Computing Overview and Sequencing of Learning

Through Computing Across the Curriculum, we aim to ensure that all of our pupils are responsible, competent, confident and creative users of information and communication technology and that they are able to understand and apply the fundamental principles and concepts of computer science at their own developmental level.

The key concepts of computational thinking we want to develop in Computing Across the Curriculum, are:

- Logical Reasoning – understanding why something happens and developing mental models of the way things work.

- Abstraction – being able to identify important information while ignoring unrelated or irrelevant details.

- Pattern recognition – making connections between similar problems and experiences.

- Algorithms – using and designing simple steps to solve problems.

- Decomposition – being able to break down complex problems into smaller, simpler problems.

- Evaluation – Judging the quality, effectiveness and efficiency of systems and processes. Deciding whether something is fit for purpose.

Understanding/ Developing Computing Across the Curriculum supports pupil's development and understanding of British Values. The school promotes British Values through our spiritual, moral, social, and cultural learning that permeates through the school's curriculum and supports the holistic development of the child so that they can 'be more', and skills learnt can be used in a variety of contexts.

Computing Across the Curriculum has been carefully designed and sequenced to provide pupils with a secure, coherent knowledge of computational thinking and the use of digital technology across all subjects. At all stages, the curriculum links to previous content and concepts and identifies later links.

Computational thinking and the use of technology is prevalent in all areas of our curricula and supports the delivery and understanding of other subjects. The

subject is arranged in broad areas in order to aid coherence with the wider curriculum subjects:

• Computational Thinking: Using Logical reasoning, Abstraction, Pattern Recognition, Algorithms, Decomposition and Evaluation to analyse and solve problems in our daily lives. This will not necessarily involve the use of any technology, but at later stages of development will be essential in understanding how computers work.

• Tinkering:
Tinkering is trying out something new to discover what it does and how it works. It's the 'hands on' element of logical reasoning and heavily involves the areas of engagement. Beginning with experiences of cause and effect, Tinkering progresses towards play-based experimentation, full of questions and surprises. Ideas which may seem wrong can be tried, just to see what happens. As pupils progress, tinkering becomes more-purposeful exploration and creation, often through trial and improvement. Tinkering helps pupils to see their use of technology as being about developing their own understanding, rather than getting a "right" answer. It helps pupils to be open to novel and innovative solutions.

• Digital Communication → Digital Storytelling:
Digital communication involves the use of digital technology to communicate our wants and needs and to comment on the world around us. As pupils' skills develop, they will begin to use technology to present and publish their own stories and narratives. This will progress to film and animation.

• Digital Audio:
The use of digital technology to create, generate, record, edit, manipulate, store, broadcast and transmit sounds.

• Digital Art and Design:
The use of digital technology in Art and Design. Access to computers, mobile devices, scanners, digital cameras, printers, the internet, augmented reality and virtual reality (AR and VR) and fabrication technology such as 3D printers can give pupils opportunities to express their ideas and be creative in new and exciting ways.

• Digital Independence:

Digital independence focuses on developing the skills and understanding to be able to use devices functionally and independently in everyday life in preparation for adulthood, e.g., making a phone call, using a microwave, using a streaming service.

• Digital Safety:
Digital safety focuses on pupils' safe use of technology – particularly around developing understanding of online safety.

Computing Across the curriculum is carefully planned to ensure concepts are taught in optimal order to support children's understanding. Medium term plans are tailored to the needs of each class, adapting the learning areas and opportunities to the interests, needs and level of learning of the class. They consist of basic mapping of concepts, resources, activities and content link to the termly curriculum topic area. This is actioned at a pupil level through the use of a highly personalised planning. Very small-stepped targets across a range of areas (including communication, interaction, emotional development and social skills) so that pupils make consistent progress towards their aspirational targets outlined in their Education Health and Care Plan (EHCP).

At the earliest stages, the sequence of learning begins with engagement with simple cause and effect activities within the pupils' holistic curriculum. Pupils will explore experiences and begin to realise simple mental models of the way things work – "when I push this, this happens!" They will begin to show anticipation of the effects of their actions.

