

Edison Primary School – Computing Progression of Skills by Jam Coding

The document below summarizes Computing in the National Curriculum and outlines Key Stage 1 and 2 objectives.

Computing in the National Curriculum Explained:

Algorithms

KS1 understand what algorithms are; how they are implemented as programs on digital devices

KS2 use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs

An algorithm is a precise list of instructions on how to perform an action. In computing terms, it is instructions for what the computer will be programmed to do. Algorithms might even be written in plain English, before translating them into code that the computer will understand.

Collect, Analyse, Evaluate and Present Data

KS2 select, use and combine a variety of software ... to design and create a range of programs, ... that accomplish given goals, including collecting, analysing, evaluating and presenting data and information

Data is just information. Presenting it could be in the form of tables, charts or graphs; it may be figures in a spreadsheet or records in a database; or it may be in the form of text, images, video or audio. We collect data by gathering from different sources. To analyse and evaluate is to study or examine it and draw our own conclusions. You may collect data from one source and insert it into another (e.g., creating a graph in a spreadsheet and copying it into a presentation).

Computer Networks

KS2 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

A computer network is a number of computers connected together, enabling them to communicate with each other. This allows information, software or hardware (such as printers) to be accessed by any computer on the network. They may be connected with wires or wirelessly. We have computer networks in our homes, schools and workplaces. The Internet or World Wide Web is like one great big network, connecting millions of computers everywhere in the world.

Controlling or Simulating Physical Systems

KS2 design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems

A physical system involves actual hardware or devices, including those that could be attached to a computer. Examples could include data logging devices to measure temperature or light, traffic lights, motion sensors, buzzers or switches. A program (a piece of code) is needed to tell the system what to do. Sometimes computer software is used to mimic or recreate on screen how a real physical system would work. This is called simulating the system.

Debug

KS1 create and debug simple programs

KS2 design, write and debug programs that accomplish specific goals

Errors in programs, or anything that stops them from working properly, are known as bugs. To debug means to fix or get rid of the bugs and solve problems within a program in order to make it work how it is intended. Mistakes are a normal, common part of programming and every computer programmer should get used to the fun of debugging!

Decomposing Problems

KS2 solve problems by decomposing them into smaller parts

Decomposing means breaking it down into chunks. If there are several parts required in a program to make it work, splitting into smaller sections makes it easier to solve each part separately.

Digital Content

KS1 use technology purposefully to create, organise, store, manipulate and retrieve digital content

KS2 use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content

Digital content means any information that is stored or presented on computers or the Internet. Everything you create on the computer becomes digital content. This includes files on your computer, network or on the World Wide Web. Children need to start taking certain factors into consideration, such as where the digital content has come from and who has made it.

Digital Devices

KS1 understand what algorithms are; how they are implemented as programs on digital devices

KS2 select, use and combine a variety of software (including internet services) on a range of digital devices

Digital devices are any type of computer that you use, including laptops, tablets and smartphones. This also includes hardware which may connect to a computer.

Logical Reasoning

KS1 use logical reasoning to predict the behaviour of simple programs

KS2 use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs

Logical reasoning means thinking logically or systematically to solve problems. The best way to understand what a program does or solve errors in a program is to think through sensibly what is supposed to happen.

Sequence, Selection and Repetition

KS2 use sequence, selection, and repetition in programs

Sequence means to put things into a particular order where it is important that one action needs to be performed before another. Selection means making a choice, specifically where a program can do one of two or more things. Repetition is to perform or repeat the same process multiple times. In a loop, a process can be repeated for a set number of times or until a variable change. Sequence, selection and repetition are the three main ways to structure a piece of computer code or algorithm.

Software

KS2 select, use and combine a variety of software (including internet services) on a range of digital devices

Different types of software are more suitable for different tasks. Choosing the best software is important for completing a task properly and combining software means using more than one type together, for example creating a graph or chart in a spreadsheet then copying this to a word processor for desktop publisher as part of a report.

Variables

KS2 work with variables and various forms of input and output

Variables are anything that can be changed or given a value in a program. A variable may be the input from a particular device or become the output, based on some code or calculation; it may be a number or text.

