Key Stage 2 – Key Stage 3 Transition Project

Unit introduction

Using the micro:bit and Make code environment, this transition project aims to support students moving from Key Stage 2 to Key Stage 3, facilitating a smooth progression between primary and secondary computing education. This unit ensures curriculum continuity by aligning teaching approaches and learning objectives between the two stages, whilst also familiarising students with the new school environment, teachers, and classmates. Additionally, it challenges students academically, which subsequently prepares them for the challenges of KS3, allowing them to adjust gradually and build confidence. More information on how to organise this project within your school setting can be found through the free 'Effective transition from KS2 to KS3 in computing' remote CPD.

Note: An understanding of the micro:bit and the MakeCode programming environment will aid this unit and its delivery. You can find more information about the micro:bit here: https://microbit.org/get-started/user-guide/overview/ Free CPD on the micro:bit can be found on the NCCE courses website, such as the 'Introduction to the micro:bit' and 'Programming with the micro:bit' Primary courses and the 'Physical computing kit- KS3 micro:bit' course.This unit is written assuming that you will be using a desktop or laptop computer (not a tablet) to connect micro:bits.

Overview of lessons

Lesson	Brief overview	Learning objectives
Key stage 2 Lesson 1 Creating a micro:bit counter	Learners will apply their knowledge of sequence, inputs, and variables from KS2 computing lessons to create a sports counter using the micro:bit. They will plan their algorithm, before using the micro:bit MakeCode to code and run their creations. Learners will then practically test their sports counters before evaluating their effectiveness.	• To understand how variables and inputs can be used on the micro:bit to create a sports counter • To create an algorithm for a sport counter, and code, ru

		• n and evaluate the use of the micro:bit to count activities
Key stage 2 Lesson 2 Creating a micro:bit timer	Learners will build on their knowledge of micro:bits from Lesson 1 to create a sports countdown timer. They will modify and debug existing programs, spotting mistakes, and analysing how they could be improved. KS2 concepts such as variables, sequence and selection will be taught, alongside introducing bar graphs, and Boolean variables (using true and false). They will use PRIMM and Parson's problems to develop their code and test it practically.	• To create a countdown timer on the micro:bit using variables • To evaluate the effectiveness of the LED display on the micro:bit when used as a timer • To modify a program using true and false statements and an if…else command • To create an activity completion using a micro:bit counter and a micro:bit timer
Key stage 3 Lesson 1 Micro:bit countdown	Learners will recap micro:bit input blocks from the KS2 transition lessons and be introduced to a count-controlled loop and efficiency in program code. Students will explore the use of a FOR loop using the terminology iteration to create a sports countdown starter.	• Compare different inputs on the micro:bit • Define iteration • Modify a program with count-controlled iteration • Create a countdown program using count-controlled iteration
Key stage 3 Lesson 2 Basketball throw strength	Learners will continue with a sports theme and look at using a program on the micro:bit to capture data and determine the strength of their throw with a basketball. Learners will be introduced to functions and how they help a programs efficiency.	• Discuss how the game basketball is played and how movement is used • Define a function • Modify a program to gather data and visualise the data

		• Create a program to gather the strength of a throw in basketball

Progression

This unit has been devised as a transitional unit to allow learners to confidently move from Year 6 to Year 7. By the end of the unit, they will have a more secure understanding of the micro:bit, and the MakeCode environment. In addition, they will be able to create and modify block-based programs to meet specific criteria.

Curriculum links

National curriculum links

Key Stage 2:

- 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

Key Stage 3

- Create, reuse, revise, and repurpose digital artefacts for a given audience, with attention to trustworthiness, design, and usability
- Use two or more programming languages, at least one of which is textual, to solve a variety of computational problems; make appropriate use of data structures; design and develop modular programs that use procedures or functions.

Assessment

Through the activities included in the lessons, pupils will be able to demonstrate learning and understanding through: the modification of the program code, coding creations and worksheets which allow activity notes to be made. In addition, assessment can be carried out by observing learners in their pairs and posing appropriate questions.

