30006
Consider availability of font libraries when designing digital artefacts e.g. online font libraries

30007
Be aware that choice of font and style affects the readability - and therefore accessibility - of digital text

20004
Understand that text attributes (e.g. bold, italics). can be used to provide emphasis and aid understanding of text

10001
Be aware that the font used, and the size and style of text, affects the readability of text in a digital artefact

30008
Understand how choice of colours can affect the usability and accessibility of digital artefacts (e.g. colour blindness)

20005
Be aware that choice of colour affects users' perceptions of digital artefacts (their 'look and feel')

10002
Be aware that colours affect the readability of text

20009
Plan how to lay out items on screen (using paper-based prototypes)

30013
Plan with consideration for design, for a given audience/user group

30005
Recognize that the design of a digital artefact or user interface will affect its usability

30004
Be aware that layout needs to be balanced e.g. text & images are positioned & sized appropriately, including value of 'white space' in digital artefacts

20003
Understand that presentation style and the use of effects e.g. sound & animation, can emphasise the purpose of digital artefacts to the audience

10027
Understand that image and sound (e.g. animation or narration) can make digital artefacts more enjoyable, accessible and understandable to an audience

10005
Understand that people interact with computers

20002
Recognise that button shape, size, use of symbols etc. etc. can affects usability

30009b
choose, use and combine multiple software packages to achieve a challenging goal

A0008
Combine a variety of forms of presenting information from a range of digital devices to create a single multimedia file

30009a
choose, use and combine software packages to achieve a specific goal

20006
combine a variety of forms of presenting information to create a single digital artefact.

A0002
Store and organise digital artefacts with the purpose of using and manipulating them in different digital formats

??????
know that information exists in a variety of forms and be able to gather it from a variety of sources

??????
recognise that computer programs use sounds, text and pictures to communicate information

10003
Know how they convey information

30003
Give consideration to the properties of media (e.g. image resolution or sound file size) when importing into digital artefacts

A0071
Understand the way of working collaboratively and their advantages

40005
Use simple user interface design guidelines

A0055
demonstrate an awareness of the difference between cascade and spiral life cycle models

30002
Consider the impact that the age and gender of the target audience has on the design of digital artefacts, and understand how design decisions can affect those with disabilities

40002
Identify the phases through which systems pass in a simple lifecycle model

30001
Identify the needs of a given audience/user group before designing a solution

20054
Be aware of the idea of a design lifecycle

50004
Analyse problems and specify requirements

50003
Identify potential user groups and their varying requirements

40016
Evaluate a software artefact against a set criteria

50005
Devise an appropriate set of criteria for evaluating an artefact

50001
Design solutions to problems

30042
Write programs that make use of pre-existing sub-programs provided by a standard library

A0044
Know common tools and facilities available in an IDE including editors, error diagnostics, run time environment, translators and auto documenters

40003
Be aware of the cost, quality, time triangle

50002
Develop programs incrementally

40024
Be aware of approaches to program translation (compilation and interpretation)

30053
Be familiar with a text-based high level programming language

20044
Be familiar with a program development environment in which programs can be written without using text

A0054
Rationally choose a programming language for a particular project

A0045
Know the characteristics of an assembler, an interpreter and compiler

A0053
know the differences and similarities between programming languages

40011
Be aware and reasonably familiar with a low level programming language

A0043
Correct syntactic errors (errors in grammar)

30054
Detect syntactic errors (errors in grammar)

20045
Detect semantic errors (errors in meaning)

20069
Correcting semantic errors (errors in meaning)

20043
Evaluate the usability of a digital artefact

40030
Test the functionality of programs

40031
Understand the relationship between specifications, programs and test plans

40050
Determine the extent to which programs meet their specifications

30024
programs can be made to appear 'intelligent' by the way
they respond to inputs

20020
appreciate that programs can work with different types of input data

40012
Understand when to use sequential data structures, and how to construct and use 2-D structures

30088a
Understand how to use sequential data structures such as 1D arrays or lists

A0042
Use basic file handling operations: open, write, read and close

30088b
Manipulate a sequential data structures such as 1D arrays or lists

A0057
justify (by presenting) the use of selected algorithm to solve a given problem

20070
use logical reasoning to explain the purpose of an algorithm in terms of inputs and result

10029
Use logical reasoning to explain the purpose of a simple algorithm /program

30091
Describe the relative merits of different models for the same real-world problem or system

30027
use logical reasoning to evaluate the performance trade offs of using alternative algorithms

