



# The Computing

# Curriculum

Year 6

Year 6 – Autumn 1	Unit 1 – Internet Communication

#### National Curriculum objectives

- Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts
- Understand computer networks, including the internet; how they can provide multiple services, such as the World Wide Web, and the opportunities they offer for communication and collaboration
- 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

#### **Unit Overview**

In this unit, the class will learn about the World Wide Web as a communication tool. First, they will learn how we find information on the World Wide Web, through learning how search engines work (including how they select and rank results) and what influences searching, and through comparing different search engines. They will then investigate different methods of communication, before focusing on internet-based communication. Finally, they will evaluate which methods of internet communication to use for particular purposes.

# Previous knowledge acquired - Technology

•	to move the cursor Know how to delete letters Know rules to keep us safe and healthy when we are using technology in and beyond the home and give examples of some of these rules Know how we benefit from these rules	technology responsibly •Know how those rules/guides can help me •Identify the choices that I make when using information technology •Know and explain simple guidance for using information technology in different environments and settings	•	connections. Know why we need a network switch. Know that a computer network is made up of a number of devices. Know and can demonstrate how information can be passed between devices. Know and can explain the role of a switch, server, and wireless access point in a network. Know and can identify how devices in a network are connected with one another. Know and can identify networked devices around me. Know and can identify the benefits of computer networks.	•	Know that websites and their content are created by people Know who owns the content on websites Know that there are rules to protect content Know that not everything on the World Wide Web is true. Know why some information I find online may not be honest, accurate, or legal. Know why I need to think carefully before I share or reshare content	•	different media to be shared Know and suggest strategies to ensure successful group work Compare working online with working offline Know different ways of working together online Know that working together on the internet can be public or private Know how the internet enables effective collaboration
Ke	y knowledge acquired throughout	t this unit						
	<ul> <li>Know how to complete a web</li> <li>Know how to refine my search</li> <li>Know how to compare results</li> <li>Know why we need tools to fit</li> <li>Know the role of web crawler</li> <li>Know how to relate a search fit</li> <li>Know that search results are of</li> <li>Know that a search engine fol</li> <li>Know some of the criteria that</li> <li>Know some of the limitations</li> <li>Know the different ways in w</li> <li>Know to choose methods of complete the search of the search complete the search of the search engines matched the search engines of the search engines matched the search engines mat</li></ul>	a search to find specific information h s from different search engines ind things online s in creating an index term to the search engine's index ordered llows rules to rank relevant pages it a search engine checks to decide on search results can be influenced of search engines ke money hich people communicate of ways of communicating over the in communication to suit particular purpo	the orc ternet	der of results				

• Know how to compare different methods of communicating on the internet

Google

- Know when I should and should not share
- Know that communication on the internet may not be private

#### Teacher subject knowledge and guidance

#### A brief history of the World Wide Web

**1989:** Sir Tim Berners-Lee invented the World Wide Web to make it easier to share documents with other scientists

**1991:** The first website was launched (a summary of what the World Wide Web is: info.cern.ch/hypertext/WWW/TheProject.html)

1994: The first widely used search engine (Yahoo!) was launched

1998: Google was founded

Search engine's index

- They use web crawlers to create an index of the web
- They take a copy of the web pages that they visit to build up the search engine's index, which is stored on the search engine's servers
- The indexes are stored in huge data centres around the world, e.g. <u>www.google.com/about/</u> <u>datacenters/locations</u>





### Methods of electronic communication

Think, pair, share, how many ways of communicating digitally can you think of?

Today, you are going to focus on these eight methods:

- SMS
- Email
- Video call
- Internet instant messaging
- Blog post
- Video sharing site
- Social networking site
- BBC Newsround

A search engine is a website that allows you to find information on the world wide web. he indexed web contains at least 4.69 billion pages as of July 2018 and without searching, it would very hard to find what you want

A web crawler, also referred to as a search engine bot or a website spider, is a digital bot that crawls across the World Wide Web to find and index pages for search engines.

Search engines don't magically know what websites exist on the Internet. The programs have to crawl and index them before they can deliver the right pages for keywords and phrases, or the words people use to find a useful page.

Web crawlers, while they're on the page, gather information about the page like the copy and meta tags. Then, the crawlers store the pages in the index, so Google's algorithm can sort them for their contained words to later fetch and rank for users.

Subject specific vocabulary and definitions (Tier 3 vocabulary)					
World Wide Web	A service provided via the internet that allows access to web pages and other shared files				
Web crawlers	A web program that browses the World Wide Web				
Web page	A HTML document viewed using a web browser				

Website	A	A collection of interlinked web pages, stored under a single domain						
Web browser	A program used to view, navigate, and interact with web pages							
Communication	Share or exchange information by speaking, writing or using another medium							
Medium Term Planning								
Week 1	Week 2     Week 3     Week 4     Week 5     Week 6							
To identify how to use a search engine		To describe how search engines select results	To explain how search results are ranked	To recognise why the order of results is important, and to whom	To recognise how we communicate using technology	To evaluate different methods of online communication		

Year 6 – Autumn 2	Unit 2 – Web Page Creation

#### National Curriculum objectives

- Use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content
- 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
- Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact

#### **Unit Overview**

Learners will be introduced to creating websites for a chosen purpose. Learners identify what makes a good web page and use this information to design and evaluate their own website using Google Sites. Throughout the process, learners pay specific attention to copyright and fair use of media, the aesthetics of the site, and navigation paths.

It is recommended that learners use laptop or desktop computers for this unit of work. The unit has been based on the use of Google Sites, which is free to use with any Google account. If your school uses the free Google Workspace for Education, your Google administrator can create accounts for pupils and also ensure that the Google Sites feature is enabled. If you don't have a school Google Workspace account, your school may choose to set one up or you may opt to create individual Google accounts for your learners to use. Whichever option you choose, it should be in line with your school's policies.