Subject knowledge

This unit focuses on building on the prior knowledge that learners have in relation to their understanding of sequence, inputs, and variables. Lessons on these areas can be found in units within the KS2 Teach Computing Curriculum, however learners will be able to access the learning without having followed units within the Teach Computing Curriculum.

Online training courses

- Effective transition from KS2 to KS3 in computing
- Introduction to the micro:bit at KS2
- Encouraging girls into computer science

Year 7 – Clear messaging in digital media

Unit introduction

This unit is designed to build upon learners' experience in key stage 2. It requires learners to use a range of different skills across several pieces of software. Learners will work between different applications to create a poster and slides on a given theme. The central theme focuses on embedding online safety and secure ways of working. The unit covers bullet points 7, 8 and 9 of the National Curriculum Programme of Study at Key Stage 3. The unit is designed so that learners can concentrate on applying skills that they may have previously learnt as well as those developed in the unit. Learners are given clear tasks for which they need to first plan and then implement a solution. A rubric is used to help learners focus on specific aspects of their work. Rubrics are used in the key stage 2 Teach Computing Curriculum but are designed for teacher's use. In this unit, learners will need to assess others and self-assess against the rubric.

Note: The suggested program for the beginning of this unit is Canva. To use Canva, accounts are needed for learners. A guide to creating accounts is provided in lesson 2. Canva is web or application based and can be used on tablets, desktops and laptops. In order to add students under the age of 13, Canva requires teachers to have parental permission. There is a sample consent form provided on the Canva website. For the second half of the unit, presentation slides software is needed such as Google Slides or Microsoft PowerPoint.

Overview of lessons

Lesson	Brief overview	Learning objectives
1 Get the message across	This lesson builds on the experiences learners will have had in primary school. Learners will need to consider the search terms needed to find specific content on the web. Learners will then search the web to find content they deem good, which they will capture and annotate digitally. This lesson is designed to get learners to move between applications and use a variety of applications and tools. Focusing on online safety will reinforce Key Stage 2 learning and introduce the additional learning points for Key Stage 3.	• Choose search terms relating to a particular issue – online safety • Use tools to copy an image into another application • Identify key features of a good poster focusing on online safety
2 Poster making	In this lesson learners will apply the features of a good poster identified in the last lesson. Learners will plan and create their own poster based on the poster they chose in Lesson 1.	• Plan a poster to clearly convey a message • Choose and download a suitable image following the theme • Create a poster using a desktop publishing application
3 Brand	This lesson starts to develop the idea of branding, which learners will concentrate on later in the unit. Students will work across applications to recolour a logo and add it to a slide. Learners will then add text and colour to the slide using the poster they made in the previous lesson for reference. Learners will also use comment tools to provide feedback for a partner. The introduction of iconography links to the theme of safety, making a link between internet safety and danger points such as webcams, risk and preserving identity.	• Modify a logo using a graphic editing program • Choose how to combine text and graphics in a slide • Use digital tools to provide feedback on design choices
4 Creating a brand	In this lesson learners will design and make three blank slides for a fictional charity. Learners will focus on branding in this lesson and then create example content in the next lesson. Learners should be independently applying skills that they have learnt in previous lessons in this unit. Learners will consider their work alongside a rubric that is provided and will be used later to self-assess their work.	• Plan a consistent layout for a set of slides • Modify a logo so that it fits in with the planned slide styles • Create a styled set of slides based on a plan

5 Adding content	In this lesson learners will add text and an image to their slides. Learners will need to search the web for text and a suitable image. After learners have completed their slides, they will review another students' slides and give feedback using a rubric for reference.	• Search for suitable text for slides • Search for and add a suitable image • Evaluate content against a rubric
6 Presenting	In this lesson learners will plan a presentation for their slides. They will then present their slides to the class or a smaller group. Finally, learners will evaluate their work against the rubric.	• Plan how to deliver a presentation • Explain your work to others through a presentation • Evaluate your work against a rubric

Progression

This unit has been devised as a transitional unit to allow learners to confidently move from Year 6 to Year 7. By the end of the unit, they should also be able to use the school network safely and respectfully, be able to recognise risk and provide suggestions as to how to avoid risk.

