Year 6 – Communication

Unit introduction

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.

Overview of lessons

Lesson	Brief overview	Learning objectives
1 Searching the web	In this lesson, learners will be introduced to a range of search engines. They will be given the opportunity to explain how we search, then they will write and test instructions. Next, they will learn that searches do not always return the results that we are looking for, and will refine their searches accordingly. Finally, they will be introduced to the two most common methods of searching: using a search engine and the address bar.	To identify how to use a search engine • I can complete a web search to find specific information • I can refine my search • I can compare results from different search engines
2 Selecting search results	In this lesson, learners will gain an understanding of why search engines are necessary to help us find things on the World Wide Web. They will conduct their own searches and break down, in detail, the steps needed to find things on the web. They will then emulate web crawlers to create an index of their own classroom. Finally, they will consider why some searches return more results than others.	To describe how search engines select results • I can explain why we need tools to find things online • I can recognise the role of web crawlers in creating an index • I can relate a search term to the search engine's index
3 How search results are ranked	This lesson includes an unplugged activity in which the	To explain how search results are ranked

	class will learn about some of the main factors that influence how a search engine ranks a web page. Learners will create paper-based 'web pages' in groups, on a topic that they are currently studying. They will then discover how their web pages would rank when searching for keywords relating to their content.	• I can explain that search results are ordered • I can explain that a search engine follows rules to rank relevant pages • I can suggest some of the criteria that a search engine checks to decide on the order of results
4 How are searches influenced?	In this lesson, learners will explore how the person performing a web search can influence the results that are returned, and how content creators can optimise their sites for searching. Learners will also explore some of the limitations of searching, then discuss what cannot be searched.	To recognise why the order of results is important, and to whom • I can describe some of the ways that search results can be influenced • I can recognise some of the limitations of search engines • I can explain how search engines make money
5 How we communicate	In this lesson, learners will deepen their understanding of the term 'communication'. They will explore different methods of communication, then they will consider internet-based communication in more detail. Finally, they will evaluate which methods of communication suit particular purposes.	To recognise how we communicate using technology • I can explain the different ways in which people communicate • I can identify that there are a variety of ways of communicating over the internet • I can choose methods of communication to suit particular purposes
6 Communicating responsibly	In this lesson, learners will use information provided and their own prior knowledge to categorise different forms of internet communication. They will then choose which	To evaluate different methods of online communication • I can compare different methods of

	method they would use for the scenarios discussed in the previous lesson. During these activities, they will explore issues around privacy and information security.	communicating on the internet • I can decide when I should and should not share • I can explain that communication on the internet may not be private

Progression

This unit progresses students' knowledge and understanding of computing systems and online collaborative working.

Curriculum links

National curriculum links

- 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
- 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

Education for a Connected World links

- I can describe and assess the benefits and the potential risks of sharing information online.
- I can use various additional tools to refine my searches (e.g. search filters: size, type, usage rights etc.).
- I can explain how to use search effectively and use examples from my own practice to illustrate this.
- I can explain how search engine rankings are returned and can explain how they can be influenced (e.g. commerce, sponsored results).

Year 6 – 3D modelling

Unit introduction

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, moving, resizing, and duplicating objects. They will then create hollow objects using placeholders and combine multiple objects to create a model of a desk tidy. Finally, learners will examine the benefits of grouping and ungrouping 3D objects, then go on to plan, develop, and evaluate their own 3D model of a building.

Overview of lessons

Lesson	Brief overview	Learning objectives
1 Introduction to 3D modelling	Learners will be introduced to the concept of 3D modelling by creating a range of 3D shapes that they select and move. Learners also examine shapes from a variety of views within the 3D space.	To recognise that you can work in three dimensions on a computer • I can add 3D shapes to a project • I can view 3D shapes from different perspectives • I can move 3D shapes relative to one another
2 Modifying 3D objects	Learners will manipulate 3D objects digitally. They will resize objects in one, two, and three dimensions. They will also lift and lower 3D objects relative to the workplane, and combine two 3D objects to make a new shape. Finally learners will recolour 3D objects.	To identify that digital 3D objects can be modified • I can resize an object in three dimensions • I can lift/lower 3D objects • I can recolour a 3D object
3 Make your own name badge	Learners will develop their understanding of manipulating digital 3D objects. They will rotate objects in three dimensions, duplicate objects, and then use grouping and ungrouping to manipulate many objects at once. They will combine these skills to create their own 3D name badge. Finally, learners will consider the practicality of 3D printing the objects they have made.	To recognise that objects can be combined in a 3D model • I can rotate objects in three dimensions • I can duplicate 3D objects • I can group 3D objects