#### Previous knowledge acquired – Digital Literacy

		-	•	-		-		-	
Y	ear 1	Y	ear 2	Ye	ear 3	Y	ear 4	Ye	ear 5
•	Know how to make marks on a	•	Know what devices can be used	•	Know how to draw a sequence of	•	Know digital devices that can	•	Know that video is a visual media
	screen and explain which tools		to take photographs		pictures		record sound and play it back		format
	were used	•	Know how to take a photograph	•	Know how to create flip book—	•	Know the inputs and outputs	•	Know features of videos
•	Know how to draw lines on a	•	Know and explain what I did to		style animation.		required to play audio or record	•	Know how to compare features in
	screen and explain which tools		capture a digital photo	•	Know how an animation and flip		sound		different videos
	were used.	•	Know the process of taking a		book works.	•	Know the range of sounds that	•	Know and find features on a
•	Know how to use paint tools to		good photograph	•	Know what an animation will		can be recorded		digital video recording device
	draw a picture.	•	Know how to take photos in		look like.	•	Know how to use a device to	•	Know how to experiment with
•	Know how to make marks with		both landscape and portrait	•	Know why little changes are		record audio and play back		different camera angles
	the square and line tools		format		needed for each frame.		sound	•	Know how to make use of a
•	Know how to use shape and line	•	Know and explain why a photo	•	Know how to create and	•	Know how to improve my		microphone
	tools effectively to recreate the		looks better in portrait or		effective stop frame animation.		recording	•	Know and suggest filming
	work of an artist		landscape format	•	Know how to break down a story	•	Know what other people include		techniques for a given purpose
•	Choose appropriate shapes	•	Know what is wrong with a		into settings, characters and		when recording sound for a	•	Know how to capture video using
•	Know how to make appropriate		photograph		events.		podcast		a range of filming techniques
	colour choices	•	Know how to take a good	•	Know how to describe an	•	Know how to plan and write the	•	Know how to review how
•	Know how to create a picture in		photograph		animation that is achievable on		content for a podcast		effective my video is
	the style of an artist	•	Know that I can improve a		screen.	•	Know why it is useful to be able	•	Know how to outline the scenes
•	Know how to choose appropriate		photograph by retaking it	•	Know how to create a		to save digital recordings		of my video
	paint tools and colours to create	•	Know the effect that light has on	n i	storyboard.	•	Know how to save a digital	•	Know how to decide which
	the work of an artist		a photo	•	Know how to use onion skinning		recording as a file		filming techniques I will use
•	Know which tools were helpful	•	Know to experiment with		to help me make small changes	•	Know how to open a digital	•	Know how to create and save
	and why	1	different light sources		between frames.		recording from a file		video content

<ul> <li>Know how to make dots of colour</li> <li>on the page</li> <li>Know how to change the colour</li> <li>and brush size</li> <li>Know how to use dots of colour</li> <li>to create a picture in the style of an artist on my own.</li> </ul>	Know and explain why a picture may be unclear Know that images can be changed Know how to use a tool to achieve a desired effect Know how to apply a range of photography skills to capture a photo Know which photos have been changed Know which photos are real and which have been changed	Know how to review a sequence of frames to check my work. Know how evaluate the quality of my animation.	Know ways in which audio recordings can be altered Know how to edit sections of an audio recording Know sounds that other people combine Know suitable sounds to include in a podcast Know how to use editing tools to arrange sections of audio Know that digital recordings need to be exported to share them Know the features of a digital recording I like Know and suggest improvements to a digital recording	<ul> <li>Know how to store, retrieve, and export my recording to a computer</li> <li>Know how to improve a video by reshooting and editing</li> <li>Know how to select the correct tools to make edits to my video</li> <li>Know how to make edits to my video</li> <li>Know how to make edits to my video and improve the final outcome</li> <li>Know that my choices when making a video will impact the quality of the final outcome</li> <li>Know how to evaluate my video and share my opinions</li> </ul>					
Key knowledge acquired throughout th	Key knowledge acquired throughout this unit								
Key knowledge acquired throughout this unit         •       Know how to explore a website         •       Know the different types of media used on websites         •       Know that websites are written in HTML         •       Know that websites are written in HTML         •       Know the common features of a web page         •       Know the common features of a web page         •       Know thow to draw a web page layout that suits my purpose         •       Know how to find copyright-free images         •       Know what is meant by the term 'fair use'         •       Know how to add content to my own web page         •       Know how to add content to my own web page         •       Know how to preview what my web page looks like         •       Know to evaluate what my web page looks like on different devices and suggest/make edits.         •       Know why anavigation paths are useful         •       Know whow to make multiple web pages and link them using hyperlinks         •       Know how to create hyperlinks to ink to other people's work         •       Know to evaluate the user experience of a website									

What is a website?		What is a web page?	What is a browser?		
A website is a collection of information accessed on a range of devices.	relating to a particular topic that can b	be Websites can be made up of lots of different web pages.	A browser allows you to navigate or find you web.	ur way around the World Wide	
		The pages are related and together they make a website.	A browser shows you what a website looks	like.	
Annotate the website	The menus at the top of the page allow you to choose thich section of the site to look at. If you hover over emmore options appear. Media: There are pictures on the site. Columbia and the site of the site of the site. Columbia and the site of the site of the site of the site. Columbia and the site of the site of the site of the site. Site of the site of the site of the site of the site of the site. These make the site of	Do you know how websites are created? • Websites are made up of code called Hypertext Markut HTML for short.	P Language or So to a website Go to a website Right-click on a section of the website Click Inspect Now you can see the HTML code. This definition	e.g. an image	
Hyperlinks	Data that the user ca	on follow by clicking or tanning			
пурепшкз		an ronow by checking of tapping.			
Navigation path	It shows the path tak	ken through a website to where a partion	cular document is located.		
Web page	A HTML document vi	iewed using a web browser			
Fair use	Being able to use ma	terial without having to get permissior	n first		
Copyright free	A picture that can be	e used by anyone			
HTML	A standardised langu	lage used to define the structure of we	b pages		
Medium Term Planning	·				
Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
To review an existing website and consider its structure	To plan the featu web page	ures of a To consider the owners and use of images (copy	hip To recognise the need to right) preview pages	To outline the need for navigation path	a To recognise the implications of linking to content owned by other people