10024
Design algorithms using pre-defined blocks that are represented graphically or as images

10016
Understand that an algorithm is a sequence of predefined instructions or steps

20055
Understand that an algorithm is anexact set of precise steps to solve a problem

30029
use logical reasoning to explain how a algorithm/program works

40014
Appreciate that different algorithms have different performance characteristics for the same task

20048
Design simple algorithms and express them in natural language

20053
create a program that implements a given algorithm

20021
use logical reasoning to explain how a simple algorithm/ program works

A0056
awareness that a solution to a problem maybe made to solve a whole range of related problems

40015
Appreciate how the choice of data structure and the values being manipulated influences the choice of algorithm

20047
Design algorithms using flowcharts

20050
Decompose a problem into component parts and compose a solution from those parts

30028
Appreciate that the choice of algorithm is influenced by what is required of the solution (speed, memory usage, etc)

30055
Design algorithms and express them in structured language ("pseudocode")

30012
Understand that different problems may share similar characteristics

30098
Write and use sub-programs, each of which contains an algorithm that solves part of a problem

40010
Write and use sub-programs that call other sub-programs, to multiple levels of nesting

30011
Recognise where two problems have similar characteristics and use the same algorithm to solve both

10008
Be aware that users can create their own programs

10009
produce algorithms to describe everyday activities, and be aware of how precise they need to be

10014
Create a simple program

30029
use logical reasoning to explain how it works

10013
Verify that a simple program does what it should

30058
Detect and correct errors in individual sub-programs

10017
Make predictions about what will happen when a program is run

40013
Document the design and operation of a program using text, diagrams and images as appropriate

20023
Understand that computers need more specific instructions than humans

10015
Understand that computers have no intelligence; they execute programs blindly

20010
distinguish between the tasks best undertaken by humans and by computers

10012
Be aware that algorithms are implemented as programs on digital devices

A0004
control or simulate the control of a physical device e.g. an object's behaviour on a monitor screen

30025
Appreciate that a program should tell human readers a story. Comments explain what is going on and why. Code says how to get from beginning to end

30052
Appreciate the need to check that software does what the user actually wants (program validation)

30030
Use a given test plan to check that software does what the specification says (program verification)

20022
Detect and correct errors in simple algorithms and programs

20019
take care and precision are necessary to avoid errors

10028
Change values in a simple program and predict the outcome when it is run

A0005
Understand and use a sequence in a algorithm/program

30079
Use uncounted loops

20064
Appreciate that sequences can be repeated

30080
Use counted loops

40069
use a loop control variable to govern loop termination

20052
know computers take inputs, process data and produce outputs

30083
Use two-way (do this/ do that) selection

30014
Use recursion

20001
Use simple (do/don't) selection in programs

30090
Understand the difference between simple selection and two-way selection

30089
write functions that take inputs and return a value

20068
declare and assign variable in programs

A0009
Appreciate that values can be moved between variables

30087
Be able to read and write Boolean expressions in the context of program control

30086
Understand and use relational operators

A0014
Understand what program variables are and what they are for

20049
Store data in and retrieve data from a table

40043
Understand that it is possible to define relationships between records in different tables, and what is meant by the degree of a relationship

40044
Understand that an entity/ table is defined by the collection of data items (fields) that make up a typical record

40033
Appreciate the need for query languages and be able to use a typical one

30023
Understand how operators are affected by negation

30023b
To assign data types

40049
Understand what a relational data model is, and how this is manifested in a relational database

A00046
use the word 'information'

A0001
Collect and identfy objects by properties (data) and their properties to organise (group) them e.g. shape, colour, material etc.

A0012
understand that 'information' is 'data' that has been collected and has been 'processed'

20016
use rows and columns

20015
sort and search for data

A0011
collect data (e.g. survey, etc.) and manually analyse

40039
Understand that a record may contain one or more foreign keys and they are used to implement relationships

40041
Appreciate that each table contains a set of records and fields

40042
Appreciate that a relational model contains entities, and that these are implemented as tables

40040
Understand what a key field is, and what makes a field a primary key

40045
Understand what data validation is, and what it is for

40034
Understand what database modules are, and what they are used for

40037
Understand and write queries that will extract the desired set of records

40035
Understand what database forms are, and what they are used for

40036
Understand the relationship between query results and reports

30022
Be aware that data may contain errors and that this can affect search/output results

40038
Understand what data verification is, and what it is for

A0050
construct different types of questions for different purposes, eg closed questions that can only be answered by yes or no, or more open questions

30021
Understand that personal information should be stored accurately and securely, used for limited purposes, and treated with respect

40009
Be aware of legislation relevant to the storage, retrieval and transmission of data, and understand its provisions

A0047
know that data can be represented using a pictogram and that the length of the column in a pictogram, the higher the number

