Computer Progression Pathways statements for KS3 & 4

Year 7 National Expectations

Algorithms

- can show an awareness of tasks best completed by humans or computers.
- can designs solutions by decomposing a problem and creates a sub-solution for each of these parts (decomposition).
- know that different solutions exist for the same problem.

Programming and Development

- know the difference between, and appropriately I can use if and if, then and else statements.
- can use a variable and relational operators within a loop to govern termination.
- can design, write and debug modular programs using procedures.
- know that a procedure can be used to hide the detail with sub-solution (procedural abstraction).

Data and Data Representation

- can perform more complex searches for information e.g. using Boolean and relational operators.
- Analyses and evaluates data and information, and I know that poor quality data leads to unreliable results, and inaccurate conclusions.

Hardware and Processing

- know why and when computers are used.
- know the main functions of the operating system.
- know the difference between physical, wireless and mobile networks.

Communications and Networks

- I know how to effectively use search engines, and I know how search results are selected, including that search engines use 'web crawler programs'.
- Selects, combines and I can use internet services.
- I can show responsible use of technologies and online services, and I know a range of ways to report concerns.

Information Technology

- can make judgements about digital content when evaluating and repurposing it for a given audience.
- know the audience when I am designing and creating digital content.
- know the potential of information technology for collaboration when computers are networked.
- can use criteria to evaluate the quality of solutions and can identify improvements making some refinements to the solution, and future solutions.

Computer Progression Pathways statements for KS3 & 4

Year 8 National Expectations

Algorithms

- know that iteration is the repetition of a process such as a loop.
- know that different algorithms exist for the same problem.
- can represent solutions using a structured notation.
- can identify similarities and differences in situations and can use these to solve problems (pattern recognition).

Programming and Development

- know that programming bridges the gap between algorithmic solutions and computers.
- have practical experience of a high-level textual language, including using standard libraries when programming.
- can use a range of operators and expressions e.g. Boolean, and applies them in the context of program control.
- can select the appropriate data types.

Data and Data Representation

- know that digital computers use binary to represent all data.
- know how bit patterns represent numbers and images.
- know that computers transfer data in binary.
- know the relationship between binary and file size (uncompressed).
- can define data types: real numbers and Boolean.
- can query data on one table using a typical query language.

Hardware and Processing

- know the function of the main internal parts of basic computer architecture.
- know the concepts behind the fetch-execute cycle.
- know that there is a range of operating systems and application software for the same hardware.

Communications and Networks

- know how search engines rank search results.
- know how to construct static web pages using HTML and CSS.
- know data transmission between digital computers over networks, including the internet i.e. IP addresses and packet switching.

Information Technology

- can evaluate the appropriateness of digital devices, internet services and application software to achieve given goals.
- can recognise ethical issues surrounding the application of information technology beyond school.
- can design criteria to critically evaluate the quality of solutions, I can use the criteria to identify improvements and can make appropriate refinements to the solution.

Computer Progression Pathways statements for KS3 & 4

Year 9 National Expectations

Algorithms

- know a recursive solution to a problem repeatedly applies the same solution to smaller instances of the problem.
- know that for some problems I can share the same characteristics and use the same algorithm to solve both (generalisation).
- know the notion of performance for algorithms and I know that some algorithms have different performance characteristics for the same task.

Programming and Development

- can use nested selection statements.
- know the need for, and can write, custom functions including use of parameters.
- know the difference between, and I can use appropriately, procedures and functions.
- know and I can use negation with operators.
- use and manipulate one dimensional data structures.
- can find and correct syntactical errors.

Data and Data Representation

- know how numbers, images, sounds and character sets use the same bit patterns.
- can perform simple operations using bit patterns e.g. binary addition.
- know the relationship between resolution and colour depth, including the effect on file size.
- can distinguish between data used in a simple program (a variable) and the storage structure for that data.

Hardware and Processing

- know the von Neumann architecture in relation to the fetch-execute cycle, including how data is stored in memory.
- know the basic function and operation of location addressable memory.

Communications and Networks

- know names of hardware e.g. hubs, routers, switches, and the names of protocols e.g. SMTP, iMAP, POP, FTP, TCP/IP, associated with networking systems.
- can use technologies and online services securely, and I know how to identify and report inappropriate conduct.

