Primary Phase Long Term Plan
Computing

William Hulme's Grammar School
The best in everyone™
Part of United Learning

Curriculum Overview

At William Hulme's Grammar School, our Computing curriculum aims to equip our children with the knowledge and skills to be Master of Technology, fostering creativity and problem-solving skills that they can apply in real-life situations. In our ever-changing world, technology will play a pivotal role in our children's lives, and it is therefore crucial that children can use technology positively, responsibly and safely. Our broad curriculum is designed to support children in making informed and positive choices about the way they use technology by introducing them to the three key disciplines within Computing: Computer Science, Digital Literacy and Information Technology.

These disciplines are split into five vertical concepts that enable children to make connections between topics across different year groups. The way that concepts are revisited over time is designed to develop mastery, allowing children to recall and apply what they have learnt over time.

Information Technology: Creating Media, Data & Information
Computer Science: Computing Systems & Networks, Programming
Digital Literacy: Risks, Benefits and Impact of Technology

We want our children to understand that they have choices when it comes to the way that they use technology that will allow them to participate safely both online and within their own community. We embed the value of respect by modelling safe and responsible use of digital technology across all wider curriculum subjects. Digital Literacy is further embedded within the Computing curriculum with regular discussion of e-safety. This is interwoven into every lesson as a starter activity so that children become aware of how this aspect of the curriculum applies every time we engage with technology. We also aim to provide a range of cross-curricular opportunities to apply knowledge, skills and understanding so that children can appreciate how their learning in Computing will transfer throughout other areas of their lives. While computational thinking is explicitly taught within the Computer Science aspect of the curriculum, the concepts of algorithms, pattern recognition, abstraction, logic and evaluation are clearly relevant to other subjects and teachers are encouraged to draw attention to this when appropriate.

Our Computing curriculum is based on the Teach Computing Scheme from the National Centre for Computing Education (NCCE) which aims to provide every child with a world-leading Computing education and covers the content stated in the National Curriculum (2014)

The way vertical concepts link into content taught is outlined below.

Vertical Concept Overview

Vertical Concept	Key Questions/Definition	Units
Creating Media (Information Technology)	Select and create a range of media including text, images, sounds, and video	**Year 1** – Digital Painting, Digital Writing **Year 2** – Digital Photography, Making Music **Year 3** – Stop-frame Animation, Desktop Publishing **Year 4** – Audio Editing, Photo Editing **Year 5** – Video Editing **Year 6** – Web Page Creation, 3D Modelling
Data & Information (Information Technology)	Understand how data is stored, organised, and used to represent real-world artefacts and scenarios	**Year 1** – Grouping Data **Year 2** – Pictograms **Year 3** – Branching Databases **Year 4** – Data Logging **Year 5** – Flat-file Databases, Vector Drawing **Year 6** – Introduction to Spreadsheets
Computing Systems and networks (Computer Science)	Understand what a computer is, and how its constituent parts function together as a whole. Understand how networks can be used to retrieve and share information, and how they come with associated risks	**Year 1** – Technology around us **Year 2** – Information Technology around us **Year 3** – Connecting Computers **Year 4** –The Internet **Year 5** – Sharing information **Year 6** – Web Page Creation
Programming (Computer Science)	Create software to allow computers to solve problems	**Year 1** – Moving a robot, Programming Animations **Year 2** – Robot Algorithms, An Introduction to Quizzes **Year 3** – Sequence in music, Events and Actions **Year 4** – Repetition in shapes, Repetition in Games **Year 5** – Selection in Physical Computing, Selection in Quizzes **Year 6** – Variables in games, Sensing
Digital Literacy	Risks, benefits and impact of technology	Interwoven through curriculum content, particularly e-safety starters.

Early Years

In EYFS, Computing is introduced informally by exposure to both digital and non-digital technology through play-based activities. This may be incorporated into formal teaching when appropriate. These opportunities can be linked to the vertical concepts as follows, though this list is not exhaustive:

Vertical Concept	Key Questions/Definition
Information Technology	**Creating Media**: Use of digital technology such as iPads or laptop to create pictures, take photographs or practise letter formation. Use of age-appropriate software such as Bug Club or digital painting apps to support their understanding of other areas of the curriculum
Computer Science	**Programming:** Play opportunities using Beebots, noticing cause and effect and the effect of giving sequences of instructions. **Computing Systems & Networks:** Identify technology and engaging with through play.
Digital Literacy	**Safety and Security:** An introduction to e-safety through adult-initiated discussions about the importance of keeping passwords safe, what information to share with a strange (offline) and the importance of consent when taking photographs. **Impact of Technology**: Play opportunities using both digital and non-digital technology that work in different ways and are used for different purposes such as phones, cameras, computers, egg-whisks, torches and construction kits. Discussion of the impact of technology such as buttons at pedestrian crossings.
Impact of Technology	Create software to allow computers to solve problems