Year 6 – Spring 1 Unit 3 – Introduction to spreadsheets National Curriculum objectives 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 ٠ accomplish given goals, including collecting, analysing, evaluating and presenting data and information Cross Curricular Links Number – addition, subtraction, multiplication, and division: Solve problems involving addition, subtraction, multiplication, and division Statistics: Interpret and construct pie charts and line graphs, and use these to solve problems Calculate and interpret the mean as an average ۲ Unit Overview This unit introduces the learners to spreadsheets. They will be supported in organising data into columns and rows to create their own data set. Learners will be taught the importance of formatting data to support calculations, while also being introduced to formulas and will begin to understand how they can be used to produce calculated data. Learners will be taught how to apply formulas that include a range of cells, and apply formulas to multiple cells by duplicating them. Learners will use spreadsheets to plan an event and answer questions. Finally, learners will create charts, and evaluate their results in comparison to questions asked. Previous knowledge acquired – Data Handling Year 1 Year 2 Year 3 Year 4 Year 5 Know how to choose a data set Know how to create multiple Know how to describe objects Know how to record data in a Know how to investigate using labels tallv chart questions with ves/no answers. to answer a given question questions about the same field Know how to match objects to Know how to represent a tally Know how to make up a yes/no Know how to suggest questions Know how information can be groups count as a total question about a collection of that can be answered using a recorded Know how to identify the label Know how to compare totals in objects. given data set Know how to order, sort, and for a group of objects a tally chart Know how to create two groups Know that data gathered over group my data cards of objects separated by one time can be used to answer Know how to count objects Know how to enter data onto a Know how to navigate a flat-file attribute. Know how to group objects computer questions database to compare different Know select an attribute to Know data that can be gathered views of information Know how to use a computer to Know how to count a group of view data in a different format Know what a 'field' and a 'record' separate objects into groups. over time objects Know that sensors are input Know how to describe an object Know how to use pictograms to Know how to create a group of is in a database answer simple questions about objects within an existing group. devices Know which field to sort data by Know how to describe a property objects Know how to arrange objects Know how to use data from a to answer a given question of an object Know how to find objects with Know how to organise data in a into a tree structure. sensor to answer a given Know how information can be Know how to select objects to question grouped tally chart similar properties arrange in a branching database. Know that data from sensors can Know how to use a tally chart to Know how to group information Know how to group similar create a pictogram Know how to group objects using be recorded to answer questions objects my own yes/no questions. Know a suitable place to collect Know how to group objects in Know what the pictogram shows Know how to combine grouping Know how my branching data Know how to tally objects using and sorting to answer more more than one way Know the intervals used to Know how to count how many a common attribute database works. specific questions

Know how to create ves/no

questions using given attributes.

Know how to create a pictogram

to arrange objects by an

collect data

Know about the data that I have

Know which field and value are

required to answer a given

objects share a property
Know how to choose how to

	<u></u>		<u>г</u>		1			
group objects	attribute	Know how to	explain that	captured	question			
• Know how to describe groups of	<ul> <li>Know how to answer 'more</li> </ul>	questions nee	d to be ordered •	Know how to import a data set	• Know how 'AND' and 'OR' can be			
objects	than'/'less than' and	carefully to sp	lit objects into	Know how to use a computer to	used to refine data selection			
<ul> <li>Know how to record how many</li> </ul>	'most/least' questions about a	n similarly sized	groups.	view data in different ways	Know to choose multiple criteria			
objects are in a group	attribute	Know how to	compare two	Know how to use a computer	to answer a given question			
<ul> <li>Know how to decide how to</li> </ul>	<ul> <li>Know how to choose a suitable</li> </ul>	e branching dat	abase structures.	program to sort data	• Know to an appropriate chart to			
group objects to answer a	attribute to compare people	Know how to	select a theme and	Know to propose a question that	visually compare data			
question	<ul> <li>Know how to collect the data I</li> </ul>	choose a varie	ety of objects.	can be answered using logged	<ul> <li>Know to refine a chart by</li> </ul>			
• Know how to compare groups of	need	Know how to	create questions	data	selecting a particular filter			
objects	<ul> <li>Know how to create a pictogra</li> </ul>	im and apply the	m to a tree	Know how to collect data using a	<ul> <li>Know the benefits of using a</li> </ul>			
Know how to record and share	and draw conclusions from it	structure.		data logger	computer to create graphs			
what I have found	<ul> <li>Know how to use a computer</li> </ul>	Know how to	use my branching	Know how to interpret data that	Know to ask questions that will			
•	program to present informatio	on database to a	nswer questions.	has been collected using a data	need more than one field to			
	in different ways	Know how to	explain what a	logger	answer			
	<ul> <li>Know to share what I have</li> </ul>	pictogram tell	s me.	Know how to draw conclusions	• Know how to refine a search in a			
	found out using a computer	Know how to	explain what a	from the data that I have	real-world context			
	<ul> <li>Know to give simple examples</li> <li>why information should not be</li> </ul>	of branching dat	abase tells me.	collected	•			
	why information should not be	<ul> <li>Know now to</li> </ul>	compare two ways	Know the benefits of using a				
		of presenting	Information.	data logger				
<ul> <li>Know and explain the relevant</li> <li>Know how to answer question</li> <li>Know to ask simple relevant of</li> <li>Know to ask simple relevant of</li> <li>Know how to apply an appropriate</li> <li>Know how to build a data set</li> <li>Know how to build a data set</li> <li>Know how to build a data set</li> <li>Know how to construct a form</li> <li>Know that changing inputs of</li> <li>Know that data can be calculate</li> <li>Know how to create a formulate</li> <li>Know how to use a spreadshow</li> <li>Know and explain why data set</li> <li>Know and apply a formulate</li> </ul>	ce of data headings ns from an existing data set questions which can be answered us priate number format to a cell in a spreadsheet application ice of a cell's data type nula in a spreadsheet langes outputs ated using different operations a which includes a range of cells to multiple cells by duplicating it eet to answer questions hould be organised calculate the data I need to answer	sing data						
Know how to produce a grap	Know how to produce a graph							
Know how to use a graph to show the answer to questions								
Know when to use a table or graph								
Teacher subject knowledge and guid	lance							
It would be beneficial for teachers to I	nave an understanding of a spreadsh	heet application e.g.	Google Sheets' or alt	ernative software such as 'Microsof	t Excel' or 'Purple Mash – 2Calculate'.			

