justify your answer.

10 = Good 1 = Bad

Capacity

Justification
In comparison to other types of storage, the capacity isn't enough store a range of files. Although Blu-ray can store up to 50GB, it's still far less than what a USB flash drive can store.

Cost

Justification
Although the capacity of these devices is relatively low, the cost per GB gives you excellent value for money. It can cost less than £1 for one blank 25GB Blu-ray disc.

Knowledge capture

WJEC Digital Technology
DT3: Knowledge Capture

Specification points:

1.1b Measuring and storing data
• be able to describe the relationship between binary data storage units

Skills audit:

Criteria			
I can order digital units of data from smallest to largest			
I can convert from one digital unit to another.			
I can identify primary, secondary and tertiary storage devices.			

Teacher feedback:

Knowledge capture

WJEC Digital Technology
DT3: Knowledge Capture

Exam-style questions

1. Emily is creating a film for a school project using a digital video camera and will transfer the videos to a computer for editing.

   The computer 2GB of storage free.

   Calculate the number of videos that could be stored on the computer if each video was 200MB in size. You must show your working.

   [2]

2. A file size has a size of 72,000,000,000 bits.

   Calculate the file size in megabytes and gigabytes. You must show your working.

   Megabytes: