Knowledge organiser - Computing - Year 9 - Autumn 1

National Curriculum Strand:

- Computer Science
- Digital Literacy
- Information Technology

Key Computing concepts

Text Programming

Python syntax

Careers that might use this knowledge

Software / Web developer

Financial Analyst

Data Scientist

AI and Machine Learning Engineer

Cybersecurity Analyst

Progression path

Ensure that code is commented for clarity of further develop and documentation of intent

Develop programs that complete specific tasks with selection and user input

Create programs by modifying examples using IF/ELSE/ELIF

Modify simple programs using basic functions and user inputs

Recognise that Python is a programming language and copy simplistic programs

Know that programs are written in code

Recognise that computers run programs to carry out tasks

Key Vocabulary

Variable	IDE	Function	Procedure
Algorithm	Subroutine	Program	Loop
Iteration	User input	Debug	Syntax
Runtime Error	Code commenting	Selection	IF/ELSE/ELIF

Prior knowledge:

In Key Stage 2 (KS2), UK computing pupils learn the basics of programming, including how to design, write, and debug simple programs. They understand concepts like sequences, selection, and repetition, and use logical reasoning to predict and correct program behavior1. Pupils also learn to solve problems by breaking them down into smaller parts and use variables and various forms of input and output. They gain practical experience by controlling or simulating physical systems through their programs1. Additionally, they are taught to use technology safely and responsibly.

Leading to:

Students studying at GCSE will need to understand the basics of programming, including writing, testing, and debugging. They should be familiar with text programming languages, such as Python, and be able to use pseudocode to plan algorithms before coding. Students need to create flowcharts to visually represent the steps and decisions in their algorithms, which helps in organising their thoughts and make the coding process more efficient. Adding comments to code and documenting the program are crucial practices to explain the purpose and functionality of the code, making it easier for others (or themselves) to understand and maintain. Additionally, they should know how to apply computational thinking to solve problems systematically.

Key Questions pupils should have the knowledge to answer

What is an algorithm? An algorithm is a step-by-step set of instructions used to solve a problem or perform a specific task.

Why learn text programming? Learning text programming develops your problem-solving skills and enables you to create a wide variety of software applications, such as websites and games. It also enhances your understanding of how technology works, preparing you for a range of careers in the digital world.

Where is Python used? Python is used worldwide in fields such as web development (e.g., Google), data science (e.g., Netflix), artificial intelligence and machine learning (e.g., IBM Watson), and scientific research (e.g., NASA).

What is an IDE? An Integrated Development Environment (IDE) is a software application that provides tools to help programmers write, test, and debug their code efficiently in one place.

What is a program? A program is a set of instructions for computers.

What is a function? A function is a named reusable block of code performing tasks. For example, print or you can define your own def add_numbers

What is a variable? A variable stores data values in a named location. The value can change throughout the program.

What are user inputs for? User input is data entered by a user to interact with a program, for example: username or password or pick a number or add favourite colour.

What is the difference between a function and a procedure and subroutine? A function is a block of code that performs a specific task and returns a value. A procedure and subroutine, while similar, usually perform tasks without returning a value; "subroutine" is a general term for both.

How can I repeat instructions with Python? You can repeat instructions in Python using loops, such as for loops or while loops.

What is the difference between syntax, logic and runtime errors? Syntax errors occur when code violates the language's rules, preventing it from running; runtime errors happen during execution, causing the program to crash; logic errors are flaws in the code's logic that produce incorrect results without crashing.

What operators are used in Python? See table ——————————————————————————->

How are logic operators used in programming? Logical operators like `AND`, `OR`, and `NOT` allow programmers to evaluate multiple conditions to control the program's flow based on true or false values. They help make complex decisions within the code, enabling more sophisticated conditional statements.

Operator	Description
<	Less than
>	Greater than
<=	Less than or equal to
>=	Greater than or equal to
==	Equal to
!=	Not equal to

Do you want to know more?