This is based on the Birth to 5 Matters (Non-Statutory Guidance) Children require access to a range of technologies, both digital and non-digital in their early lives. Exploring with different technologies through play provides opportunities to develop skills that children will go on to develop in their lifetimes. Investigations, scientific inquiry and exploration are essential components of learning about and with technology both digitally and in the natural world. Through technology children have additional opportunities to learn across all areas in both formal and informal ways. Technologies should be seen as tools to learn both from and with, in order to integrate technology effectively within early years practice.

Key Stage One

	Year 1	Year 2	Assessment
Autumn Term 1	**Unit:** Technology around us. **Vertical Concept:** Computing Systems and networks (Computer Science) **Key Question:** What is technology? **Overview:** • An introduction to what is 'technology' • Exploring how technology can be used to help us • Development of foundational computing skills (typing and mouse).	**Unit:** IT around us **Vertical Concept:** Computing Systems and networks (Computer Science) **Key Question:** How can technology help us? **Overview:** • Identify examples of IT, starting with in the home. • Explore how IT is being used for good in our lives. • Discuss the responsible use of technology and how to make smart choices when using it.	• Formative assessments during every lesson include: • Review, verbal feedback, a range of questioning techniques and mini whiteboard tasks. • Year 1: Teacher assessment of the students' understanding of what IT is and examples they can identify. • Year 2: Teacher assessment of the different ways the students use IT over the course of the unit.

	Year 1	Year 2	Assessment
Autumn Term 2	**Unit:** Digital painting **Vertical Concept:** Creating Media (Information Technology) **Key Question:** How can technology be used to create art? **Overview:** • Study how art can also be made digitally. • Development of skills to create a digital piece of art. • Creation of a digital piece of art.	**Unit:** Digital photography **Vertical Concept:** Creating Media (Information Technology) **Key Question:** How can we use technology to take photographs? **Overview:** • Recognise that different devices can be used to capture photographs. • Gain experience of capturing, editing and improving photos. • Recognise that images that they see are not always real.	• Formative assessments during every lesson include: • Review, verbal feedback, a range of questioning techniques and mini whiteboard tasks. • Year 1: Teacher assessment of the final digital painting pieces that the students produce. • Year 2: Teacher assessment of the final edited photos the students produce.

	Year 1	Year 2	Assessment
Spring Term 1	**Unit:** Moving a robot **Vertical Concept:** Programming (Computer Science) **Key Question:** How can commands be used to control robots? **Overview:** • Explore giving individual commands to other learners and as a part of a computer program. • Identify what each floor robot command does and use this knowledge to make predictions. • Begin to introduce elements of programming through the use of algorithms.	**Unit:** Robot algorithms **Vertical Concept:** Programming (Computer Science) **Key Question:** How can algorithms be used to give a set of instructions. **Overview:** • Develop the understanding of instructions in sequences and how to predict outcomes. • Explore how different command sequences can result in different outcomes. • Design and test algorithms.	• Formative assessments during every lesson include: • Review, verbal feedback, a range of questioning techniques and mini whiteboard tasks. • Year 1: Teacher assessment of the student's knowledge of the floor bot commands. • Year 2: Teacher assessment of the final algorithms.
Spring Term 2	**Topic:** Grouping data **Vertical Concept:** Data & Information (Information Technology) **Key Question:** How can we collect and ask questions about data? **Overview:** • Introduce students to the idea of data and information. • Students will demonstrate they can count object before and after they have been grouped. • Use their ability to sort objects into different groups to answer questions about data.	**Topic:** Pictograms **Vertical Concept:** Data & Information (Information Technology) **Key Question:** How can we begin to organise and present data? **Overview:** • Begin to understand what data means and how this can be collected in the form of a tally chart. • Use the term 'attribute' to help them organise data. • Present data in the form of pictograms and block diagrams.	• Formative assessments during every lesson include: • Review, verbal feedback, a range of questioning techniques and mini whiteboard tasks. • Year 1: Teacher assessment of how students group and ask questions based on the animal and fruit pictograms. • Year 2: Teacher assessment of the collection, presentation and conclusions drawn from student generated data collection questions.