A0048
use a pictogram to answer simple questions

40046
Understand the importance of consistency and appreciate why data redundancy and duplication are undesirable

40048
Appreciate what a Database Management System (DBMS) is, and what it is used for

40047
Understand the notions of data independence and application independence in the context of databases

A0035
Know the merits of custom written software, off the shelf, open source and proprietary software

30057
Understand what is meant by Application Software

20014
Appreciate that both operating systems and application software make use of stored data

20046
Understand that an operating system mediates between application software and machine hardware

30051
Be aware of Moore's Law

20033
Understand that application software refers to programs that have been created to meet a human need

10023
Be aware that all software is programmed, and that computers can do nothing unless they are running programs

A0013
and create a graph using data to interpret results

A0020
categorise software into groups by their purpose

20034
Recognise and name the internal components of the computer

30034
Know the basic architecture of a computer and the function of its component parts

A0099
Understand High and low voltage

A0024
Understand the purpose and function of CPU

A0026
Know the role of cache memory in speeding up execution

40021
Understand why some memory is read only and that it is non volatile

30046c
understand the concept of and work with the folder hierarchy i.e. move files and folders

A0015
recognise the respective extensions of the different types of files and determine which software uses them

A0016
store and open files on a local server or external media

40028
Understand the Von Neumann architecture and the fetch execute cycle

30046b
create folders and move files between them

30046a
create and use folders when working with files

A0017
open, edit and save files in some applied software

20041
Understand that a computer collects data from input devices, and that there are many different types with different characteristics

A0018
use the navigation and menu systems to start, close adjust i.e. minimise and maximise windows, software applications

A0049
enter words using a keyboard

A0032
Know suitable input and output devices for a wide range of computer controlled situations and human needs

A0019 switch between applications to complete a given task

A0023
Understand the environmental considerations e.g. computer waste, recycling, environmentally friendly materials and energy efficiency

A0021
Understand the advantages of standardising hardware interfaces and communication protocols

20035
Understand that a computer sends data to output devices, and that there are many different types with different characteristics

A0022
Show awareness of the bodies that develop and produce standards

A0025
Know the measurements of clock speed including over clocking

A0028
Show an awareness of the architecture of modern processor e.g. single, dual and quad core

A0027
Show an awareness of physical core and logical paths of execution and how this improves performance

40027
Understand what is meant by the term 'secondary storage' and appreciate that different storage media and implementation strategies are available

40026
Understand what persistent storage is and when it is used

A0034
Justify selection of storage devices and storage media for a given application e.g. portability reliability, speed and durability

A0010
collect reliable and robust data e.g. through a sensor

A0063
Compare social networks, their purpose and functions

A0064
know the types of social media and awareness of social norms

A0066
understand what is meant by distance learning

A0064
use social networks for learning as an information resource

20024
Know the difference between the Internet and world wide web

A0067
know the features, functions and target audience of different online forms of communications

10018
Know that the world wide web contains an enormous amount of digital artefacts i.e. documents, images, audio, video etc.

10010
Communicate safely and respectfully online

A0061
identify a range of methods for communicating e.g. telephone, fax, email, web conference

20028
Keep network login safe

10021
Be aware of, and follow basic 'health and safety' guidelines when using isolated and networked IT systems

A0057
understand the causes of computer related health issues e.g. Back strain, RSI, Eye strain etc.

10019
use web browsers and understand that each web page has a unique address

20029
Understand what constitutes inappropriate contact over the internet and avoid such contact

A0006
demonstrate safe using web services e.g. VOIP and email

A0070
Consider the risks of computer (and internet) addition

A0058
understand ways of avoiding health problems related to using computers with consideration for ergonomics

A0059
Be aware of legislation governing the welfare of employees i.e. Health & Safety, using equipment such as computers

A0062
Understand and demonstrate concept of netiquette, 'online' and 'offline'

10011
Keep personal information private

20030
keep personal information private and stored securely when using web services

20011
Appreciate that the internet supports a wide range of different services, such as VOIP, streaming and the web

20027
Recognise the importance of limiting the amount of time spent working on a computer

10004
Be aware that information can be represented in a variety of forms, e.g. text, numbers etc

20008
recognise that information can be represented in a variety of forms, e.g. symbols, puzzles etc

40019
Understand that users and systems can be granted or denied access rights

A0031
Be aware of ethical issues surrounding the application of IT, and of the existence of a legal framework governing its use