Curriculum links

National curriculum links

- undertake creative projects that involve selecting, using, and combining multiple applications, preferably across a range of devices, to achieve challenging goals, including collecting and analysing data and meeting the needs of known users
- Create, reuse, revise, and repurpose digital artefacts for a given audience, with attention to trustworthiness, design, and usability
- Understand a range of ways to use technology safely, respectfully, responsibly, and securely, including protecting their online identity and privacy; recognise inappropriate content, contact, and conduct and know how to report concerns

Education for a Connected World links

Online relationships

- I can give examples of how to make positive contributions to online debates and discussions (Y8)

Online bullying

- I can recognise online bullying can be different to bullying in the physical world and can describe some of those differences. (Y7)

Privacy and security

- I can explain how my internet use is often monitored (e.g. by my school or internet service provider) (Y7)

Assessment

Summative assessment

- We include an assessment rubric, which is introduced in Lesson 4; and used in Lessons 5 / 6. At the end of the unit, learners will self-assess against the rubric. Teachers can also use the rubric to make their own assessment of students' work.

Digital assessment

- Student Knowledge Question Banks are available from the Teach Computing website, presented as self-marking multiple-choice questions as Microsoft / Google forms.

Subject knowledge

This unit focuses on working between different tools including collaborative online tools and being safe online. You can include key aspects of your school's pupil IT policy (e.g. password, logging on, accessing stored files) where you feel it best suits your students.

Enhance your subject knowledge to teach this unit through the following training opportunities:

Microsoft and Google courses

The most common application suites in schools are Office 365 and G Suite. If your school uses these suites and you are unsure of how to use them, both companies provide free online courses. Certification requires a fee. These are:

- The Google Education: Teacher Center (G Suite account required)
- Microsoft Certified Educator (Office 365 account required)

Online training courses

- Impact of Technology: How to Lead Classroom Discussions

Online courses

- Artificial intelligence in Key Stage 3 computing

Online safety

Online safety directly impacts the well-being and development of students, making them vulnerable to risks such as cyberbullying, inappropriate content, identity theft, and online predators. Teaching and promoting online safety empowers students to navigate the digital world responsibly and make informed decisions. We have compiled resources to support the national curriculum for online safety and help students navigate the online world safely in their academic, professional, and personal lives.

Misconceptions

Incorrect misconceptions can be easily established. Below are some common misconceptions identified within this unit of work. These misconceptions are provided to aid the teacher in planning this unit of work.

Common misconception:	**Guidance on how to overcome the misconception:**
1. Thinking you have to type full sentences into search engines	1. Model how to use keywords and phrases when searching
2. Confusion between online apps and desktop apps	2. Practice saving and organising local files, uploading them into web apps and downloading them to be used in other local apps

Request a Computing Ambassador

A Computing Ambassador can help to bring computing alive and provide real-life examples of computing careers, creating an invaluable link to industry. For many years, Ambassadors have been an incredible resource to schools across the UK and can be requested to support STEM skills across the curriculum. It's easy to request a Computing Ambassador (via the STEM Ambassador platform). Just create an account or sign in to your dashboard, fill in the details and publish your activity. STEM Ambassador Request

You can use the example requests, simply copy and paste the text into the portal to find the perfect Computing Ambassador to work with.

Example requests:

Support our learning in messaging through digital media

Year 7 (11-12) are working between different applications to generate a poster and slides with the intention of developing knowledge of what makes effective branding. We require someone who has experience of branding or designing digital media products. We would like you to provide students with a realistic brief and help them to develop a poster, logo, and a set of 3 branded slides.

Skills and knowledge required:

- Effective design
- Consistent layout
- Use of images and design ideation
- Logo and page design

The final lesson in the series will allow students to showcase their work and you will provide them with feedback.