Code Combat - Python free trial	Learn to code
Programming KS3	https://craft.buzzcoder.com/?lesson=hoc
Python Software	Flappy dinosaur game coding
Learn Python independently	Python Beginners Course

Knowledge organiser - Computing - Year 9 - Autumn HT2

National Curriculum Strand:

- [x] Computer Science
- [ ] Digital Literacy
- [ ] Information Technology

Key Computing concepts

Data representation - Graphics

Careers that might use this knowledge

Graphic designer

Game developer

Advertising executive

Progression path

Can justify the choices they have made in creating new images and the efficiency of the tools they have used

Can create a range of images fit for purpose using different tools

Recognises the difference between raster and vector images and their use

Is aware that bitmaps are made up of pixels and there are other types of image which can be made

Can combine shapes to create images on a computer

Can create and access images on a computer using different programs

Know that computers can display images

Key Vocabulary

Vector	Raster	Bitmap	Pixel
Binary	RGB	Path	Stroke
Scalability	Logo	Polygon	File extension
Layers	Union / Merge	Icon	Hex color

Prior knowledge:

Within Key Stage 2, pupils should be Pupils should be taught to: select, use, and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems, and content that accomplish given goals, including collecting, analysing, evaluating, and presenting data and information. This may have included various aspects of digital media creation, such as: Stop-frame animation; Photo editing of raster graphics; Video production: Planning, filming, and editing short videos including graphics and titles; Desktop publishing: combining word and graphical elements to produce a complete layout.

Leading to:

Students studying GCSE Computer Science will focus further on this area . This may includes: Introduction to Raster and Vector Graphics: Students learn about the main types of digital gfx. Raster graphics are made up of pixels, while vector graphics are composed of paths defined by mathematical equations; File Formats: Students learn about the associated file formats for each type of graphic; Software Tools: introduced to open-source applications that can be used to create both raster and vector gfx. Practical Application: Students get hands-on experience creating their own graphics using software tools. They learn how to manipulate and edit these graphics to achieve desired outcomes. Copyright and Licensing: The curriculum also covers the importance of following appropriate copyright laws when using and creating digital graphics.

Key Questions pupils should have the knowledge to answer

What are graphics? Graphics are pictures, drawings, animations, or any visual elements created on a computer or by hand to make things look more interesting and to help explain ideas better. They can be anything from simple icons you see on your phone to complex animations in video games.

How are raster graphics made? These are made up of tiny dots called pixels. When you zoom in, you can see each individual pixel. Photos you take with your phone are raster graphics.

How vector graphics made? These are made using mathematical formulas. They can be resized without losing quality. Logos and icons are often vector graphics because they need to look sharp at any size.

What are raster graphics used for? Raster graphics are used for detailed images like photos, web graphics, digital art, game textures, and printed media.

What are vector graphics used for? Vector graphics are used for logos, icons, and illustrations as they can be resized without losing quality or detail.

What are the benefit and drawbacks of raster graphics? Raster graphics are excellent for detailed and realistic images but can become pixelated when resized beyond their original dimensions. They often have large file sizes and can be challenging to edit without quality loss.

What are the benefit and drawbacks of vector graphics? Vector graphics can be resized without losing quality and are ideal for logos and icons. However, they are less suitable for detailed, photo-realistic images and can be complex to create for intricate designs.

Name some raster file formats and programs to create them.

Raster File Formats:

JPEG (JPG): Common for photos and web images / PNG: Supports transparency, often used for web graphics / GIF: Supports simple animations and limited colours / BMP: Uncompressed format, used for high-quality images / TIFF: Used for high-quality image storage, often in printing and publishing.

Programs to Create Raster Graphics: Adobe Photoshop / GIMP / Microsoft Paint / Corel Painter / Preview (macOS)

Name some vector file formats and programs to create them.