Curriculum Objectives

Key stage 1

Pupils should be taught to:

- understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions
- create and debug simple programs
- use logical reasoning to predict the behaviour of simple programs
- use technology purposefully to create, organise, store, manipulate and retrieve digital content
- recognise common uses of information technology beyond school
- use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about content or contact on the internet or other online technologies

Key stage 2

Pupils should be taught to:

- 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
- understand computer networks including 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

Computing Expectations by Year Group

Year 2

Creating media	Networks & Data Representation	Data	Programming	e-Safety
<ul style="list-style-type: none"> I can use technology to organise and present my ideas in different ways. I can use the keyboard on my device to add, delete and space text for others to read. I can tell you about an online tool that will help me to share my ideas with other people. I can save and open files on the device I use. 	<ul style="list-style-type: none"> I can tell you why I use technology in the classroom. I can tell you why I use technology in my home and community. I am starting to understand that other people have created the information I use. I can identify benefits of using technology including finding information, creating and communicating. I can talk about the differences between the Internet and things in the physical world. 	<ul style="list-style-type: none"> I talk about the different ways I use technology to collect information, including a camera, microscope or sound recorder. I can make and save a chart or graph using the data I collect. I can talk about the data that is shown in my chart or graph. I am starting to understand a branching database. I can tell you what kind of information I could use to help me investigate a question. 	<ul style="list-style-type: none"> I can give instructions to my friend (using forward, backward and turn) and physically follow their instructions. I can tell you the order I need to do things to make something happen and talk about this as an algorithm. I can program a robot or software to do a particular task. I can look at my friend's program and tell you what will happen. I can use programming software to make objects move. can watch a program execute and spot where it goes wrong so that I can debug it. 	<ul style="list-style-type: none"> I can explain why I need to keep my password and personal information private. I can describe the things that happen online that I must tell an adult about. I can talk about why I should go online for a short amount of time. I can talk about why it is important to be kind and polite online and in real life. I know that not everyone is who they say they are on the Internet.

Year 3

Creating media	Networks & Data Representation	Data	Programming	e-Safety
<ul style="list-style-type: none"> I can create different effects with different technology tools. I can combine a mixture of text, graphics and sound to share my ideas and learning. I can use appropriate keyboard commands to amend text on my device, including making use of a spellchecker. I can evaluate my work and improve its effectiveness. <p>can use an appropriate tool to share my work online.</p>	<ul style="list-style-type: none"> I can save and retrieve work on the Internet, the school network or my own device. I can talk about the parts of a computer. I can tell you ways to communicate with others online. I can describe the World Wide Web as the part of the Internet that contains websites. I can use search tools to find and use an appropriate website. <p>think about whether I can use images that I find online in my own work.</p>	<ul style="list-style-type: none"> I can talk about the different ways data can be organised. I can search a ready-made database to answer questions. I can collect data help me answer a question. I can add to a database. I can make a branching database. I can use a data logger to monitor changes and can talk about the information collected. 	<ul style="list-style-type: none"> I can break an open-ended problem up into smaller parts. I can put programming commands into a sequence to achieve a specific outcome. I keep testing my program and can recognise when I need to debug it. I can use repeat commands. I can describe the algorithm I will need for a simple task. I can detect a problem in an algorithm which could result in unsuccessful programming. 	<ul style="list-style-type: none"> I can talk about what makes a secure password and why they are important. I can protect my personal information when I do different things online. I can use the safety features of websites as well as reporting concerns to an adult. I can recognise websites and games appropriate for my age. I can make good choices about how long I spend online. I ask an adult before downloading files and games from the Internet. I can post positive comments online.

Year 4

Creating media	Networks & Data Representation	Data	Programming	e-Safety
<ul style="list-style-type: none"> I can use photos, video and sound to create an atmosphere when presenting to different audiences. I am confident to explore new media to extend what I can achieve. I can change the appearance of text to increase its effectiveness. I can create, modify and present documents for a particular purpose. I can use a keyboard confidently and make use of a spellchecker to write and review my work. I can use an appropriate tool to share my work and collaborate online. <p>can give constructive feedback to my friends to help them improve their work and refine my own work.</p>	<ul style="list-style-type: none"> I can tell you whether a resource I am using is on the Internet, the school network or my own device. I can identify key words to use when searching safely on the World Wide Web. I think about the reliability of information I read on the World Wide Web. I can tell you how to check who owns photos, text and clipart. I can create a hyperlink to a resource on the World Wide Web. 	<ul style="list-style-type: none"> I can organise data in different ways. I can collect data and identify where it could be inaccurate. I can plan, create and search a database to answer questions. I can choose the best way to present data to my friends. I can use a data logger to record and share my readings with my friends. 	<ul style="list-style-type: none"> I can use logical thinking to solve an open-ended problem by breaking it up into smaller parts. I can use an efficient procedure to simplify a program. I can use a sensor to detect a change which can select an action within my program. I know that I need to keep testing my program while I am putting it together. I can use a variety of tools to create a program. I can recognise an error in a program and debug it. I recognise that an algorithm will help me to sequence more complex programs. I recognise that using algorithms will also help solve problems in other learning such as Maths, Science and Design and Technology. 	<ul style="list-style-type: none"> I choose a secure password when I am using a website. I can talk about the ways I can protect myself and my friends from harm online. I use the safety features of websites as well as reporting concerns to an adult. I know that anything I post online can be seen by others. I choose websites and games that are appropriate for my age. I can help my friends make good choices about the time they spend online. I can talk about why I need to ask a trusted adult before downloading files and games from the Internet. I comment positively and respectfully online.

