**Programme of Study Key stage 1 from Naace and CAS**

**Algorithm**. An algorithm is a precise method for solving a given problem. At KS1 an understanding of algorithms might be that a problem can be solved through a number of clear steps (e.g. open bread bin; take 2 slices; put bread in toaster; wait until toast pops up; take toast out; eat it). Including steps such as "counting" and "waiting until" adds an element of decision making and flexibility (e.g. take 4 slices) and encourages pupils to understand why algorithms are so useful for solving a wide range of problems and that they are using algorithms every day!

 \_*Pupils should make algorithms in a range of ways, with a range of tools.*

o **Example**: Make a toy robot, floor turtle or screen turtle move around a square with sides of length 4.

o **Algorithm**: go forward 4, turn right, and do that repeatedly until you get back to where you started.

 \_*Pupils should learn that there may be many algorithms that solve the same problem.* Describing the route home may have different answers and provides a context for learning that reinforces understanding that algorithms exist in a variety of forms. The toy robot may be given different instructions to travel around a square with sides of length 4.

o **Algorithm 1:** go forward 4, turn right, and do that repeatedly until you get back to where you started.

o **Algorithm 2:** repeat four times: go forward 4, turn right

 \_The algorithm above could also be used to draw a square with a screen turtle, then draw a tilted square with sides the same length.

 \_*Pupils should explore and devise "real world" algorithms and appreciate that a good algorithm will enable things to be achieved better, faster or more easily.*

o **Example**: from a pile of 64 coins, all of equal weight except one that is lighter, find the light coin, with only a weighing balance.

o **Algorithm 1**: weigh the first two coins. If one is lighter, that’s the light coin. If not, discard both. Repeat until you find the light coin.

o **Algorithm 2:** divide the pile in half, and weigh the two halves. Pick the lighter half, and repeat.

 \_*An algorithm might be executed on a computer – but it might not.* Algorithms can be physically "acted out" by pupils in an analogue way, such as a precise set of instructions for leaving the classroom during a fire drill without losing any children. The coin sorting is done manually - both of these are algorithms even though they are not executed using any technology.

 \_*An algorithm may be expressed informally, unlike a program; but should be precise enough that a reasonable person would not be in doubt about how it works*. There is no irrelevant detail, even though it might appear to be informal.

 **Programs execute:** The computer carries out the instructions contained in the programme.

 **Simple programs.** These may be sequences of instructions for controlling outputs such as the movement of a robot (eg Bee Bot or ProBot) or an on screen turtle or sprite. Simple programs might be responsive to input e.g. mouse, touch, keyboard, sensor. Other examples of programs may be the algorithm that navigates a person around an obstacle course (move left, right, jump etc); or an algorithm that plays noughts and crosses on paper; or an algorithm to dance the "Gay Gordon" or similar dance. These can be created, and 'debugged'.

 **Logical reasoning** is not used here as a technical term. It just means that students should be able to explain cause and effect, rather than randomly guess without reasoning. It includes predicting what will happen as a result of applying a program.e.g. "If the robot turns right four times (through a right angle), it will be facing the same way as it started".

 **Creating and manipulating digital content** should include the use of text, images, video, sound. Pupils should learn to use different input methods effectively and efficiently - e.g. touch, mouse, keyboard, voice recognition, gestures, etc. Manipulating the digital content refers to editing and refining their text, images, video and sounds. The key idea here is that they can control their own final product and there is more than one way to do it.

**Organising, storing and retrieving digital content** includes the efficient and effective use of the computer file system or equivalent cloud-based storage (which is simply an alternative file system). This should be closely linked with pupils' own work.

 **Use technology safely and respectfully** may be through a whole range of digital content types. Using appropriate online etiquette for online interactions can be included here, as well as developing skills in using different tools. Knowing what 'stranger' means and associated online risks is an important part of safe use. It also includes knowing how to report inappropriate content to a responsible adult. It may be taught and reinforced within the context of creating digital content.

 **Keeping personal information private**. At KS1 the context for this learning may include passwords that are used to access the school network, learning platform, website or other online/offline tools or content. Using a "garden-walled" non-public online environment may provide the opportunity for pupils to explore the use of digital communication and which personal information they would not wish to share widely - and why it is not a good idea to share it widely. Personal information includes the obvious identifying information such as full name and address. It also includes less obvious information that enables inferences to be drawn, such as photographs with school uniform, membership of a club that meets at a particular time.

 **Recognising common uses** of information technology beyond school is about raising awareness of the vast number of devices, tools and everyday activities that make use of technology.

 **Knowing where to go for help and support** is an important aspect of safe and responsible use. In the first instance, this might mean identifying an appropriate adult to speak to. Consideration may include who this might be in school, at any out of school club setting or at home. It is also important for pupils to know that such information may be passed onto appropriate people who can help, whether that is through a measured response by teachers, parents, carers or the head teacher; online support; or through others involved when responses to serious incidents need to be escalated.