4 Making a desk tidy	Learners will be introduced to the dimensions of shapes in Tinkercad which will enable them to accurately resize and move shapes. Learners will then be introduced to placeholders which can be used to create holes in objects. Finally learners will duplicate, then resize multiple objects to create a meaningful 3D object.	To create a 3D model for a given purpose • I can accurately size 3D objects • I can show that placeholders can create holes in 3D objects • I can combine a number of 3D objects
5 Planning a 3D model	Learners will see how computer-based 3D design is used in architecture to plan buildings. They will explode 3D models of buildings to see what shapes they comprise of. Learners will then look at real world structures and identify the shapes that they include. They will then plan their own 3D building design.	To plan my own 3D model • I can analyse a 3D model • I can choose objects to use in a 3D model • I can combine objects in a design
6 Make your own 3D model	Learners will create a computer 3D model based on their design. They will then evaluate their model and that of another learner, before modifying their own model to improve it.	To create my own digital 3D model • I can construct a 3D model based on a design • I can explain how my 3D model could be improved • I can modify my 3D model to improve it

Progression

This unit progresses students' knowledge and understanding of creating 3D graphics using a computer. Prior to undertaking this unit, learners should have worked with 2D graphics applications.

Please see the learning graph for this unit for more information about progression.

Curriculum links

National curriculum links

Computing – KS2

- 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

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 computer-aided design

Mathematics – KS2 (Y6)

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

Education for a Connected World links

Strand

- Lesson 1 and Lesson 3 – Privacy and Security (Y4) – I can describe strategies for keeping my personal information private, depending on context

Year 6 – Web page creation

Unit introduction

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.

Overview of lessons

Lesson	Brief overview	Learning objectives
1 What makes a good website?	In this lesson, learners will explore and review existing websites and evaluate their content. They will have some understanding that websites are created by using HTML code.	To review an existing website and consider its structure • I can explore a website • I can discuss the different types of media used on websites • I know that websites are written in HTML
2 How would you lay out your web page?	Learners will look at the different layout features available in Google Sites and plan their own web page on paper. **Homework:** Learners will look at two of their favourite websites and sketch them on the worksheet provided, detailing the similarities and differences. **Note:** For the homework activity, teachers could provide printed 'home page' images for anyone who doesn't have internet access at home.	To plan the features of a web page • I can recognise the common features of a web page • I can suggest media to include on my page • I can draw a web page layout that suits my purpose
3 Copyright or copyWRONG?	During this lesson learners will become familiar with the terms 'fair use' and 'copyright'. They will gain an understanding of why they should only use copyright-free images and will find appropriate images to use in their work from suggested sources.	To consider the ownership and use of images (copyright) • I can say why I should use copyright-free images • I can find copyright-free images • I can describe what is meant by the term 'fair use'

	Homework: Learners answer a series of questions based on copyright and fair use.	
4 How does it look?	Today learners will revise how to create their own web page in Google Sites. Using their plan from previous lessons, learners will create their own web page/home page. They will preview their web page as it will appear on different devices and suggest or make edits to improve the user experience on each device.	To recognise the need to preview pages • I can add content to my own web page • I can preview what my web page looks like • I can evaluate what my web page looks like on different devices and suggest/make edits.
5 Follow the breadcrumbs	During this lesson learners will begin to appreciate the need to plan the structure of a website carefully. They will plan their website, paying attention to the navigation paths (the way that pages are linked together). They will then create multiple web pages for their site and use hyperlinks to link them together as detailed in their planning.	To outline the need for a navigation path • I can explain what a navigation path is • I can describe why navigation paths are useful • I can make multiple web pages and link them using hyperlinks
6 Think before you link!	Learners will consider the implications of linking to content owned by other people and create hyperlinks on their own websites that link to other people's work. They will then evaluate the user experience when using their own website and that of another learner.	To recognise the implications of linking to content owned by other people • I can explain the implication of linking to content owned by others • I can create hyperlinks to link to other people's work • I can evaluate the user experience of a website

Progression

This unit progresses students' knowledge and understanding of the following: digital writing, digital painting, desktop publishing, digital photography, photo editing, and vector drawing.

Curriculum links

National curriculum links

- 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.

English links

- Writing composition: Identifying the audience for and purpose of the writing, selecting the appropriate form, and using other similar writing as models for their own.

Education for a Connected World links

Online relationships

- I can use the internet with adult support to communicate with people I know. (EY-7)

Managing information online

- I can navigate online content, websites, or social media feeds using more sophisticated tools to get to the information I want (e.g. menus, sitemaps, breadcrumb-trails, site search functions). (11-14)

Copyright and ownership

- I can explain why copying someone else's work from the internet without permission can cause problems.
- I can give examples of what those problems might be.
- When searching on the internet for content to use, I can explain why I need to consider who owns it and whether I have the right to reuse it.
- I can give some simple examples.
- I can assess and justify when it is acceptable to use the work of others.
- I can give examples of content that is permitted to be reused.
- I can demonstrate the use of search tools to find and access online content which can be reused by others.
- I can demonstrate how to make references to and acknowledge sources I have used from the internet.
- I can explain the principles of fair use and apply this to case studies. (11-14)

Year 6 – Introduction to spreadsheets

Unit introduction

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.