An understanding that data can be words, numbers, dates, images, sounds, etc. without context is important. Just as words need to be in a sentence to give them meaning, data items need to be part of a structure. For example, the number 6 isn't data unless it's part of a larger structure, such as included in a spreadsheet with data headings. Understanding that a data set is a collection of related data that can be modified using a computer is helpful, as learners will be creating their own data sets throughout the unit.

Knowledge of why data headings are important and an understanding of how data is organised in columns and rows would be beneficial. Organising data is an important aspect of data and information. It supports the use of calculations and provides the opportunity to use sorting and filtering, which enables ease of use and reduces human error.

This unit focuses on the learners applying number formats to alter cells. It is important to understand that this type of formatting changes how a spreadsheet interacts with the data and is different to applying style formatting (bold, italics, etc.), which only changes the appearance of data.

In Lesson 5 of this unit, learners have been provided with the mathematical calculations they need to complete the activities in the unit, the calculations can be found in the 'Data calculations' handout. It is important that learners are given the opportunity to demonstrate their ability to use the computational skills required, regardless of their mathematical ability.



Subject specific vocabulary and definitions (Tier 3 vocabulary)									
Spreadsheet	An app that allows users to organ	An app that allows users to organise, analyse and store data in a table							
Formula	A group of letters, numbers or otl	A group of letters, numbers or other symbols which represents a mathematical rule							
Cell	A small rectangular box within a s	preadsheet							
Duplicate	Making an exact copy of somethin	Making an exact copy of something							
Data set	A collection of related data that can be modified using a computer								
Format	Arrange the way the text or graph	nics appear							
Medium Term Planning	Medium Term Planning								
Week 1	Week 2     Week 3     Week 4     Week 5     Week 6								
To identify questions which can be answered using dataTo explain that objects can be described using dataTo explain that formulas can be used to produce calculated dataTo apply formulas to data, including duplicatingTo create a spreadsheet to plan an eventTo choose suitable present data					To choose suitable ways to present data				

Year 6 – Spring 2	Unit 4 – 3D modelling
National Curriculum objectives	

- 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
- Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact

# **Cross Curricular Links**

#### Art and design – KS2

• To improve their mastery of art and design techniques, including drawing, painting and sculpture with a range of materials

# Design and technology – KS2

• Generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computeraided design

# Mathematics – KS2 (Y6)

Recognise, describe and build simple 3D shapes, including making nets

### **Unit Overview**

During this unit, learners will develop their knowledge and understanding of using a computer to produce 3D models. Learners will initially familiarise themselves with working in a 3D space, including combining 3D objects to make a house and examining the differences between working digitally with 2D and 3D graphics. Learners will progress to making accurate 3D models of physical objects, such as a pencil holder, which include using 3D objects as placeholders. Finally, learners will examine the need to group 3D objects, then go on to plan, develop, and evaluate their own 3D model of a photo frame.

For this sequence of lessons, learners will be using a website called Tinkercad (https://www.tinkercad.com). Learners will need accounts to save their work and access the resources. We recommend signing up for a teacher account at https://www.tinkercad.com/join, which enables learner accounts to be created and the website accessed with a Class Code: https://tinkercad.zendesk.com/hc/en-us/articles/360026236693-Tinkercad-Classrooms. Please ensure your school's online safety policy (or similar) is closely adhered to and avoid using learners' full names when creating accounts.

# Previous knowledge acquired – Digital Literacy

Year 1	Year 2	Year 3	Year 4	Year 5
<ul> <li>Know how to open a word processor</li> </ul>	<ul> <li>Know and identify simple differences in pieces of music</li> </ul>	<ul> <li>Know the difference between text and images.</li> </ul>	<ul> <li>Know the changes that we can make to an image</li> </ul>	<ul> <li>Know that vector drawings are made using shapes</li> </ul>
Know keys on a keyboard	Know to listen with	• Know that text and images can	Know how images can be	Know how to experiment with
• Know how to enter text into a	concentration to a range of	communicate messages clearly.	changed in real life	the shape and line tools
computer	music (links to the Music	<ul> <li>Know I can identify the</li> </ul>	• Know the effect that editing can	<ul> <li>Know how vector drawings are</li> </ul>
• Know how to use letter, number,	curriculum)	advantages and disadvantages of	have on an image	different from paper-based
and space keys	<ul> <li>Know how music makes me feel,</li> </ul>	using text and images.	<ul> <li>Know what has changed in an</li> </ul>	drawings
<ul> <li>Know how to use backspace to</li> </ul>	e.g. happy or sad	• Know how to change font style,	edited image	<ul> <li>Know the shapes used to make a</li> </ul>
remove text	<ul> <li>Know how to create a rhythm</li> </ul>	size, and colours for a given	<ul> <li>Know how to change the</li> </ul>	vector drawing
Know how to type capital letters	pattern	purpose.	composition of an image by	<ul> <li>Know that each element added to</li> </ul>
<ul> <li>Know where the toolbar is and</li> </ul>	<ul> <li>Know how to play an instrument</li> </ul>	<ul> <li>Know how to edit text.</li> </ul>	selecting parts of it	a vector drawing is an object
use bold, italic, and underline	following a rhythm pattern	<ul> <li>Know how to explain that text</li> </ul>	• Know why someone might want	<ul> <li>Know how to move, resize, and</li> </ul>
<ul> <li>Know how to select a word by</li> </ul>	• Know how to explain that music	can be changed to communicate	to change the composition of an	rotate objects I have duplicated
double-clicking	is created and played by	more clearly.	image	<ul> <li>Know how to use the zoom tool</li> </ul>