Staff will model and facilitate the use of digital technology in all subject areas and will use their knowledge of individual motivators to engage pupils with a variety of experiences and devices.

As computational thinking becomes more developed children will begin to apply these skills through tinkering with devices during their play and exploration of the classroom. Engaging in purposeful exploration, experimentation, and creation, often through trial and improvement.

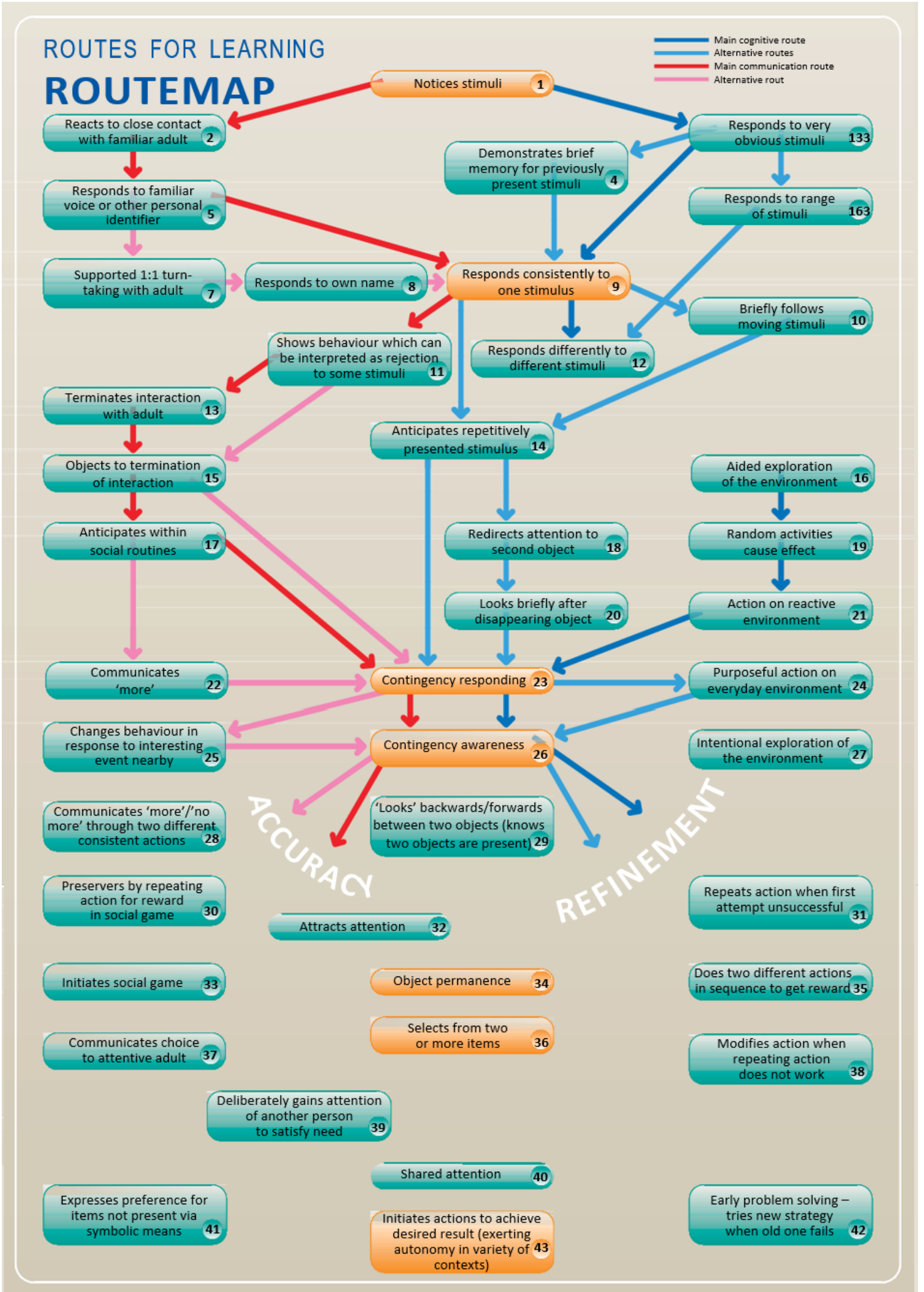
Pupils will begin to show an interest in the use of technology to create and communicate and to assist them in carrying out familiar tasks independently. They will evaluate the effectiveness of systems and processes and determine the best device to use for a task.