Vector File Formats:

SVG (Scalable Vector Graphics) / AI (Adobe Illustrator) / EPS (Encapsulated PostScript) / PDF (Portable Document Format) / DXF (Drawing Exchange Format)

Programs for Creating Vector Graphics: Adobe Illustrator / Inkscape / Affinity Designer (macOS) CorelDRAW / Vectr / Gravit Designer

Do you want to know more?

https://www.bbc.co.uk/bitesize/articles/z2tgr82#zm376rd

https://www.bbc.co.uk/bitesize/guides/zpfdwmn/revision/1

https://www.youtube.com/watch?v=seFLJeDZKZM

https://www.youtube.com/watch?v=ywIpBSblBdA

https://www.101computing.net/bitmap-vs-vector-based-graphics/

https://guides.lib.umich.edu/c.php?g=282942&p=1885352

https://filecamp.com/blog/vector-vs-bitmap-images-explained/

Knowledge organiser - Computing - Year 9 - Spring 1

National Curriculum Strand:

- ☐ Computer Science
- ☐ Digital Literacy
- ■ Information Technology

Key Computing concepts

- Spreadsheet models
- Databases
- Sorting, searching and validating data

Careers that might use this knowledge

- Accountant
- Scientist
- Market researcher

Progression path

- Can explain the benefits and drawbacks of spreadsheets models in a business environment
- Can use a wide range of efficiency tools. Can adapt and devise formulae to meet a need.
- Can unpick models to identify how they work from the end point backwards
- Can create models that meet the users needs
- Can use formulae within cells to calculate answers
- Can navigate cells in Excel and change formatting for purpose and clarity
- Know key terms relating to spreadsheets: cell, row, column, format, formula

Key Vocabulary

Model	Cell reference	Look Up Table	Validation
Conditional	Criteria	IF	Formulae
Function	Efficiency tools	Reverse Engineer	Data vs. information
Data type	Field	Record	Spreadsheet

Prior knowledge:

In Key Stage 2, pupils have used simple formulae in spreadsheets and constructed models for home purposes (parties, saving etc.) Pupils can format cells, sort and filter data. They know what a model is and have worked with simple models to explore different scenarios.

Leading to:

Pupils should construct models that are fit for purpose using efficiency tools and advanced features. They will construct formulae with conditions or based on criteria (IF).

At KS 4, pupils are expected to understand spreadsheets. They should know how to store and manipulate data, use common functions like SUM and AVERAGE, utilise cell references, and create charts for data analysis. They should also solve problems and answer “what if…?” questions using spreadsheets.

WJEC Vocational Award in ICT focuses on technical skills, practical application, and real-world scenarios. The course combines theoretical and practical assessments to ensure students can effectively apply their knowledge in various ICT contexts.

Key Questions pupils should have the knowledge to answer

What is a spreadsheet? A spreadsheet is a digital tool composed of rows and columns used to organize information, perform calculations, and create charts for data visualization. It is highly effective for tasks such as budgeting, tracking progress, and analyzing data.

What advanced tools does Excel/Google Sheets have? Conditional formatting to influence cells based on conditions. Lookup tables where data is input from cells based on the criteria you 'look up'. Data validation to limit incorrect answers. Protection and locking to secure your spreadsheet. Drop down menus to ensure correct data is entered.

What is data validation? Data validation is a feature in Excel used to control what a user can enter into a cell. For example, you could use data validation to make sure a value is a number between 1 and 6, make sure a date occurs in the next 30 days, or make sure a text entry is less than 25 characters. It stops users being able to enter invalid data.

Why use a spreadsheet model? It allows storage and organisation of information so that you can access and understand it. Many features have been automated in a model so you can add new data for it to be calculated in the same way, thus saving time. An existing model can allow a novice to enter data and have it calculate and analyse for them.

What are IF statements used for in spreadsheets? A spreadsheet uses an "IF" function to test a condition and return one value if true and another if false. For example:=IF(A2>=50, "Pass", "Fail") This will mark the score in A2 as "Pass" if it's 50 or above; otherwise, it will show "Fail".

How do spreadsheet models help us explore different scenarios? They enable you to model different scenarios and outcomes in several ways:

- What-If Analysis: Spreadsheets allow you to change variables and see how those changes affect the outcome. For example, you can adjust sales figures to predict revenue under different conditions.
- Scenario Analysis: You can create multiple scenarios within a spreadsheet to compare different sets of assumptions side by side. For example, you can model best-case, worst-case, and most-likely scenarios for a project.
- Data Visualization: Spreadsheets can create charts and graphs that help you visually analyze and compare different scenarios, making it easier to identify trends and patterns.
- Automated Calculations: By using functions and formulas, spreadsheets can automatically calculate results based on different inputs, saving time and reducing errors.