	Year 1	Year 2	Assessment
Summer Term 1	**Unit:** Digital writing **Vertical Concept:** Creating Media (Information Technology) **Key Question:** How can using technology benefit with our writing? **Overview:** • Develop students' understanding of how computers can be used to create and change text. • Develop typing skills using a keyboard. • Consider the similarities and differences between using a computer and writing on piece of paper to create text.	**Unit:** Digital Music **Vertical Concept:** Creating Media (Information Technology) **Key Question:** How can technology be used to create music? **Overview:** • Explore how music can make them think and feel. • Through the use of patterns, students will make music with both percussion instruments and digital tools. • Create different rhythms and tunes to match to the movement of animals.	• Formative assessments during every lesson include: • Review, verbal feedback, a range of questioning techniques and mini whiteboard tasks. • Year 1: Teacher assessment of the sentences typed and editing. • Year 2: Teacher assessment of the final pieces of music created based on the movement of animals.
Summer Term 2	**Unit:** Programming animations **Vertical Concept:** Programming (Computer Science) **Key Question:** How can we use coding to create an animation? **Overview:** • Introduce students to programming through ScratchJr. • Explore how to create a 'project' using sprites and backgrounds. • Use a range of programming blocks to modify and create programs.	**Unit:** Programming quizzes **Vertical Concept:** Programming (Computer Science) **Key Question:** How can we using coding to create a sequence of commands? **Overview:** • Recap of learning from previous year on the use of ScratchJr • Begin to understand that sequences of commands have an outcome and make predictions based off this. • Use and modify design to create their own quiz questions	• Formative assessments during every lesson include: • Review, verbal feedback, a range of questioning techniques and mini whiteboard tasks. • Year 1: Teacher assessment of the final ScratchJR projects based on the creation of a rocket sprite and related code. • Year 2: Teacher assessment of the final student created quizzes.

Lower Key Stage Two

	Year 3	Year 4	Assessment
Autumn Term 1	**Unit:** Connecting computers **Vertical Concept:** Computing Systems and networks (Computer Science) **Key Question:** What are inputs, outputs and processes?	**Unit:** The Internet **Vertical Concept:** Computing Systems and networks (Computer Science) **Key Question:** What is the world wide web?	• Formative assessments during every lesson include: • Review, verbal feedback, a range of questioning techniques and mini whiteboard tasks. • Year 3: Teacher assessment of students' understanding of the key components in a computer network.

	Year 3	Year 4	Assessment
Autumn Term 1	**Overview:** • Develop an understanding of digital devices through inputs, processes and outputs. • Compare digital and non-digital devices. • Introduce students to computer networks and the key components that make them (routers and switches).	**Overview:** • Apply their knowledge of networks to understand how the internet is a network of networks. • Explore the 'World Wide Web' and learn about content ownerships. • Critically evaluate content found online to decide how honest, accurate or reliable it is.	• Year 4: Teacher assessment of the students' ability to define what the 'world wide web' is.
Autumn Term 2	**Unit:** Stop-frame animation **Vertical Concept:** Creating Media (Information Technology) **Key Question:** What is a stop motion animation? **Overview:** • Plan and create a stop-frame animation based on a short story. • Further develop the animations by adding other types of media such as music and text.	**Unit:** Audio Production **Vertical Concept:** Creating Media (Information Technology) **Key Question:** How can we use technology to audio produce? **Overview:** • Identify the input and output devices required to work with sounds digitally. • Understand the ownership of digital audio and the copyright implications of duplicating the work of others. • Plan, record and edit a short podcast.	• Formative assessments during every lesson include: • Review, verbal feedback, a range of questioning techniques and mini whiteboard tasks. • Year 3: Teacher assessment of the final stop-frame animations • Year 4: Teacher assessment of the final podcasts.

	Year 3	Year 4	Assessment
Spring Term 1	**Unit:** Sequencing sounds **Vertical Concept:** Programming (Computer Science) **Key Question:** How can we create our own programs? **Overview:** • Transition students to using Scratch. • Introduce a selection of motion, sound and event blocks that will be used to create their own programs and sequences.	**Unit:** Repetition in shapes. **Vertical Concept:** Programming (Computer Science) **Key Question:** What are loops in coding and how can we use them? **Overview:** • Build on previous knowledge to explore the use of repetition and loops within programming. • Create programs by planning, modifying and testing commands to create shapes and patterns.	• Formative assessments during every lesson include: • Review, verbal feedback, a range of questioning techniques and mini whiteboard tasks. • Year 3: Teacher assessment of final scratch project with the meaningful use of sound, motion and event blocks. • Year 4:Teacher assessment of final 'wrapping paper' project and use of repeating shapes.
Spring Term 2	**Topic:** Branching databases. **Vertical Concept:** Data & Information (Information Technology) **Key Question:** How do digital and physical databases differ?	**Topic:** Data logging. **Vertical Concept:** Data & Information (Information Technology) **Key Question:** What are data loggers and why do we use them?	• Formative assessments during every lesson include: • Review, verbal feedback, a range of questioning techniques and mini whiteboard tasks. • Year 3: Teacher assessment of the final, digital branching database questions.