As their understanding of computational thinking and their skills in using technology becomes more secure; pupils will begin to apply these concepts in more complex ways. Creating and following algorithms for familiar tasks and using simple code to control devices. They will recognise errors in algorithms and code and begin to debug them.

Computing Across the Curriculum prepares pupils for future learning and transition to Key Stage 3 by giving a sound and secure understanding of the fundamental concepts of computational thinking which serve as the foundation for coding and computing. By providing rich opportunities to apply these concepts and use a broad range of technology in meaningful, functional contexts, we aspire to enable our pupils to apply their technological understanding in the wider community to allow them to live fulfilling and independent lives, both now and in adulthood.

Sequence of Learning for Learners on our Informal Pathway

The Routes for Learning Routemap (diagram on next page) focuses on learners' early cognitive development, their communication and social interaction skills, and their interaction with the environment. The most important milestones are shown in orange boxes. The learning descriptors are numbered for ease of reference and do not show an expected sequence of learning. Likely next steps are, instead, indicated with arrows. Some of our learners on the informal pathway also demonstrate learning at Band 1.


ROUTES FOR LEARNING
ROUTEMAP
Main cognitive route
Alternative routes
Main communication route
Alternative rout
Notices stimuli 1
Reacts to close contact with familiar adult 2
Responds to very obvious stimuli 133
Demonstrates brief memory for previously present stimuli 4
Responds to familiar voice or other personal identifier 5
Responds to range of stimuli 163
Supported 1:1 turn-taking with adult 7
Responds to own name 8
Responds consistently to one stimulus 9
Briefly follows moving stimuli 10
Shows behaviour which can be interpreted as rejection to some stimuli 11
Responds differently to different stimuli 12
Terminates interaction with adult 13
Anticipates repetitively presented stimulus 14
Objects to termination of interaction 15
Aided exploration of the environment 16
Anticipates within social routines 17
Redirects attention to second object 18
Random activities cause effect 19
Looks briefly after disappearing object 20
Action on reactive environment 21
Communicates 'more' 22
Contingency responding 23
Purposeful action on everyday environment 24
Changes behaviour in response to interesting event nearby 25
Contingency awareness 26
Intentional exploration of the environment 27
ACCURACY
REFINEMENT
Communicates 'more'/'no more' through two different consistent actions 28
'Looks' backwards/forwards between two objects (knows two objects are present) 29
Preservers by repeating action for reward in social game 30
Repeats action when first attempt unsuccessful 31
Attracts attention 32
Initiates social game 33
Object permanence 34
Does two different actions in sequence to get reward 35
Selects from two or more items 36
Communicates choice to attentive adult 37
Modifies action when repeating action does not work 38
Deliberately gains attention of another person to satisfy need 39
Shared attention 40
Expresses preference for items not present via symbolic means 41
Initiates actions to achieve desired result (exerting autonomy in variety of contexts) 43
Early problem solving – tries new strategy when old one fails 42

-Computing

--Band 1

---[] I turn towards a sound
---[] I respond to music
---[] I can access digital content e.g. watching a song video on the computer or interactive whiteboard
---[] I can anticipate repeated sounds, sights and actions when an adult demonstrates an action toy several times