Overview of lessons

Lesson	Brief overview	Learning objectives
1 Collecting data	Learners will collect and organise data in a format of their choice. They will then explore how data can be structured in a table. Finally they will input data into a spreadsheet.	To create a data set in a spreadsheet • I can collect data • I can suggest how to structure my data • I can enter data into a spreadsheet
2 Formatting a spreadsheet	Learners will develop their understanding of the structure of a spreadsheet. They will be introduced to cell references, data items and the concept of formatting cells. Learners will see data items formatted in different ways, they will then choose formats for data items before applying formats in their own spreadsheet.	To build a data set in a spreadsheet • I can explain what an item of data is • I can choose an appropriate format for a cell • I can apply an appropriate format to a cell
3 What's the formula?	Learners will begin to use formulas to produce calculated data. They will understand that the type of data in a cell is important (e.g. numbers can be used in calculations whereas words cannot). Learners will create formulas to use in a spreadsheet using cell references and identify that changing inputs will change the output of the calculation.	To explain that formulas can be used to produce calculated data • I can explain which data types can be used in calculations • I can construct a formula in a spreadsheet • I can identify that changing inputs changes outputs

4 Calculate and duplicate	Learners will calculate data using the operations of multiplication, subtraction, division, and addition. They will use these operations to create formulas in a spreadsheet. Learners will then begin to understand the importance of creating formulas that include a range of cells and the advantage of duplicating in order to apply formulas to multiple cells.	To apply formulas to data • I can calculate data using different operations • I can create a formula which includes a range of cells • I can apply a formula to multiple cells by duplicating it
5 Event planning	Learners will plan and calculate the cost of an event using a spreadsheet. They will use a predefined list to choose what they would like to include in their event, and use their spreadsheet to answer questions on the data they have selected. Learners will be reminded of the importance of organising data and will then create a spreadsheet using formulas to work out costs for their event.	To create a spreadsheet to plan an event • I can use a spreadsheet to answer questions • I can explain why data should be organised • I can apply a formula to calculate the data I need to answer questions
6 Presenting data	Learners will gain skills to create charts in Google Sheets. They will evaluate the results from their charts to answer questions. Finally, learners will show they understand that there are different software tools available within spreadsheet applications to present data.	To choose suitable ways to present data • I can produce a chart • I can use a chart to show the answer to a question • I can suggest when to use a table or chart

Progression

This unit progresses students' knowledge and understanding of data, and teaches them how to organise and modify data within spreadsheets. Specifically, learners will have experienced data in tables and charts in the Y4 data logging and Y5 branching database units.

Curriculum links

National curriculum links

- 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

National curriculum maths 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

Education for a Connected World links

Managing information online

- I can describe how I can search for information within a wide group of technologies (e.g. social media, image sites, video sites)
- I can use different search technologies
- I can evaluate digital content and can explain how I make choices from search results

Year 6 – Programming A – Variables in games

Unit introduction

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

Overview of lessons

Lesson	Brief overview	Learning objectives
1 Introducing variables	Learners are introduced to variables. They see examples of real-world variables (score and time in a football match) before they explore them in a Scratch project. Learners then design and make their own project that includes variables. Finally, learners identify that variables are named and that they can be letters (strings) as well as numbers.	To define a 'variable' as something that is changeable • I can identify examples of information that is variable • I can explain that the way a variable changes can be defined • I can identify that variables can hold numbers or letters
2 Variables in programming	Learners understand that variables are used in programs, and that they can only hold a single value at a time. They complete an unplugged task that demonstrates the process of changing variables. Then, learners explore why it is important to name variables and apply their learning in a Scratch project in which they make, name, and update variables.	To explain why a variable is used in a program • I can identify a program variable as a placeholder in memory for a single value • I can explain that a variable has a name and a value • I can recognise that the value of a variable can be changed
3 Improving a game	Learners apply the concept of variables to enhance an existing game in Scratch. They predict the outcome of changing the same `change score` block in different parts of a program, then they test	To choose how to improve a game by using variables • I can decide where in a program to change a variable