		Year 3	Year 4	Assessment

<table>

Spring Term 2	**Overview:** • Students to develop their understanding of branching databases by initially using yes/no questions to group objects. • Create physical and digital versions of branching databases. • Create a final digital branching database and test it.	**Overview:** • Students to compare how humans and digital devices experiences environments. • Collect and analyse data by looking at data points, data sets and logging intervals. • Pose questions and then use the data loggers to collect the data needed to answer them.	• Year 4: Teacher assessment of final questions posed alongside the data capture and analysis.

	Year 3	**Year 4**	**Assessment**
Summer Term 1	**Unit:** Desktop publishing **Vertical Concept:** Creating Media (Information Technology) **Key Question:** How can we use technology to publish work? **Overview:** • Students become familiar with the terms 'text' and 'images' and understand how they can be used to communicate messages. • Use desktop publishing software to consider the use of font size and colour when editing a pre-existing document. • Start to create their own pieces of work by considering the layout and purpose of their work.	**Unit:** Photo editing **Vertical Concept:** Creating Media (Information Technology) **Key Question:** How can we use technology to take and manipulate images? **Overview:** • Develop an understanding of how digital images can be changed and edited. • Practice editing images and consider the impact and effectiveness of their choices.	• Formative assessments during every lesson include: • Review, verbal feedback, a range of questioning techniques and mini whiteboard tasks. • Year 3: Teacher assessment of final versions of the student magazines. • Year 4:Teacher assessment of the students' collection of edited photos.
Summer Term 2	**Unit:** Events and actions in programs. **Vertical Concept:** Programming (Computer Science) **Key Question:** How can we use events and actions to develop our coding knowledge? **Overview:** • Explore the links between events and actions while consolidating prior learning on sequencing. • Within Scratch, students will explore movement within a context of moving a sprite around a maze. • Introduce programming extensions through the use of the 'pen' blocks.	**Unit:** Repetition in games **Vertical Concept:** Programming (Computer Science) **Key Question:** How do game designers create engaging games? **Overview:** • Explores the concept of repetition in programming within Scratch. • Study the difference between count-controlled and infinite loops. • Design and create a game which uses repetition.	• Formative assessments during every lesson include: • Review, verbal feedback, a range of questioning techniques and mini whiteboard tasks. • Year 3: Teacher assessment of the final maze project with optional pen trail. • Year 4: Teacher assessment of the final game with use of repetition blocks.

</table>

Upper Key Stage Two

	Year 5	Year 6	Assessment
Autumn Term 1	**Topic:** Systems and searching **Vertical Concept:** Computing Systems and networks (Computer Science) **Key Question:** How is information transferred across a network? **Overview:** • Define what a 'computer system' is and how information is transferred between systems and devices • Explain what an input and an output is • Understand how search engines function and how search results are influenced.	**Topic:** Communication **Vertical Concept:** Computing Systems and networks (Computer Science) **Key Question:** How do search engines function? **Overview:** • Understand how internet addresses function. • Explain how large chunks of data is split into 'packets' • Take part in a collaborative online project with other students in the class	• Formative assessments during every lesson include: • Review, verbal feedback, a range of questioning techniques and mini whiteboard tasks. • Year 5: Teacher assessment of the website design in relation to search ranking. • Year 6: Teacher assessment of the final 'shared' presentation created with another student
Autumn Term 2	**Topic:** Video production **Vertical Concept:** Creating Media (Information Technology) **Key Question:** How can we use technology to film, edit and publish a video? **Overview:** • Develop the skills of capturing, editing and manipulating video. • Apply this to create a short film utilising the skills they have learnt.	**Topic:** Web page creation **Vertical Concept:** Creating Media (Information Technology) **Key Question:** How are websites made? **Overview:** • Plan the features of a web page • Consider the ownership and use of images (copyright) • Recognise the need to preview pages • Outline the need for a navigation path	• Formative assessments during every lesson include: • Review, verbal feedback, a range of questioning techniques and mini whiteboard tasks. • Year 5: Teacher assessment of the final video created. • Year 6: Teacher assessment of the final website created.