Year 7 – Networks: from semaphores to the internet

Unit introduction

Imagine a world without computer networks, and how different your life would be. There would be no more YouTube, Google, instant messaging, online video gaming, Netflix, and iTunes. There would be no online shopping, or quickly looking up directions to a location at the click of a button. There would be no more sharing of files or peripherals such as a printer, and no more central backups of information. As networks have evolved, society has become increasingly reliant on the services that they provide. They have changed the way we learn, work, play, and communicate. This unit begins by defining a network and addressing the benefits of networking, before covering how data is transmitted across networks using protocols. The types of hardware required are explained, as is wired and wireless data transmission. Learners will develop an understanding of the terms 'internet' and 'World Wide Web', and of the key services and protocols used. Practical exercises are included throughout to help strengthen understanding.

Overview of lessons

Lesson	Brief overview	Learning objectives
Lesson 1: Computer networks and protocols	This lesson will get the learners thinking about the history of different communication methods. Learners will learn what a computer network is, along with the meaning of the word 'protocol'. Learners will gain an appreciation of the growth of networked devices. Learners will identify different greeting protocols and use a series of protocol commands in a 'climber/belayer' scenario to ensure	• Define what a computer network is and explain how data is transmitted between computers across networks • Define 'protocol' and provide examples of non-networking protocols

	that the climber ascends safely. Finally, learners will make a connection between non-networking and networking protocols.	
Lesson 2: Networking hardware	This lesson explores the functionality of key hardware components found in a network. The lesson covers network cables, hubs, servers and routers. Each is explained in turn, and learners then use their knowledge of each component to build a series of increasingly complicated network diagrams. This lesson also includes a piece of homework in which a series of terms and statements need to be matched up.	• List examples of the hardware necessary for connecting devices to networks
Lesson 3: Wired and wireless networks	This lesson explores the different wireless technologies, and how bandwidth varies between these technologies. Learners will discuss the mobile technologies of 3G, 4G, and 5G. Learners will develop an understanding of the term 'bandwidth' and test the performance of their own internet connection. Learners will also develop an appreciation for online activities that are bandwidth-heavy, before moving on to explore the advantages and disadvantages of wired and wireless networks. By the end of the lesson, learners should be able to identify whether a wired or wireless network should be used in a number of given scenarios.	• Compare wired to wireless connections and list examples of specific technologies currently used to implement such connections • Define 'bandwidth', using the appropriate units for measuring the rate at which data is transmitted, and discuss familiar examples where bandwidth is important
Lesson 4: The internet	This lesson explores the internet and its uses. Learners will watch a video from one of the "fathers of the internet", Vinton Gray Cerf, who explains the internet	• Define what the internet is

	and its history. Learners will gain an appreciation of the vastness of the internet. It is truly global, with 99% of data transmitted through oceanic cables spanning all continents, the longest of which is 39,000 kilometres. Learners will watch a video called *A Packet's Tale* which will explain how messages can be successfully sent from one device to another across the planet in under a second using packets and IP addresses. Learners will develop an understanding of packet structure and packet switching. The term 'protocol' will be revisited, and two particular protocols, TCP and IP, will be explained. The lesson will finish with a short multiple choice quiz to test learners' understanding of the lesson material.	• Explain how data travels between computers across the internet • Describe key words such as 'protocols', 'packets', and 'addressing'
Lesson 5: Internet services	This lesson explores the internet, its services, and the World Wide Web. Learners will understand the difference between the internet and the World Wide Web and how each came about. They will understand that the activity on the internet in a single minute is quite staggering. Through an 'Internet minute' exercise, learners will also understand that many different services are provided across the internet. Email and Voice over Internet Protocol (VoIP) will be explained. The term 'Internet of Things (IoT)' will be explored. Learners will understand that the internet can be integrated into anything to make it smarter. Learners will discuss the predicted growth of this area and review smart home IoT devices. Learners will discuss the advantages of IoT, as well as the disadvantages, focussing on privacy and security.	• Explain the difference between the internet, its services, and the World Wide Web • Describe how services are provided over the internet • List some of these services and the context in which they are used • Explain the term 'connectivity' as the capacity for connected devices ('Internet of Things') to collect and share information about me with or without my knowledge (including microphones, cameras, and

