



Year 13 Computer Science – Exchanging Data

Learning about this topic is important because:

You will learn about the key concepts of relational databases which are vital in the efficient, secure management of data by organisations. This topic also introduces encryption, compression and hashing which are vital for the secure, efficient exchange of data between computer systems.

This builds on:

Year 12 Operating Systems / Nature of Applications

This leads to:

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We will learn:

- Lossy vs lossless compression
- Run-length encoding and dictionary coding for lossless compression
- Symmetric and asymmetric encryption
- Different uses of hashing
- Relational database, flat file, primary key, foreign key, secondary key, entity relationship modelling, normalisation and indexing
- Methods of capturing, selecting, managing and exchanging data
- Normalisation to 3NF
- SQL: Interpret and modify
- Referential integrity
- Transaction processing, ACID (Atomicity, Consistency, Isolation, Durability), record locking and redundancy

We will develop/practise skills including:

- Application of lossless compression algorithms to different sets of data.
- Practical experience of creating relational databases using Microsoft Access.
- Practical experience of writing SQL queries using Microsoft Access.

Some of the vocabulary that we will use includes:

Lossy Compression, Lossless Compression, Run Length Encoding Dictionary Coding, Symmetric Encryption, Asymmetric Encryption Hashing, Relational Database, Flat File, Primary Key, Foreign Key Concatenated Primary Key, Secondary Key, ERM, Normalisation Indexing, Normal Forms, SQL, Referential Integrity, Transaction Processing ACID, Record Locking, Redundancy.

You could learn more about this topic by:

Craig n Dave – Compression, Encryption and Hashing – [Click Here](#)
Craig n Dave – Relational Databases – [Click Here](#)
Physics and Maths Tutor – Exchanging Data – [Click Here](#)



Your teacher will assess your knowledge & understanding throughout the topic by looking at your work, questioning, discussion and giving you feedback in lots of different ways. The key pieces of work in this topic are: **SLR9/SLR10, Key Homework Tasks, End of Unit Assessment**



Year 13 Computer Science – Exchanging Data



West Kirby
Grammar School



Year 13 Computer Science – Data Types and Boolean Algebra

Learning about this topic is important because:

This topic will extend your knowledge of binary by learning how negative numbers and fractions are represented. Boolean logic is a fundamental aspect of not just computer programs/algorithms but also of how the hardware such as the processor operates. This topic will further extend your knowledge of basic Boolean operations and you will learn how operations such as adding numbers can be implemented using logic circuits.

This builds on:

Year 11 – Boolean Logic (Spring 2)

This leads to:

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We will learn:

- Primitive data types, integer, real/floating point, character, string and Boolean.
- Represent positive integers in binary
- Use of sign and magnitude and two's complement to represent negative numbers in binary
- Addition and subtraction of binary integers
- Represent positive integers in hexadecimal
- Convert positive integers between binary, hexadecimal and denary
- Positive and negative real numbers using normalised floating-point representation
- Representation and normalisation of floating-point numbers in binary
- Floating-point arithmetic, positive and negative numbers, addition and subtraction
- Bitwise manipulation and masks; shifts combined with AND, OR and XOR
- How character sets (ASCII/UNICODE) are used to represent text
- Use of Karnaugh maps to simplify Boolean expressions
- Use the following rules to derive or simplify statements in Boolean algebra: • De Morgan's laws • distribution • association • commutation • double negation
- Using logic gate diagrams and truth tables
- The logic associated with D-type flip-flops and half and full adders

We will develop/practise skills including:

- Mathematics – Calculations required for binary number conversions and addition/shifts of binary values.
- Simplification of Boolean expressions.
- Design, create and test logic circuits.



Year 13 Computer Science – Data Types and Boolean Algebra

Some of the vocabulary that we will use includes: Boolean Algebra, De Morgan's Law, Distribution, Association, Commutation, Double Negation, Logic Gate Diagram, Truth Table D Type Flip Flops, Half Adders, Full Adders, Integer, Real, Floating Point Character, String, Boolean, Binary, Sign and Magnitude, Two's Complement Hexadecimal, Denary, Floating-Point Arithmetic, Bitwise Manipulation Shifts, AND, OR, XOR	You could learn more about this topic by: Craig n Dave Data Types – Click Here Craig n Dave Boolean Algebra – Click Here Physics and Maths Tutor – Data Types / Boolean Algebra – Click Here Logic.ly – Create your own logic circuits – Click Here 
Your teacher will assess your knowledge & understanding throughout the topic by looking at your work, questioning, discussion and giving you feedback in lots of different ways. The key pieces of work in this topic are: SLR13/SLR15, Key Homework Tasks, End of Unit Assessment	



Year 13 Computer Science – Social, Legal, Ethical and Cultural Factors in Computing

Learning about this topic is important because:

This topic allows us to consider Computing and related technology in the context of the real world. We examine the impacts of technological advances on our everyday lives and individuals and as a society as a whole. We will also consider laws in place to prevent the misuse of modern technology and consider their application in real case studies.

This builds on:

Year 11 – Social, Ethical and Legal Factors

This leads to:

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We will learn:

The individual (moral), social (ethical) and cultural opportunities and risks of digital technology:

- Computers in the workforce
- Automated decision-making
- Artificial intelligence
- Environmental effects
- Censorship and the internet
- Monitoring behaviour
- Analysing personal information
- Piracy and offensive communications
- Layout, colour paradigms and character sets

Computing related legislation:

- The Data Protection Act 2018
- The Computer Misuse Act 1990
- The Copyright Design and Patents Act 1988
- The Regulation of Investigatory Powers Act 2000

We will develop/practise skills including:

- Research
- Analysis
- Application of knowledge of laws to particular scenarios.
- Forming balanced arguments about computing related issues.

Some of the vocabulary that we will use includes:

Data Protection Act, Computer Misuse Act, Copyright Design and Patents Act, Regulation of Investigatory Powers Act, Artificial intelligence, Censorship, Automation, Piracy, Character Sets

You could learn more about this topic by:

Craig n Dave – Legislation – [Click Here](#)

Craig n Dave – Ethical, Moral and Cultural Issues – [Click Here](#)

Physics and Maths Tutor – Legal, Moral, Ethical and Cultural Issues – [Click Here](#)





Year 13 Computer Science – Social, Legal, Ethical and Cultural Factors in Computing

Your teacher will assess your knowledge & understanding throughout the topic by looking at your work, questioning, discussion and giving you feedback in lots of different ways. The key pieces of work in this topic are: SLR16/SLR17, Key Homework Tasks, End of Unit Assessment.	