What useful functions does a spreadsheet have? Spreadsheets have many functions to help you organize and analyse data. These include: **SUM -** Adds up a range of numbers. For example, =SUM(A1:A10) adds all numbers from cell A1 to A10; **AVERAGE—** Calculates the average of a group of numbers. For example, =AVERAGE(B1:B10) finds the average of numbers in cells B1 to B10. **MIN/MAX—**Finds the smallest or largest number in a range. For example, =MIN(C1:C10) finds the smallest number in cells C1 to C10. **IF -** Checks if a condition is true or false and gives different results. For example, =IF(D1>50, "Pass", "Fail") checks if the number in cell D1 is greater than 50. **COUNT/COUNTA -** Counts numbers or non-empty cells in a range. For example, =COUNT(E1:E10) counts the number of cells with numbers in E1 to E10.

Do you want to know more?

https://www.bbc.co.uk/bitesize/guides/zdydmp3/revision/1

https://www.youtube.com/watch?v=wbJcJCkBcMg

https://www.lynda.com/Excel-tutorials/Excel-2016-Advanced-Formulas-Functions/431188-2.html

https://www.excel-easy.com/

https://www.youtube.com/watch?v=kSQmPK-tWnw

https://alison.com/course/microsoft-excel-2019-beginners

https://support.microsoft.com/en-us/office/excel-video-training-9bc05390-e94c-46af-a5b3-d7c22f6990bb

Knowledge organiser - Computing - Year 9 - Spring 2

National Curriculum Strand:

- Computer Science
- Digital Literacy
- Information Technology

Key Computing concepts

- Algorithms
- Search and sort
- Flowcharts

Careers that might use this knowledge

- Games developer
- Network Manager
- Project Manager

Progression path

- Consider the needs of the user in creating algorithms
- Recognise and explain the impact that algorithms have in modern life. Use stepwise refinement to create more efficient algorithms
- Create flowcharts to express algorithms and represent programs. Know that pseudocode can also be used to express these concepts
- Create algorithms to express solutions to problems. Recognise key algorithms used for search and sort.
- Recognise the connection between programs, flowcharts and algorithms to create reliable outcomes
- Know that flowcharts can be used to represent programs rather than using a programming language.
- Know that code is used to give instructions to a computer. Know that algorithms express a sequence of instructions

Key Vocabulary

Algorithm	Iteration	Selection	Flowchart
Pseudocode	Boolean Logic	Decomposition	Abstraction
Stepwise refinement	Pattern recognition	Sequence	Binary search
Subroutine / Procedure / Function	Bubble sort	Linear search	Merge sort

Prior knowledge:

Pupils have explored programming and key programming principles. They are familiar with variables and structures such as loops and selection. They will have used flowcharts within set problems with control software and should recognise the flowchart symbols. They will understand the basic principles of computational thinking when solving a problem.

Leading to:

This will be their first introduction to using pseudocode but will form more of their study at KS4 if they choose Computer Science. The use of flowcharts to express solutions is used widely rather than limited to Computing and will support their learning in the wider world.

Problem solving skills support many other areas of life and learning.

Key Questions pupils should have the knowledge to answer

How do algorithms bridge the gap between human and computer thinking? By abstraction, removing all the specifics of a situation and allowing it to be reduced to a series of instructions which can be carried out clearly.

How do I improve my algorithms to be clear and explicit? Through the process of decomposition and stepwise refinement. Breaking a problem into smaller steps and then working through each step into separate processes which can be addressed individually.

What is common pseudocode notation? There is no strict set of standard notations for pseudocode, but some of the most widely recognised are:

INPUT – indicates a user will be inputting something

OUTPUT – indicates that an output will appear on the screen

WHILE – a loop (iteration that has a condition at the beginning)

FOR – a counting loop (iteration)

REPEAT – UNTIL – a loop (iteration) that has a condition at the end

IF – THEN – ELSE – a decision (selection) in which a choice is made

any instructions that occur inside a selection or iteration are usually indented

What is the difference between a function, a procedure and subroutine? A function is a block of code that performs a specific task and returns a value. A procedure is similar but does not return a value; it's focused on performing actions. A subroutine is a general term for any block of code that can be called to perform a task, including functions and procedures. Subroutines are expressed as their own symbol within a flowchart.