--Band 2

---[] I can anticipate repeated sounds, sights and actions e.g. when a button is pressed on a pop-up toy
--[] I show an interest in toys with buttons, flaps and simple mechanisms and am beginning to learn to operate them
---[] I am beginning to operate toys with buttons, flaps and simple mechanisms e.g. toy camera
---[] I engage with technological role play e.g. toy phones, cash registers
---[] I engage with a variety of simple cause and effect games and/or apps and produce a simple result, with support (including colour in and jigsaw games)
---[] I use technology to explore and access digital content e.g. IWB song choose
---[] I can move objects on a touchscreen by touching/dragging
---[] I can follow a simple instruction either verbally or when shown a symbol to control a device e.g. can press 'go' on a beebot to start a pre-inputted sequence of moves
---[] I can count 1, 2 lots in a digital resource
---[] I know that technology around me can control things (e.g. remote control turns on smartboard, light switch turns on light

--Band 3

---[] I can turn toys/equipment with a simple switch, on e.g. keyboard, torch
---[] I can operate a mechanical toy e.g. turn a knob on a windup toy, pull back a friction toy
---[] I can operate a digital device with support to fulfil a task
---[] I can repeat a digital device with support to fulfil a task
---[] I can repeat an action to trigger a specific outcome
---[] I know to pick up a receiver if a telephone is ringing and respond with words/vocalisations
---[] I can create simple digital content e.g. mark making on IWB

---[] I seek to acquire basic skills in turning and operating some ICT equipment
---[] I can select basic options in a familiar application e.g. choosing a colour in a paint program
---[] I understand you can control video and audio e.g. play, stop, restart
---[] I can follow instructions to control a device
---[] I can select random letters/symbols on a keyboard
---[] I can use a digital camera/iPad to take "random" pictures
---[] I can sort familiar objects into given categories e.g. big/little, shapes, and colours
---[] I can sequence 2-3 images of an everyday activity in task order e.g. getting dressed, brushing teeth

--Band 4
---[] I can operate a range of simple equipment e.g. turn on CD player, use remote control
---[] I engage appropriately with technological toys with knobs or a pulley, or real objects such as cameras or mobile phones
---[] I can make toys work by pressing parts, lifting flaps etc to achieve effects such as sound, movements or new images
---[] I am familiar with, and can name, a range of digital devices e.g. computer, iPad, beebot
---[] I show awareness that information can be stored and retrieved (e.g. I may ask to look at a photo I have taken, request a particular video/song from the whiteboard)
---[] I know that information can be retrieved from computers
---[] I can find information from a familiar website with support (e.g. navigate to a particular video on Espresso e.g. about animals)
---[] I can control a device to do a specific task e.g. move beebot/remote controlled cars from one place to another
---[] I can follow a set of symbolistic instructions e.g. to make a sandwich of my own choice
---[] I can count 1-5 in a digital resource
---[] I can sort familiar objects into 3 or more given categories
---[] I can create a simple picture using the mouse
---[] I can name the basic parts of a computer e.g. mouse, screen, keyboard
---[] I can use a keyboard or other access device to add text to a document

--Band 5
---[] I can complete a range of simple programs on the computer

---[] I can use ICT hardware to interact with stage appropriate computer software
---[] I use a computer mouse to select icons on the computer
---[] I can find information on the internet using a basic internet search
---[] I can choose appropriate software for a particular task e.g. email for sending messages, clicker 7/Microsoft word for writing
---[] I can independently load software and make a choice within that software e.g. within 2simple can choose whether to paint or create a graph
---[] I can recognise the differences between different forms of information (text, graphic, audio, and video)
---[] I can recognise that a range of technology is used in places such as homes/schools
---[] I can navigate to a specific page of a familiar website (e.g. espresso, school website) or resource (e.g. Clicker – Find out and Write About) to gain info
---[] I can present information and ideas by combining different media e.g. text and graphics
---[] I understand that you can edit and change digital content
---[] I can select basic options to change the appearance of digital content e.g. manipulate a photo to correct orientation, sizing
---[] I can give simple instructions control devices (e.g. make a character in Espresso Coding move across the screen/follow a path
---[] I can put the steps of a known task in order in a list (may be pictorially/symbols)
---[] I can create a short sequence of instructions to control a device, using symbols/words
---[] I can collect simple data (e.g. likes, dislikes) on a topic
---[] I can present data using images, e.g. pupil symbol/name and a picture of what they like to eat