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| --- | --- |
| **Learn how different input output and storage devices can be applied as a solution of different problems.** | |
| **Grade D / E** | **Know that a computer system is made up of input, output and storage devices** |
| **Grade B / C** | **Apply different devices as a solution to different problems** |
| **Grade A** | **Explore a wide range of devices and their uses** |

**Hardware Basics**

Insert your input/output/storage device mind map here.

**Scenario 1**

A hospital is planning to install a patient heart monitoring system. This system will feed real time results to doctors in order to monitor the circadian rhythms of patients in intensive care.

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| **Type of device** | **Your choice** | **Justification** |
| **Input** | Heart Beat Sensor | To detect the heart beat |
| **Output** | monitor | To see a visual interpretation |
| **Storage** | RAM | To see the heartbeat temporarily |

**Scenario 2**

A graphics design company are looking to use a computer system that could showcase their work to potential clients. This system will be based in their office and ideally should project an image of professionalism and high standards.

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| --- | --- | --- |
| **Type of device** | **Your choice** | **Justification** |
| **Input** | Touch Screen | Easy access and mobility |
| **Output** | Portable Display(s) | Easy access and mobility |
| **Storage** | SSD | Fast loading of images |

**Scenario 3**

A photographer needs a computer system to store and edit photographs as well as a way to send the final results to clients.

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| --- | --- | --- |
| **Type of device** | **Your choice** | **Justification** |
| **Input** | Usb Port | Ability to access the files |
| **Output** | Internet Adapter | Ability to send files through the internet |
| **Storage** | SSD | To hold the editing programs |

**Scenario 4**

A school for learners with special needs requires a new system to help a student with mobility difficulties produce computerised work. Ideally the system should be flexible enough that other students with other special needs can benefit as well.

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| **Type of device** | **Your choice** | **Justification** |
| **Input** | Vision Click | Allows for emulation of a mouse click through a mouse click |
| **Output** | RGB Monitor | A display with the ability to change the colour of the screen |
| **Storage** | HDD | Allow for default storage of programs and such that do not need to be launched with speed |

**Scenario 5**

A radio controlled plane needs a new computer system that will provide auto stabilisation facilities to counteract wind and air resistance.

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| **Type of device** | **Your choice** | **Justification** |
| **Input** | Gyroscope + Accelerometer | To measure the speed and the angle of the plane |
| **Output** | Motor | To allow for movement of the fins to auto balance and stabilise the plane |
| **Storage** | ROM + RAM | Pre-programmed System with the ability to temporarily store data to compare against |

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| **The uses of magnetic, flash and optical storage devices.** | |
| **Grade D / E** | **Match the words magnetic, flash and optical to commonly used storage devices.** |
| **Grade B / C** | **Explain how each storage methods works.** |
| **Grade A** | **Analyse the effectiveness of each device type for specific purposes** |

|  |  |  |
| --- | --- | --- |
| *Picture* | *Name of Device* | *Magnetic / Flash / Optical?* |
| http://helpingindia.com/images/Seagate_NL35_400GB_SATA150.jpg | HDD | Magnetic |
| http://www.powersourceonline.com/cgi/en/attachment.download/Attachment@id=13980602969/Attachment.SubType=MAINhttp://1.bp.blogspot.com/-_kAr4lYRuMQ/TXiavDHKEDI/AAAAAAAAAC4/sn2ILERCDtk/s1600/cdr.jpg | Disk Drive | Optical |
| http://hothardware.com/newsimages/Item7276/ts1130.jpghttp://www.backupassist.com/blog/wp-content/uploads/2013/04/iStock_000000393598_L3.jpg | Tape Player | Optical |
| http://ecx.images-amazon.com/images/I/41YRU1ejrxL._SY300_.jpg | USB Stick | Flash |
| https://upload.wikimedia.org/wikipedia/commons/0/0b/Memory-card-comparison.jpg | SD Cards | Flash |
| http://www.shuttle.eu/_archive/older/en/prod/acc/big/cr20b.jpghttps://s-media-cache-ak0.pinimg.com/736x/5a/ea/61/5aea61eb1b4f5605e86520e3d75fe2f6.jpg | DVD-RW | Optical |
| http://ecx.images-amazon.com/images/I/81hDMqd2KFL._SL1500_.jpg | SSD | Magnetic |
| http://hothardware.com/newsimages/Item15492/slim-laciebd.jpghttps://upload.wikimedia.org/wikipedia/commons/4/4b/Blu-ray_200GB.png | Blu-Ray Disk Player | Optical |

Once you have seen the presentations from your classmates fill in these explanations.