What is stepwise refinement of an algorithm? Stepwise refinement, also known as top-down design, is a method used in computer science to break down a complex problem into more manageable parts. It involves the following steps: Start with the main problem: Define the overall task or goal you want to achieve, then divide the problem into smaller tasks: Break these into smaller, more specific subproblems until they are simple enough to be easily solved. Implement solutions for the smallest tasks and continue to combine these together until you have a solution to the main problem made of many smaller steps. Stepwise refinement helps in creating clear, organized, and efficient algorithms by focusing on one small part of the problem at a time. It's like building a house by first planning the structure, then working on the foundation, followed by the walls, and so on.

Why are algorithms important in modern life? Searching and sorting algorithms are essential for efficient data retrieval, optimized performance, and resource management, impacting everything from web searches to real-time applications like GPS navigation and financial trading. They form the backbone of modern technology, ensuring smooth, timely, and accurate processing and analysis of large datasets.

Do you want to know more?

https://www.bbc.co.uk/bitesize/guides/zpp49j6/revision/1

https://medium.com/@MatthewOldridge/is-it-about-coding-no-its-about-computational-thinking-fe0ba30add61

https://www.bbc.co.uk/bitesize/guides/z3bq7ty/revision/2

https://www.youtube.com/watch?v=xli_FI7CuzA

https://www.bbc.co.uk/bitesize/guides/zp92mp3/revision/1

https://www.youtube.com/watch?v=MFhxShGxHWc

https://www.youtube.com/watch?v=246V51AWwZM

https://www.youtube.com/watch?v=4VqmGXwpLqc

Knowledge organiser - Computing - Year 9 - Summer 1

National Curriculum Strand:

- ■ Computer Science
- □ Digital Literacy
- □ Information Technology

Key Computing concepts

- Computer networks
- Data transmission and packets
- Search engines

Careers that might use this knowledge

- Telecommunications engineer
- Web developer
- Network manager

Progression path

- Innovatively connects historical communication methods (e.g., semaphores) to advancing concepts like edge computing or AI-driven networks. Can critically evaluate potential future developments in communication technologies. Communicates understanding clearly, using precise terminology and real-world examples.
- Explores deeper implications of networking advancements (e.g., societal impacts of the internet). Analyses limitations and benefits of past and present technologies.
- Demonstrates detailed understanding with examples (e.g., describing how IP addresses enable communication). Applies understanding to explain modern technologies like 5G or IoT.
- Understand that data can be split into packets for transmission across networks. Explains terms accurately. Understands the role of networks and transfer protocols like TCP/IP.
- Shows a basic understanding of how networks work and terms like "data packet." Able to describe some differences between wired and wireless networks with guidance.
- Understand that hardware is needed to create computer networks
- Recognise that computers can share information with other computers

Key Vocabulary

Header	HTTP(S)	Packet	Protocol
Bandwidth	Network	IP Address	Router
Server	Ethernet	Web browser	Fibre optic
3g/4g/5g	Wifi	IoT	Search Engine

Prior knowledge:

KS2 students will have an awareness of historical and modern communication methods (e.g., postal systems vs. emails) and basic recognition of what a network is. They will understand that that data can be created, stored, and shared electronically (e.g., sending messages or using cloud platforms for projects) and know how files and folders can be used to save and access work.

Leading to:

This knowledge acts as a stepping stone for more complex topics in KS3 such as advanced networking concepts or the basics of cybersecurity. Establishing a basic understanding of concepts like packet-switching and the role of protocols is critical for tackling networking topics in the GCSE curriculum, as well as supporting students with real life technology and use of networks and devices at home.

Key Questions pupils should have the knowledge to answer

What is the difference between the internet and the World Wide Web? The internet is a global network of interconnected computers and servers, enabling data communication between devices. The World Wide Web is a service that operates on the internet, providing access to websites and online content via protocols like HTTP/HTTPS. In simple terms, the internet is the infrastructure, and the web is a service built on top of it.