•	Know how to select all of the text	humans	•	Know and can explain what	•	Know and talk about changes		to help me add detail to my
	by clicking and dragging	• Know how to connect images		'page orientation' means.		made to images		drawings
•	Know how to change the font	with sounds	•	Know how to recognise	•	Know how to use effects to make	•	Know how alignment grids and
•	Know and say what tool I used to	• Know how to use a computer t	c	placeholders and say why they		my image fit a scenario		resize handles can be used to
	change the text	experiment with pitch and		are important.	•	Know why my choices fit a		improve consistency
•	Know if my changes have	duration	•	Know how to create a template		scenario	•	Know how to modify objects to
	improved my writing	• Know to relate an idea to a		for a particular purpose.	•	Know how an image has been		create a new image
•	Know how to use 'undo' to	piece of music	•	Know how to add content to a		retouched	•	Know that each added object
	remove changes	• Know that music is a sequence		desktop publishing publication.	•	Know examples of positive and		creates a new layer in the
•	Know how to write a message on	of notes	•	Know how to choose the best		negative effects that retouching		drawing
	a computer and on paper	• Know how to use a computer t	5	locations for my content.		can have on an image	•	Know how to change the order of
•	Compare using a computer with	create a musical pattern using	•	Know how to paste text and	•	Know appropriate tools to		layers in a vector drawing
	using a pencil and paper	three notes		images to create a magazine		retouch an image	•	Know how to use layering to
•	Know which method I like best	• Know how to describe an anim	al	cover.	•	Know how to sort images into		create an image
		using sounds	•	Know how to make changes to		'fake' or 'real' and explain my	•	Know how to copy part of a
		• Know to explain my choices		content after I've added it.		choices		drawing by duplicating several
		• Know how to save my work	•	Know how different layouts can	•	Know how to combine parts of		objects
		Know to refine my musical		suit different purposes		images to create new images	•	Know how to recognise when I
		pattern on a computer	•	Know how to identify different	•	Know the effect of adding other		need to group and ungroup
		• Know how to reopen my work		layouts.		elements to my work		objects
		• Know to explain how I made m	y 🔸	Know how to match a layout to a	•	Know to compare the original	•	Know how to reuse a group of
		work better	-	purpose.		image with my completed		objects to further develop my
		• Know to listen to music and	•	Know how to choose a suitable		publication		vector drawing
		describe how it makes me feel		layout for a given purpose.	•	Know to evaluate the impact of	•	Know how to create a vector
		•	•	Know the benefits of desktop		my publication on others		drawing for a specific purpose
				publishing		through feedback	•	Know to reflect on the skills I
			•	Know how to identify the uses of	f			have used and why I have used
				desktop publishing in the real				them
				world.			•	Know how to compare vector
			•	Know how to say why desktop				drawings to freehand paint
				publishing might be helpful.				drawings
			•	Know how to compare work				
				made on desktop publishing to				
				work created by hand.				

# Key knowledge acquired throughout this unit

• Know the similarities and differences between 2D and 3D shapes

• Know why we might represent 3D objects on a computer

• Know how to select, move, and delete a digital 3D shape

• Know how graphical objects can be modified

• Know how to resize a 3D object

- Know how to change the colour of a 3D object
- Know how to rotate a 3D object
- Know how to position 3D objects in relation to each other
- Know how to select and duplicate multiple 3D objects
- Know how to identify the 3D shapes needed to create a model of a real-world object
- Know how to create digital 3D objects of an appropriate size
- Know how to group a digital 3D shape and a placeholder to create a hole in an object
- Know to plan my 3D model
- Know which 3D objects I need to construct my model
- Know how to modify multiple 3D objects
- Know how my model can be improved
- Know to modify my model to improve it
- Know to evaluate my model against a given criterion

#### Teacher subject knowledge and guidance

Lesson 1: You will need to be familiar with creating, selecting, and moving 3D objects in Tinkercad, including how to view them from different angles. Tinkercad's Start Learning 3D tutorials provide a good starting point (https://www.tinkercad.com/learn/designs).

Lesson 2: You will need to be familiar with resizing, lifting, and altering the colour of 3D objects in Tinkercad. Tinkercad's Start Learning 3D tutorials provide a good starting point (https://www.tinkercad.com/learn/designs).

Lesson 3: You will need to be familiar with rotating and positioning 3D objects in Tinkercad. Tinkercad's Rotate it tutorial provides a good starting point

(https://www.tinkercad.com/learn/designs) along with the Promo Ambition's Tinkercad Tutorial 2 (https://promoambitions.com/tinkercad). In order to deliver the extension task in Activity 3, the Changing workplanes teacher guidance provides further information, along with Promo Ambition's Tinkercad Tutorial 4 (https://promoambitions.com/tinkercad).

Lesson 4: You will need to be familiar with resizing 3D objects to specific dimensions in Tinkercad. Tinkercad's Size it up! tutorial provides a good starting point

(https://www.tinkercad.com/learn/designs). In order to use other objects as placeholders to create holes within 3D objects, 3D shapes need to be grouped. The Group it! tutorial provides further information (https://www.tinkercad.com/learn/designs).

Lesson 5: You may wish to revisit resizing and grouping 3D objects from Lesson 4. Lesson 6: You may wish to revisit the skills developed during the previous lessons.