How does magnetic storage technology work? Write a paragraph and use diagrams to support your answer.

How does optical storage technology work? Write a paragraph and use diagrams to support your answer.

How does flash storage technology work? Write a paragraph and use diagrams to support your answer.

**Challenge**: How has the invention of large capacity flash memory changed computer design? What potential possibilities are there for the future?

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| **Explain RAM and ROM.** | |
| **Grade D / E** | **Know the purpose of RAM and ROM**. |
| **Grade B / C** | **Explain the features of RAM and ROM** |
| **Grade A** | **Do further research into modern RAM chips and / or the history of ROM** |

What is RAM?

Random Access Memory

What is ROM?

Read-Only Memory

Draw a graphic of some description with two columns – RAM and ROM. Put these statements into the correct column. You should then paste your graphic here.

* Embedded in the motherboard and isn’t normally removed. - ROM
* Volatile. - RAM
* Constantly interacting with the CPU. - RAM
* No need to refresh the data as it is permanent. - ROM
* Holds data while it is being used by the CPU. - RAM
* Very small capacity. - ROM
* Only interacts with the CPU under certain conditions. - ROM
* Can be easily removed from the computer and upgraded. - RAM
* Non-volatile. - ROM
* Contains data that the computer needs to boot up. - ROM
* Needs constant refreshing to stay active. - RAM
* In modern computers the size is measured in GB. - RAM

Task – choose **one** of the following essay question titles and answer it below.

1. “ROM stands for Read Only Memory but this is actually a misnomer as data can be written to modern ROM chips. Explain how this has come to pass by discussing the history of ROM including PROM, EPROM and EEPROM.”
2. “There have been many different types of RAM over the years. Discuss the different types available today, their features and uses and how these have evolved over time.”

In the beginning, SDRAM was used to solve a problem that was coming up as computers began to get more powerful – requiring the need for Random Access Memory. Traditional DRAM ran asynchronously, meaning that it ran separate from the CPU, which made it difficult for when the CPU needed information. Because of this, SDRAM was made, a DRAM that ran synchronously with the CPU, allowing for easy access of data for the CPU as the data was ‘keeping up’ with the speed of the CPU. SDRAM ran by synchronising the memory’s response to control inputs with the system bus, allowing it to queue up tasks while waiting for others. This way, computers could execute more tasks at once, allowing for more powerful computers, eventually becoming the standard by the end of the 1990s.

However, this too had its own problems that were soon discovered by hardware developers and regular users. The original SDRAM operated by a Single Data Rate (or SDR) interface that could still only accept one command per clock cycle.  As computers were becoming more popular and more complicated, and thus issuing more complex requests to the memory more frequently, this was slowing down performance.

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| **Explain virtual storage.** | |
| **Grade D / E** | **Know the difference between memory, hard drive storage and virtual storage** |
| **Grade B / C** | **Explain the need for and use of a swap file** |
| **Grade A** | **Explain how cache can be used to increase efficiency** |

Using the video below as inspiration create an animation that shows:

1. Programs being loaded into RAM.
2. The computer running out of physical RAM.
3. Programs being stored in the swap file on the hard disk.
4. An explanation of the relative speeds of RAM and the hard drive

[Video Link](https://www.youtube.com/watch?v=TMV_Dwsd8dI)

Save your animation as an animated gif and paste it below:

If complete add an explanation of how cache can be used to improve the efficiency of this operation.

Challenge question:

Where else in the computer do we see examples of cache?