What is bandwidth, and why is it important? Bandwidth refers to the maximum amount of data that can be transmitted over a network connection in a given amount of time, usually measured in bits per second (e.g., Mbps or Gbps). It determines how quickly data can be sent or received. High bandwidth allows faster downloads, smoother streaming, and better performance when multiple devices use the network simultaneously. Low bandwidth can lead to slow speeds, buffering, or dropped connections.

What are the differences between wireless and wired networks? Wired Networks: Use physical cables (e.g., Ethernet) to connect devices. They are generally faster, more reliable, and less susceptible to interference. However, they limit mobility since devices must stay connected to the cable. **Wireless Networks:** Use radio waves (e.g., Wi-Fi) to transmit data. They allow greater flexibility and mobility but can be affected by interference, physical obstacles, or distance from the router. Wireless networks are also usually slower than wired networks due to shared bandwidth among devices.

How is data transmitted across a network using packets? Data is split into small units called packets for transmission across a network. Each packet contains a portion of the data along with metadata, such as the sender's and receiver's IP addresses and instructions for reassembly. The packets are sent individually across the network, potentially taking different paths, and are reassembled in the correct order at the destination.

What role do IP addresses play in data transmission? IP addresses are unique identifiers assigned to devices on a network. They act like a postal address, ensuring that data packets are sent to the correct destination and received from the correct source. For example, when you visit a website, your device's IP address tells the server where to send the data, and the website's IP address ensures you're accessing the right server.

How has the evolution of communication technologies, like from semaphores to the internet, impacted society? The evolution of communication technologies has drastically improved the speed, reliability, and accessibility of sharing information. Early methods like semaphores were limited in scope and speed, but the internet allows instantaneous global communication, enabling advances in education, commerce, healthcare, and entertainment. However, this evolution has also introduced challenges, such as cybersecurity threats and digital divides.

Do you want to know more?

https://www.bbc.co.uk/bitesize/guides/zc6rcdm/revision/1	https://www.youtube.com/watch?v=3QhU9jd03a0
https://www.bbc.co.uk/bitesize/guides/z8nk87h/revision/1	https://www.youtube.com/watch?v=KjD3KANH-xc
https://www.bbc.co.uk/bitesize/articles/z78nydm	https://www.youtube.com/watch?v=mpFWIZ318eQ
https://aws.amazon.com/what-is/computer-networking/	https://www.youtube.com/watch?v=8sTy8466MoE

Knowledge organiser - Computing - Year 9 - Summer 2

National Curriculum Strand:

- [ ] Computer Science
- [ ] Digital Literacy
- [ ] Information Technology

Key Computing concepts

Online safety

Data protection

Online threats

System security

Careers that might use this knowledge

Cryptographer

Security Software Developer

Security Analyst

Progression path

I can assess systems for risks and explain these and suggest effective ways to prevent any data loss or negative impacts from attacks. I explain how to prevent any breach of the CIA triad.

I can discuss the reasons for different threats to computer systems. I recognise that these are not always malicious but can explain their impact.

I recognise many types of encryption and can understand how they work. I know ways that systems can be protected by devices and software.

I can recognise and discuss a range of threats to computer security. I can explain how to moderate these. I know what encoding and encryption are and how they are used to protect and secure data.

I know there are physical and software based threats to systems. I know that people can deliberately or accidentally compromise computer security. I know what encoding is. I know that encryption also exists.

I know there are a range of threats to computer systems and data. I know that data can be changed to protect it.

I know there are threats to computer systems.

Key Vocabulary

CIA Triad	Cyber Security	Cipher	Encryption
Virus	Authentication	Confidentiality	Social Engineering
Integrity	Firewall	Privileges	Access control
Malware	Encoding	DoS	Hacker

Prior knowledge:

Students have developed foundational computing skills through KS1 and KS2, including an understanding of binary code, converting between binary and denary, and an introduction to hexadecimal (hex) for digital applications. They have also learned online safety principles, such as using strong passwords, protecting personal data, and avoiding phishing scams. In Year 7, students build on this by developing their understanding of networks and networking infrastructure.