	Year 5	Year 6	Assessment
Spring Term 1	**Topic:** Selection in physical computing **Vertical Concept:** Programming (Computer Science) **Key Question:** What is physical computing? **Overview:** • Explore 'physical computing' through the programming of Crumble controllers • Learn how to connect and program the different components. • Understand how conditions can be used to control the flow of actions.	**Topic:** Variables in games **Vertical Concept:** Programming (Computer Science) **Key Question:** How are variables used within games? **Overview:** • Define a 'variable' as something that is changeable • Explain why a variable is used in a program • Choose how to improve a game by using variables • Design a project that builds on given examples	• Formative assessments during every lesson include: • Review, verbal feedback, a range of questioning techniques and mini whiteboard tasks. • Year 5: Teacher assessment of the final crumble program that will control their fairground ride. • Year 6: Teacher assessment of the variables used in the final games.

	Spring Term 2		Assessment
Spring Term 2	**Topic:** Flat file databases. **Vertical Concept:** Data & Information (Information Technology) **Key Question:** How do digital and paper based databases differ? **Overview:** • Use a form to record information • Compare paper and computer-based databases • Outline how grouping and then sorting data allows us to answer questions	**Topic:** Introduction to spreadsheets **Vertical Concept:** Data & Information (Information Technology) **Key Question:** How do spreadsheets allow use to organise and interpret data? **Overview:** • Identify questions which can be answered using data • Explain that objects can be described using data • Explain that formula can be used to produce calculated data • Apply formulas to data, including duplicating	• Formative assessments during every lesson include: • Review, verbal feedback, a range of questioning techniques and mini whiteboard tasks. • Year 5: Teacher assessment of the final 'Travel Agent' databases. • Year 6: Teacher assessment of the final 'party planner' spreadsheet and formulas.

	Year 5	Year 6	Assessment
Summer Term 1	**Topic:** Vector drawing **Vertical Concept:** Creating Media (Information Technology) **Key Question:** How can we use technology to create digital drawings? **Overview:** • Identify that drawing tools can be used to produce different outcomes • Create a vector drawing by combining shapes • Recognise that vector drawings consist of layers	**Topic:** 3D Modelling **Vertical Concept:** Creating Media (Information Technology) **Key Question:** How are 3D models constructed used technology? **Overview:** • Use a computer to create and manipulate three-dimensional (3D) digital objects • Compare working digitally with 2D and 3D graphics • Construct a digital 3D model of a physical object • Identify that physical objects can be broken down into a collection of 3D shapes	• Formative assessments during every lesson include: • Review, verbal feedback, a range of questioning techniques and mini whiteboard tasks. • Year 5: Teacher assessment of the final vector drawing artwork. • Year 6: Teacher assessment of the final 3D models.
Summer Term 2	**Topic:** Events and actions in programs. **Vertical Concept:** Programming (Computer Science) **Key Question:** How can we use conditional statements to create programs? **Overview:** • Explain how selection is used in computer programs • Relate that a conditional statement connects a condition to an outcome	**Topic:** Sensing **Vertical Concept:** Programming (Computer Science) **Key Question:** How can we use additional hardware to develop our coding? **Overview:** • Create a program to run on a controllable device • Explain that selection can control the flow of a program • Update a variable with a user input	• Formative assessments during every lesson include: • Review, verbal feedback, a range of questioning techniques and mini whiteboard tasks. • Year 5: Teacher assessment of the final scratch • Year 6: Teacher assessment of the final micro:bit step counter.

• Explain how selection directs the flow of a program • Design a program which uses selection	• Use a conditional statement to compare a variable to a value	

Useful Resources for Supporting Your Child at Home:	Homework ideas:
Year 1-3: Scratch JR Coding based on using a block system. This is the same coding website used in school. ScratchJr - Home **Year 4-6: Scratch** Coding based on using a block system that builds upon Scratch JR. This is the same coding website used in school. Scratch - Imagine, Program, Share (mit.edu) **STEM:** For a selection of age-appropriate Science Technology Engineering and Maths activities. https://www.stem.org.uk/	Use the built in tutorials on Scratch and Scratch JR to improve your coding skills. Year 5 and 6 students can use their Chromebooks to complete independent research and create documents and presentations. Create a set of e-safety rules for using devices at home.