Information Technology

- can justify the choice of and independently combine and I use multiple digital devices, internet services and application software to achieve given goals.
- can evaluate the trustworthiness of digital content and consider the usability of visual design features when designing and creating digital artefacts for known audience.
- design criteria for users to evaluate the quality of solutions, use the feedback from users to identify improvements and make appropriate refinements.
- can identify and explain how the use of technology can impact on society.

Computer Progression Pathways statements for KS3 & 4

KS4 National Expectations

Algorithms

- know that the design of an algorithm is distinct from its expression in a programming language (which will depend on the programming constructs available).
- can evaluate the effectiveness of algorithms and models for similar problems.
- know where information can be filtered out in generalizing problem solutions (abstraction).
- can use logical reasoning to explain how an algorithm works.
- can represent algorithms using a structured language.

Programming and Development

- know the effect of the scope of a variable e.g. a local variable can't be accessed from outside its function.
- know and apply parameter passing.
- know the difference between, and I can use, both pre-tested e.g. 'while', and post-tested e.g. 'until' loops.
- can apply a modular approach to error detection and correction.

Data and Data Representation

- know the relationship between data representation and data quality.
- know the relationship between binary and electrical circuits, including Boolean logic.
- know how and why values are data typed in many different languages when manipulated within programs.

Hardware and Processing

- know that processors have instruction sets and that these relate to low-level instructions carried out by a computer

Communications and Networks

- know the purpose of the hardware and protocols associated with networking computer systems.
- know the client-server model including how dynamic web pages use server-side scripting and that web servers process and store data entered by users.
- know that persistence of data on the internet requires careful protection of online identity and privacy.

Information Technology

- can undertake creative projects that collect, analyse, and evaluate data to meet the needs of a known user group.
- can effectively design and create digital artefacts for a wider or remote audience.
- consider the properties of media when importing them into digital artefacts.
- can document user feedback, the improvements identified and the refinements made to the solution.
- can explain and justify how the use of technology impacts on society, from the perspective of social, economical, political legal, ethical and moral issues.

<p style="text-align:center">Computing and Business Studies</p>

Why is Computing and Business Studies important and relevant to the development of the whole child in the 21st Century?

The Computing and Business curriculum at Alder Grange aims to equip "… *pupils to understand and change the world through logical thinking and creativity, ……Computing equips pupils to use information technology to create programs, systems and a range of media. It also ensures that pupils become digitally literate – able to use, and express themselves and develop their ideas through, information and communication technology – at a level suitable for the future workplace and as active participants in a digital world.*" **National Curriculum 2014**

What skills will students develop through studying Computing and Business Studies that will benefit them as a successful learner?

Pupils will develop skills that allow them to…

- use technology safely and responsibly
- collaborate effectively in order to generate creative and innovative ideas
- analyse problems in computational terms, writing computer programs in order to solve such problems
- apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation
- evaluate and apply information technology, including new or unfamiliar technologies, analytically to solve problems
- develop their perseverance
- be adaptable to software and technological developments

How do we bridge from the Key Stage 2 National Curriculum for Computing and Business Studies as students move from year 6 to 7?

- Year 7 induction unit to audit current skills
- Contact with primary schools
- Following the Computing At School (CAS) progression pathway document to help continuous development through KS2-3

How do we assess our students' performance in Computing and Business Studies as they move across years 7 to 9?

- Induction unit in year 7 includes baseline assessment written test and practical activity covering Computer Science, IT and Digital Literacy
- All years complete an end of year assessment (1 practical activity, 1 written test)
- This mark combined with Unit tracking sheet information will give an overall level for performance measurement

How do we track the progress of our students' learning and skill development across years 7 to 9?

- Use of Unit assessment tracking sheets within lessons
- Observations
- Discussions with students
- Investigative independent homework projects – 1 per term
- Levels are awarded termly at intervals and monitored against target levels
- Progress compared against baseline assessment information from y7 test and against end of Key Stage expectations

Grade collections will report if a pupil's progress shows that they are **'on track'** for achieving both the **'expected standard'** at the end of years 7 to 9 and their own **personal GCSE target**. If a pupil continues to make the necessary progress towards the end of year **'expected standards'** then they will be **'on track'** to meet the **national expectation at GCSE** which is **grade 5**.