Leading to:

Students build on their knowledge by exploring how digital threats affect individuals, businesses, and governments. They learn about advanced encryption methods, cybersecurity laws, ethical hacking, and network security to understand how real-world systems stay protected. In KS3 Computer Science, they apply their understanding of binary, hex, and algorithms to data security, learning how encryption scrambles information to prevent unauthorized access. In KS4, cybersecurity is linked to practical applications, such as firewalls, penetration testing, and risk management, helping students develop skills for careers in IT, cybersecurity, and digital forensics. An early foundation in online safety and secure computing ensures they can navigate digital spaces responsibly while preparing for further study and life experiences.

Key Questions pupils should have the knowledge to answer

What is cyber security? Cyber security is how individuals and organisations reduce the risk of cyber attack. It is the practice of protecting computer systems, networks, and data from unauthorized access, attacks, and damage. It involves using technologies, processes, and security measures to safeguard sensitive information and prevent cyber threats such as hacking, malware, phishing, and denial-of-service (DoS) attacks. Strong cybersecurity ensures confidentiality, integrity, and availability of data, allowing individuals and organizations to operate safely online. It includes areas like encryption, authentication, firewalls, and ethical hacking, all designed to strengthen defenses against cybercrime.

What cyberthreats do online systems face? Numerous threats that can compromise sensitive data, disrupt systems, and cause financial losses. Some of the most common threats include **ransomware**, where attackers encrypt data and demand payment for its release; **phishing**, which tricks users into revealing personal information through deceptive emails or websites; and **malware**, malicious software designed to damage or infiltrate systems. Other threats include **denial-of-service (DoS) attacks**, which overwhelm networks to make them inaccessible, and **man-in-the-middle (MitM) attacks**, where cybercriminals intercept communications to steal data. Additionally, **social engineering** exploits human psychology to manipulate users into giving up confidential information.

What is needed in a secure system? The triad of cyber security is CIA—Confidentiality, Integrity and Availability. The right people get accurate data when they need it.

What is the difference between encoding and encryption? Encoding is for maintaining data usability and can be reversed by employing the same algorithm that encoded the content, i.e. no key is used. Encryption is for maintaining data confidentiality and requires the use of a key (kept secret) in order to return to plaintext.

What is a key? An encryption key is a random string of bits created explicitly for scrambling and unscrambling data. Encryption keys are designed with algorithms intended to ensure that every key is unpredictable and unique.

What are biometric security measures? Biometric security devices measure unique characteristics of a person, such as voice pattern, the iris or retina pattern of the eye, or fingerprint patterns. With biometrics, it can be extremely difficult for someone to break into a system.

What is the CIA triad? The **CIA Triad** is a core framework in cybersecurity that ensures the protection of information by maintaining **Confidentiality, Integrity, and Availability**. **Confidentiality** restricts access to sensitive data through encryption, authentication, and access control measures, preventing unauthorized disclosure. **Integrity** ensures that information remains accurate and unaltered by unauthorized changes, using techniques like hashing, checksums, and digital signatures. **Availability** guarantees that data and systems are accessible when needed by implementing redundancy, backups, and protections against threats such as denial-of-service (DoS) attacks. These three principles work together to create a **balanced and secure system**, ensuring data is safeguarded against unauthorized access, tampering, and disruptions.

Do you want to know more?

https://www.youtube.com/watch?v=q9NNMWBCPHM

https://www.youtube.com/watch?v=PWVN3Rq4gzw

https://www.bbc.co.uk/bitesize/guides/zrtrd2p/revision/3

https://www.bbc.co.uk/bitesize/guides/z9p9kqt/revision/1

https://www.youtube.com/watch?v=-AkuKKJ8dN0

https://www.bbc.co.uk/bitesize/guides/z9nk87h/revision/2

https://schoolcodebreaking.com/code-breaking-competition/

https://www.youtube.com/watch?v=Y_kp-1rhJP0

https://www.youtube.com/watch?v=-yFZGF8FHSg