Year 5

Creating media	Networks & Data Representation	Data	Programming	e-Safety
<ul style="list-style-type: none"> I can use text, photo, sound and video editing tools to refine my work. I can use the skills I have already developed to create content using unfamiliar technology. I can select, use and combine the appropriate technology tools to create effects that will have an impact on others. I can select an appropriate online or offline tool to create and share ideas. I can review and improve my own work and support others to improve their work. 	<ul style="list-style-type: none"> I can describe different parts of the Internet. I can use different online communication tools for different purposes. I can use a search engine to find appropriate information and check its reliability. I can recognise and evaluate different types of information I find on the World Wide Web. I can describe the different parts of a webpage. I can find out who the information on a webpage belongs to. 	<ul style="list-style-type: none"> I can use a spreadsheet and database to collect and record data. I can choose an appropriate tool to help me collect data. I can present data in an appropriate way. I can search a database using different operators to refine my search. I can talk about mistakes in data and suggest how it could be checked. 	<ul style="list-style-type: none"> I can decompose a problem into smaller parts to design an algorithm for a specific outcome and use this to write a program. I can refine a procedure using repeat commands to improve a program. I can use a variable to increase programming possibilities. I can change an input to a program to achieve a different output. I can use 'if' and 'then' commands to select an action. I can talk about how a computer model can provide information about a physical system. I can use logical reasoning to detect and debug mistakes in a program. I use logical thinking, imagination and creativity 	<ul style="list-style-type: none"> I protect my password and other personal information. I can explain why I need to protect myself and my friends and the best ways to do this, including reporting concerns to an adult. I know that anything I post online can be seen, used and may affect others. I can talk about the dangers of spending too long online or playing a game. I can explain the importance of communicating kindly and respectfully. I can discuss the importance of choosing an age-appropriate website or game. I can explain why I need to protect my computer or device from harm. I know which resources on the Internet I can download and use.

Year 6

Creating media	Networks & Data Representation	Data	Programming	e-Safety
<ul style="list-style-type: none"> I can talk about the audience, atmosphere and structure when planning a particular outcome. I can confidently identify the potential of unfamiliar technology to increase my creativity. I can combine a range of media, recognising the contribution of each to achieve a particular outcome. I can tell you why I select a particular online tool for a specific purpose. I can be digitally discerning when evaluating the effectiveness of my own work and the work of others. 	<ul style="list-style-type: none"> I can tell you the Internet services I need to use for different purposes. I can describe how information is transported on the Internet. I can select an appropriate tool to communicate and collaborate online. I can talk about the way search results are selected and ranked. I can check the reliability of a website. I can tell you about copyright and acknowledge the sources of information that I find online. 	<ul style="list-style-type: none"> I can plan the process needed to investigate the world around me. I can select the most effective tool to collect data for my investigation. I can check the data I collect for accuracy and plausibility. I can interpret the data I collect. I can present the data I collect in an appropriate way. I use the skills I have developed to interrogate a database. 	<ul style="list-style-type: none"> I can deconstruct a problem into smaller steps, recognising similarities to solutions used before. I can explain and program each of the steps in my algorithm. I can evaluate the effectiveness and efficiency of my algorithm while I continually test the programming of that algorithm. I can recognise when I need to use a variable to achieve a required output. I can use a variable and operators to stop a program. I can use different inputs (including sensors) to control a device or onscreen action and predict what will happen. I can use logical reasoning to detect and correct errors in a algorithms and programs. 	<ul style="list-style-type: none"> I protect my password and other personal information. I can explain the consequences of sharing too much about myself online. I support my friends to protect themselves and make good choices online, including reporting concerns to an adult. I can explain the consequences of spending too much time online or on a game. I can explain the consequences to myself and others of not communicating kindly and respectfully. I protect my computer or device from harm on the Internet.