Lifting and lowering	Rotating	Duplicat	ng objects						
The cone shaped handle is used to lift or lower shapes relative to the workplane.	The three cur dimensions.	If you want than once, y Once you he you can still	to use an object more ou can duplicate it. Ave duplicated an object, modify it.						
Measurements in Tink	ercad	Antimate Contro for Education Making holes in sh	napes						
<ul> <li>Measurements are displayed in millimetres (mm).</li> <li>On the workplane:</li> <li>One small square measures 10mm x 10mm or 1cm<sup>2</sup></li> <li>One large square measures 10mm x 10mm or 1cm<sup>2</sup></li> <li>One large square measures 10mm x 10mm or 1cm<sup>2</sup></li> <li>One large square measures 10mm x 10mm or 1cm<sup>2</sup></li> </ul>									
Botate									
Dunlicate	Make an exact conv								
Resize	Make bigger or smaller								
Grouping	Moving or resizing all the objects as o	one							
Medium Term Planning									
Week 1	Week 2 W	Veek 3	Week 4	Week 5	Week 6				
To use a computer to create and manipulate three-dimensional (3D) digital objects	To compare working To digitally with 2D and 3D m graphics	o construct a digital 3D nodel of a physical object	To identify that physica objects can be broken down into a collection of 3D shapes	To design a digital model by combining 3D objects of	To develop and improve a digital 3D model				

Year 6 – Summer 1	Unit 5 – Variables in games
National Curriculum objectives	

- Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts
- Use sequence, selection, and repetition in programs; work with variables and various forms of input and output
- Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs
- 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
- Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact

# Unit Overview

This unit explores the concept of variables in programming through games in Scratch. First, pupils will learn what variables are, and relate them to real-world examples of values that can be set and changed. Pupils will then use variables to create a simulation of a scoreboard. In Lessons 2, 3, and 5, which follow the Use-Modify-Create model, pupils will experiment with variables in an existing project, then modify them, then they will create their own project. In Lesson 4, pupils will focus on design. Finally, in Lesson 6, pupils will apply their knowledge of variables and design to improve their game in Scratch.

There are two Year 6 programming units:

- Programming A Variables in games
- Programming B Sensing
- This is unit A, which should be delivered before unit B.

# Previous knowledge acquired – Programming A

		/ · · · · ·						
Y	ear 1	Year 2	Year 3	3	Year	4	Y	ear 5
•	I can predict the outcome of a	I can predict the outcome	•	Know all the objects in a	•	Know how to program a	•	Know how to build a simple
	command on a device	of a command on a device		Scratch project (sprites,		computer by typing		circuit to connect a
•	Know how to match a command	Know how to match a		backdrops)		commands		microcontroller to a computer
	to an outcome	command to an outcome	•	Know that objects in Scratch	•	Know the effect of changing	•	Know how to program a
•	Know how to run a command on	Know how to run a		have attributes (linked to)		a value of a command		microcontroller to light an LED
•	a device Know how to follow an	command on a device	•	Know that commands in	•	Know how to create a code	•	Know and explain why I used an
	instruction	Know how to follow an		Scratch are represented as		snippet for a given purpose		infinite loop
•	Know how to recall words that	instruction		blocks	•	Know how to use a template	•	Know how to connect more than
	can be acted out	Know how to recall words	•	Know that each sprite is		to draw what I want my		one output device to a
•	Know how to give directions	that can be acted out		controlled by the commands		program to do		microcontroller
•	Know how to compare forwards	Know how to give direction:	s	I choose	•	Know how to write an	•	Know how to design sequences
_	and backwards movements	Know how to compare	•	Know a word which		algorithm to produce a given	ı	for given output devices
•	the same place	forwards and backwards		describes an on-screen		outcome	•	Know which output devices I
	L can predict the outcome of a	movements		action for my design	•	Know how to test my		control with a count-controlled
	sequence involving forwards and	Know to start a sequence	•	Know how to create a		algorithm in a text-based		loop
	backwards commands	from the same place		program following a design		language	•	Know that a condition is
•	Know to compare left and right	L can predict the outcome	•	Know how to start a	•	Know examples of repetition	1	something that can be either true
	turns	of a sequence involving		program in different ways		in everyday tasks		or false (eg whether a value is

<ul> <li>Know how to experiment with turn and move commands to move a robot</li> <li>I can predict the outcome of a sequence involving up to four commands</li> <li>Know how to what my program should do</li> <li>Know how to choose the order of commands in a sequence</li> <li>Know how to debug my program</li> <li>Know how to identify several possible solutions</li> <li>Know how to plan two programss</li> <li>Know how to use two different programs to get to the same place</li> </ul>	<ul> <li>forwards and backwards commands</li> <li>Know to compare left and right turns</li> <li>Know how to experiment with turn and move commands to move a robot</li> <li>I can predict the outcome of a sequence involving up to four commands</li> <li>Know how to what my program should do</li> <li>Know how to choose the order of commands in a sequence</li> <li>Know how to debug my program</li> <li>Know to identify several possible solutions</li> <li>Know how to plan two programs</li> <li>Know how to use two different programs to get to the same place</li> </ul>	<ul> <li>Know how to create a sequence of connected commands</li> <li>Know how to explain that the objects in my project will respond exactly to the code</li> <li>Know how to explain what a sequence is</li> <li>Know how to combine sound commands</li> <li>Know how to order notes into a sequence</li> <li>Know how to order notes into a sequence</li> <li>Know how to build a sequence of commands</li> <li>Know how to decide the actions for each sprite in a program</li> <li>Know how to make design choices for my artwork</li> <li>Know the names of the objects I will need for a project</li> <li>Know how to implement my algorithm as code</li> </ul>	<ul> <li>Know how to identify patterns in a sequence</li> <li>Know how to use a count-controlled loop to produce a given outcome</li> <li>Know the effect of changing the number of times a task is repeated</li> <li>Know to predict the outcome of a program containing a count-controlled loop</li> <li>Know how to choose which values to change in a loop</li> <li>Know where there are 'chunks' of actions in the real world</li> <li>Know how to use a procedure in a program</li> <li>Know that a computer can repeatedly call a procedure</li> <li>Know how to design a program that includes count-controlled loops</li> <li>Know how to design a program that includes count-controlled loops</li> <li>Know how to design a program that includes count-controlled loops</li> <li>Know how to design a program that includes count-controlled loops</li> <li>Know how to make use of my design to write a program</li> </ul>	<ul> <li>more than 10, or whether a button has been pressed)</li> <li>Know to experiment with a 'do until' loop</li> <li>Know how to program a microcontroller to respond to an input</li> <li>Know that a condition being met can start an action</li> <li>Know how to identify a condition and an action in my project</li> <li>Know how to use selection (an 'if then' statement) to direct the flow of a program</li> <li>Know how to identify a condition to start an action (real world)</li> <li>Know how to create a detailed drawing of my project</li> <li>Know how to write an algorithm to control lights and a motor</li> <li>Know to use selection to produce an intended outcome</li> <li>Know how to test and debug my project</li> </ul>				
Key knowledge acquired throughout	this unit		program by debugging it					
<ul> <li>Know examples of information that is variable</li> <li>Know that the way that a variable changes can be defined</li> <li>Know that variables can hold numbers or letters</li> <li>Know to identify a program variable as a placeholder in memory for a single value</li> <li>Know that a variable has a name and a value</li> <li>Know that the value of a variable can be changed</li> <li>Know where in a program to change a variable</li> </ul>								