	their predictions in Scratch. Learners also experiment with using different values in variables, and with using a variable elsewhere in a program. Finally, they add comments to their project to explain how they have met the objectives of the lesson.	• I can make use of an event in a program to set a variable • I can recognise that the value of a variable can be used by a program
4 Designing a game	Learners work at the 'design' level of abstraction, where they create their artwork and algorithms. Learners first design the sprites and backgrounds for their project, then they design their algorithms to create their program flow.	To design a project that builds on a given example • I can choose the artwork for my project • I can create algorithms for my project • I can explain my design choices
5 Design to code	Learners implement the algorithms that they created in Lesson 4. In doing this, they identify variables in an unfamiliar project and learn the importance of naming variables. They also have the opportunity to add another variable to enhance their project.	To use my design to create a project • I can create the artwork for my project • I can choose a name that identifies the role of a variable • I can test the code that I have written
6 Improving and sharing	Learners build on the project that they created in Lesson 5. They consider how they could improve their own projects and make small changes to achieve this. Learners then have the opportunity to add a variable independently. Finally, learners evaluate each other's projects; they identify features that they liked and features that could be improved.	To evaluate my project • I can identify ways that my game could be improved • I can use variables to extend my game • I can share my game with others

Progression

This unit assumes that learners have some prior experience of programming in Scratch. Specifically, they should be familiar with the programming constructs of sequence, repetition, and selection. These constructs are covered in the Year 3, 4, and 5 National Centre for Computing Education programming units respectively. Each year group includes at least one unit that focuses on Scratch.

Curriculum links

National curriculum links

- 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

Year 6 – Sensing

Unit introduction

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 pupils 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 pupils to build in and test within the new programming environment, before transferring it to their micro:bit. Pupils 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 pupils the opportunity to create code from a given design. In Lesson 4 that scaffolding is gradually reduced, then in Lesson 5, pupils create their own design, using the same template. In the final lesson, pupils will apply their knowledge of the programming constructs and use their design to create their own micro:bit-based step counter.

Overview of lessons

Lesson	Brief overview	Learning objectives
1 The micro:bit	Pupils will be introduced to the micro:bit as an input, process, output device that can be programmed. Pupils will familiarise themselves with the device itself and the programming environment, before creating their own programs. They will then run their programs on the device. **Note:** This unit is written assuming that you will be using a desktop or laptop computer (not a tablet) to connect micro:bits.	To create a program to run on a controllable device • I can apply my knowledge of programming to a new environment • I can test my program on an emulator • I can transfer my program to a controllable device
2 Go with the flow	Pupils will explore how if, then, else statements are used to direct the flow of a program. They will initially relate if, then, else statements to real-world situations, before creating programs in MakeCode. They will apply their knowledge of if, then, else statements to create a program that features selection influenced by a	To explain that selection can control the flow of a program • I can identify examples of conditions in the real world • I can use a variable in an if, then, else statement to select the flow of a program

	random number to create a micro:bit fortune teller project.	• I can determine the flow of a program using selection
3 Sensing inputs	Pupils will initially use the buttons to change the value of a variable using selection. They will then develop their programs to update the variable by moving their micro:bit using the accelerometer to sense motion. Finally, they will learn that a variable's value remains the same after it has been checked by the program.	To update a variable with a user input • I can use a condition to change a variable • I can experiment with different physical inputs • I can explain that checking a variable doesn't change its value
4 Finding your way	Pupils will apply their understanding of the importance of order in programs. They will then use operands in selection to determine the flow of a program. Pupils will then modify a program which will enable the micro:bit to be used as a navigational device. To code this, they will adapt the code they completed to make a basic compass.	To use an conditional statement to compare a variable to a value • I can use an operand (e.g. <>=) in an if, then statement • I can explain the importance of the order of conditions in else, if statements • I can modify a program to achieve a different outcome
5 Designing a step counter	Pupils will be working at the design level. They will pick out features of a step counter, a piece of technology with which they are likely to be familiar. They will then relate those features to the sensors on a micro:bit. In the main activity, pupils will design the algorithm and program flow for their step counter project.	To design a project that uses inputs and outputs on a controllable device • I can decide what variables to include in a project • I can design the algorithm for my project • I can design the program flow for my project
6 Making a step counter	Pupils will use the design that they have created in Lesson 5 to make a micro:bit-based step counter. First they will review their plans, followed by creating their code. Pupils will test and debug their code, using the emulator and then	To develop a program to use inputs and outputs on a controllable device • I can create a program based on my design • I can test my program against my design

	the physical device. To successfully complete this project, Pupils will need to demonstrate their understanding of all the programming lessons they've had so far.	• I can use a range of approaches to find and fix bugs

Progression

This unit presumes that pupils are already confident in their understanding of sequence, repetition and selection independently within programming. If pupils are not yet ready for this, you may wish to revisit earlier programming units where these constructs are introduced.

Curriculum links

National curriculum links

- 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