		geolocation) • Describe how internet-connected devices can affect me
Lesson 6: The World Wide Web	This lesson explores the World Wide Web (WWW), the components that are associated with the WWW, and how they work together. First, learners will look at a series of images and identify how they can be grouped into web browsers, web pages, and search engines. Next, the key components of the WWW are explained (browser, server, web pages, and search engines). A link is made to the first lesson of the unit, in which the class learnt about protocols — learners will develop an understanding of the difference between HTTP and HTTPS protocols. Learners will also gain an understanding of URLs and their structures. Next, learners will discuss the domain name system and the relationship between IP address and domain name, then complete an activity in which they have to identify the 'type' of organisation from a website URL. Learners will identify which websites should use HTTP and which should use HTTPS based on the type of activity that they support.	• Describe components (servers, browsers, pages, HTTP and HTTPS protocols, etc.) and how they work together

Progression

This unit progresses students' knowledge and understanding of networks and associated hardware. The unit will establish a foundation understanding of how data is transmitted across networks, as well as exploring the factors that can affect performance. The unit will spend time focussing on the internet and services provided over the internet.

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

Curriculum links

National curriculum links

- Understand the hardware and software components that make up computer systems, and how they communicate with one another and with other systems

Education for a connected world links

- Explain the term ‘connectivity’ as the capacity for connected devices (‘internet of things’) to collect and share information about me with or without my knowledge (including microphones, cameras and geolocation).
- Describe how internet-connected devices can affect me.

Assessment

Summative assessment

The summative assessment for this unit will be in the form of a set of multiple choice questions.

- Please see the assessment question and answer documents for this unit.

Digital assessment

- Digital versions of the summative assessment document are available for this unit. These are available as self-marking Microsoft / Google Forms. Use the links below to duplicate / copy a version to your account.
    - Microsoft Form Link
    - Google Form Link
- Student Knowledge Question Banks are also available from the Teach Computing website, presented as self-marking multiple-choice questions as Microsoft / Google forms.

Subject knowledge

This unit focusses on networks, the internet, and associated technology (network, hub, server, router, ISP, protocol, mainframe, personal computer, stand-alone, HTTP, wired, wireless, 3G, 4G, 5G, WiFi, bandwidth, bit, megabit, gigabit, broadband, buffering, packet, IP address, packet header, packet payload, Transmission Control Protocol, Internet Protocol, World Wide Web, WWW, internet services, email, Voice over Internet Protocol (VoIP), Internet of Things (IoT), spam, privacy, security, web browser, web server, web page, search engine, HTTP, HTTPS, URL, domain name, domain name system) .

Enhance your subject knowledge to teach this unit through the following training opportunities:

Online training courses

- An Introduction to Computer Networking for Teachers
- Introduction to cybersecurity for teachers
- The internet and cybersecurity

Other online courses are available on our website here

Misconceptions

Incorrect misconceptions can be easily established. Below are some common misconceptions identified within this unit of work. These misconceptions are provided to aid the teacher in planning this unit of work.

Common misconception:	Guidance on how to overcome the misconception:
1. Using the term WiFi to mean any internet connection (even if it's connected via ethernet)	1. Research broadband provider speed and cost and discuss any mistakes or inconsistencies of units of speed

2. Confusion between Mbps and MBps (bits and bytes per second) when discussing bandwidth	2. Show examples of broadband providers who misuse
3. Confusion between a web browser and a search engine	3. Try out different browsers and search engines and discuss the advantages and disadvantages of each so that you can regularly ask students to justify their choice of browser and search engine

Online safety

Online safety directly impacts the well-being and development of students, making them vulnerable to risks such as cyberbullying, inappropriate content, identity theft, and online predators. Teaching and promoting online safety empowers students to navigate the digital world responsibly and make informed decisions. We have compiled resources to support the national curriculum for online safety and help students navigate the online world safely in their academic, professional, and personal lives.