- Know to make use of an event in a program to set a variable
- Know that the value of a variable can be used by a program
- Know how to choose the artwork for my project
- Know to explain my design choices
- Know how to create algorithms for my project
- Know how to create the artwork for my project
- Know to choose a name that identifies the role of a variable
- Know how to test the code that I have written
- Know ways that my game could be improved
- Know how to extend my game further using more variables
- Know how to share my game with others

# Teacher subject knowledge and guidance

This unit focuses on developing pupils' understanding of variables in a new programming language. It highlights where variables can be used and how they can be set and changed through the running of a program. This unit also develops pupils' understanding of design in programming, using the approach outlined below.

When programming, there are four levels that can help describe a project (known as 'levels of abstraction'). Research suggests that this structure can support pupils in understanding how to create a program and how it works:

- Task what is needed
- Design what it should do
- Code how it is done
- Running the code what it does

Spending time at the 'task' and 'design' levels before engaging in writing code can aid pupils in assessing the 'do-ability' of their programs. It also reduces the cognitive load for pupils during programming.

Pupils will move between the different levels throughout the unit, and this is highlighted within each lesson plan.

During this unit, pupils are required to save their work in Scratch. We recommend the use of teacher and pupil accounts to manage this process. You can find detailed guidance on setting up and managing accounts in Scratch on the Scratch website (scratch.mit.edu/educators/faq).



Variable	Something that is changeable									
Value	A number or amount									
Code	The commands that a computer can run									
Program	A set of ordered commands that can be run by a computer to complete a task									
Algorithm	A precise set of ordered steps that can be followed by a human or a computer to achieve a task									
Medium Term Planning										
Week 1	Week 2	Week 3	Week 4	Week 5	Week 6					
To define a 'variable' as something that is changeable	To explain why a variable is used in a program	To choose how to improve a game by using variables	To design a project that builds on a given example	To use my design to create a project	To evaluate my project					

 Year 6 – Summer 2
 Unit 6 – Sensing

### National Curriculum objectives

- Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts
- Use sequence, selection, and repetition in programs; work with variables and various forms of input and output
- Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs
- 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

### Unit Overview

This unit is the final KS2 programming unit and brings together elements of all the four programming constructs: sequence from Year 3, repetition from Year 4, selection from Year 5, and variables (introduced in Year 6 – 'Programming A'. It offers learners the opportunity to use all of these constructs in a different, but still familiar environment, while also utilising a physical device — the micro:bit. The unit begins with a simple program for learners to build in and test in the programming environment, before transferring it to their micro:bit. Learners then take on three new projects in Lessons 2, 3, and 4, with each lesson adding more depth.

Design features prominently in this unit. A design template is introduced in Lesson 3, initially scaffolded to give learners the opportunity to create code from a given design. In Lesson 4 that scaffolding is gradually reduced, then in Lesson 5, learners create their own design, using the same template. In the final lesson, learners will apply their knowledge of the programming constructs and use their design to create their own micro: bit-based step counter.

There are two Year 6 programming units:

- Programming A Variables in games
- Programming B Sensing

This is unit B, which should be delivered after unit A.

# Previous knowledge acquired

Y	ear 1	Year 2	Year 3	Year 4	Year 5
•	I can predict the outcome of a	Know where the start of a	Know the relationship between	<ul> <li>Know an everyday task as a set</li> </ul>	• Know how conditions are used in
	command on a device	sequence is	an event and an action	of instructions including	selection
•	Know how to match a command	<ul> <li>Know that a program needs to</li> </ul>	• Know which keys to use for	repetition	• Know how to identify conditions
	to an outcome	be started	actions and explain my choices	Know to predict the outcome of	in a program
•	Know how to run a command on	<ul> <li>Know how to run my program</li> </ul>	<ul> <li>Know a way to improve a</li> </ul>	a snippet of code	Know how to modify a condition
	a device	Know to predict the outcome of	e of program	<ul> <li>Know how to modify a snippet of</li> </ul>	
•	Know how to follow an	a sequence of commands	<ul> <li>Know a suitable size for a</li> </ul>	code to create a given outcome	in a program
	instruction	<ul> <li>Know how to match two</li> </ul>	character in a maze	<ul> <li>Know how to modify loops to</li> </ul>	<ul> <li>Know how to use selection in an</li> </ul>
•	Know how to recall words that	sequences with the same	<ul> <li>Know how to program</li> </ul>	produce a given outcome	infinite loop to check a condition
	can be acted out	outcome	movement	<ul> <li>Know when to use a count-</li> </ul>	Know to identify the condition
•	Know how to give directions	<ul> <li>Know how to change the</li> </ul>	<ul> <li>Know how to use a programming</li> </ul>	controlled and an infinite loop	and outcomes in an 'if then
•	Know how to compare forwards	outcome of a sequence of	extension	<ul> <li>Know that some programming</li> </ul>	else' statement
	and backwards movements	commands	<ul> <li>Know to consider the real world</li> </ul>	languages enable more than one	<ul> <li>Know how to croate a program</li> </ul>
•	Know to start a sequence from	<ul> <li>Know how to work out the</li> </ul>	when making design choices	process to be run at once	Know now to create a program
	the same place	actions of a sprite in an	<ul> <li>Know which blocks to use to set</li> </ul>	<ul> <li>Know which action will be</li> </ul>	with different outcomes using
•	I can predict the outcome of a	algorithm	up my program	repeated for each object	selection
	sequence involving forwards and	<ul> <li>Know which blocks to use to</li> </ul>	<ul> <li>Know additional features (from a</li> </ul>	<ul> <li>Know what the outcome of the</li> </ul>	<ul> <li>Know that program flow can</li> </ul>
	backwards commands	meet the design	given set of blocks)	repeated action should be	branch according to a condition

• • •	Know to compare left and right turns Know how to experiment with turn and move commands to move a robot I can predict the outcome of a sequence involving up to four commands Know how to what my program should do	<ul> <li>Know how to build the sequences of blocks I need</li> <li>Know how to choose backgrounds for the design</li> <li>Know how to choose characters for the design</li> <li>Know how to create a program based on the new design</li> <li>Know how to choose the images for my own design</li> <li>Know how to create an based on the create an base</li></ul>	•	Know suitable keys to turn on additional features Know how to build more sequences of commands to make my design work Know how to test a program against a given design Know how to match a piece of code to an outcome Know how to modify a program using a design	•	Know to evaluate the effectiveness of the repeated sequences used in my program Know which parts of a loop can be changed Know the effect of my changes Know to re-use existing code snippets on new sprites Know to evaluate the use of repetition in a project	•	Know how to design the flow of a program which contains 'if then else' Know that a condition can direct program flow in one of two ways Know how to outline a given task Know how to use a design format to outline my project Know how to identify the outcome of user input in an
• • • •	Know how to experiment with turn and move commands to move a robot I can predict the outcome of a sequence involving up to four commands Know how to what my program should do Know how to choose the order of commands in a sequence Know how to debug my program Know to identify several possible solutions Know how to plan two programs Know how to use two different programs to get to the same place	<ul> <li>Know how to choose backgrounds for the design</li> <li>Know how to choose characters for the design</li> <li>Know how to create a program based on the new design</li> <li>Know how to choose the images for my own design</li> <li>Know how to create an algorithm</li> <li>Know how to build sequences of blocks to match my design</li> <li>Know how to compare my project to my design</li> <li>Know how to improve my project by adding features</li> <li>Know how to debug</li> </ul>		Know how to build more sequences of commands to make my design work Know how to test a program against a given design Know how to match a piece of code to an outcome Know how to modify a program using a design Know to make design choices and justify them Know how to implement my design Know to evaluate my project	•	sequences used in my program Know which parts of a loop can be changed Know the effect of my changes Know to re-use existing code snippets on new sprites Know to evaluate the use of repetition in a project	• • • • • • •	then else' Know that a condition can direct program flow in one of two ways Know how to outline a given task Know how to use a design format to outline my project Know how to identify the outcome of user input in an algorithm Know how to implement my algorithm to create the first section of my program Know how to test my program Know how to share my program with others Know to identify ways the program could be improved Know how to identify the setup code I need in my program
								further

#### Key knowledge acquired throughout this unit

- Know how to apply my knowledge of programming to a new environment
- Know how to test my program on an emulator
- Know how to transfer my program to a controllable device
- Know how to identify examples of conditions in the real world
- Know to use a variable in an if, then, else statement to select the flow of a program
- Know how to determine the flow of a program using selection
- Know to use a condition to change a variable
- Know how to experiment with different physical inputs
- Know that if you read a variable, the value remains
- Know the importance of the order of conditions in else, if statements
- Know how to use an operand (e.g. <>=) in an if, then statement
- Know how to modify a program to achieve a different outcome
- Know what variables to include in a project
- Know how to design the algorithm for my project

- Know how to design the program flow for my project
- Know how to create a program based on my design
- Know how to test my program against my design
- Know to use a range of approaches to find and fix bugs

#### Teacher subject knowledge and guidance

This unit focuses on developing pupils' understanding of variables in a different programming environment and using a physical device. It also enables pupils to combine their knowledge and understanding of programming constructs introduced in previous years. This unit continues to advance pupils' understanding of design in programming, using the approach outlined below. When programming, there are four levels that can help describe a project (known as 'levels of abstraction'). Research suggests that this structure can support pupils in understanding how to create a program and how it works:

- Task what is needed
- Design what it should do
- Code how it is done
- Running the code what it does

Spending time at the 'task' and 'design' levels before engaging in writing code can aid pupils in assessing the 'do-ability' of their programs. It also reduces the cognitive load for pupils during programming.

Pupils will move between the different levels throughout the unit, and this is highlighted within each lesson plan:

- Lesson 3 pupils work at the 'code' and 'running the code' levels from a given design
- Lesson 4 pupils move from 'design' to 'code', to 'running the code' with some scaffolding
- Lesson 5 pupils work at the 'design' level with increasing independence
- Lesson 6 pupils work at the 'code' and 'running the code' levels, using their own design





Output device	A piece of hardware that is controlled by outputs from a computer									
Medium Term Planning										
Week 1	Week 2 Week 3		Week 4	Week 5	Week 6					
To create a program to run on a controllable device	To explain that selection can control the flow of a program	To update a variable with a user input	To use an conditional statement to compare a variable to a value	To design a project that uses inputs and outputs on a controllable device	To develop a program to use inputs and outputs on a controllable device					