40018
Appreciate what failover is, and the circumstances under which it happens

30037
Appreciate the need to backup data, and keep backup copies of their own materials

10020
Use a web browser to navigate between web pages and sites

20031
Show awareness that digital content may be available for ever on the internet

20012
Understand that the internet is a collection of digital devices connected together sharing the same way of communicating

10006
Appreciate that a web browser is a program used to view pages published on the web, and to navigate between them

A0040
Know a brief history ofHTML and www consortium

20026
Understand the structure of a URL, and

30038
Understand basic techniques for encipherment, such as substitution

30039
Appreciate the notion of acceptable use

40062
Understand the notion of preventive security measures

40060
Be aware of legislation governing the misuse of digital technology

40061
Understand the notion of corrective security measures

40017
Understand what disaster recovery is, and why it is necessary for organisations to have effective disaster recovery mechanisms in place

30076
use HTML & Custom Style Sheets

40059
Know how to use html to add colour to a web page

40051
Understand how a URL is structured

20018
Appreciate that a web page is constructed by a web browser using instructions given in a language called HTML

30075
Appreciate that a protocol is a set of rules governing communication between systems and be aware of simple protocols

40068
Understand IP addresses and MAC addresses, and the difference between them

40007
Understand the need for routing

30073
Appreciate that special hardware and software is required for connecting to a network

40065
Understand the need for security measures

30068
Be aware that software can be used to detect some security breaches

30072
Be aware of what a LAN is

40066
Understand what a client-server system is

30017
Understand that a network is a collection of digital devices communicating with one another

40067
Be aware of a range of network topologies and their pros and cons

40064
Understand the Domain Name System (DNS), and the purpose of DNS servers

30036
Be aware of what a WAN is

40006
Understand that problems (such as deadlock) can arise in networks of communicating devices

30067
Understand that hexadecimal is just a compact and human-readable way of representing bit strings, and convert between binary, hex and denary

20007
Understand what is meant by the term 'compression'

30010
perform basic data compression techniques on text & calculate percentage compression

40001
Determine which data compression technique has been used from the file extension

40054
Appreciate the difference between 'lossless' and 'lossy' data compression

30020
Be aware that the choice of representation influences how easy it is to perform an operation or solve a problem

30056
Understand what file extensions are, and what they are for

40025
Be aware of the need for memory management and some common techniques that may be employed by operating systems in the management of memory

30064
Know unit measures (e.g. bits, bytes)

40057
Calculate unit measures i(e.g. from bits to bytes)

40056
Understand the idea of a character set e.g. ASCII, and that each character must have a unique binary representation

30019
Understand that the same bit pattern may be used to represent many different things, and that one thing may have many different binary representations

30066
Convert between binary and denary representations of whole numbers

40074
Be aware that data are sent between systems in chunks, and that the chunks in a single message may not all follow the same route

40074
Be aware that data are sent between systems in chunks, and that the chunks in a single message may not all follow the same route

40070
Use multi-way selection

30081
Use nested selection statements

30082
Use a sequence of selection statements

30085
Understand the semantics of simple Boolean operators and use them in expressions

30084
Appreciate that data values are typed, and understand the differences between simple data types

30077
Appreciate what a web server does

20066
Understand how to use a search engine

20067
Understand and use arithmetic operators

20062
Show a basic understanding of search results

30035
Carry out an advanced web search effectively

20061
know Domain Structure

10025
Obtain documents via the internet

20032
Identify the author of a web page and respect ownership

10022
understand the idea that a document has an author and a publisher

30018a
Appreciate that search engines select pages

30018b
Appreciate that search engines select and rank pages

30026
Appreciate that programs can can model and simulate environments to answer "what if" questions

30016
Investigate what may be achieved algorithmically, and understand that some things are not computable

20056
write a program to achieve a specific goal

20025
Carry out a basic web search effectively

30033
Appreciate the difference between primary and secondary sources, and between fact and opinion

30032
Record and cite sources of information

40063
Understand the idea of intellectual property, and be aware of the legal framework that supports intellectual property rights

30078
Understand simple algorithms to perform common tasks (such as sorting and searching)

10007
Appreciate that information can be stored & communicated (presented) in variety of forms e.g. text, image

10026
Be aware that digital computers employ binary representations for all data

20017
Be aware that all data items are transmitted in binary

20059
know that data need to be converted into binary to be processed by a computer

40071
Read and write truth tables

40020
Read and write block diagrams showing logic gates

30040
Understand what a web browser does and what it can be used for

???
Know the relationship between pixels & VDU refresh rate

20058
Know how an image may be represented as a series of pixels, each described by a bit pattern

30063
Understand that the resolution of an image depends on the number of pixels used, and how this affects the number of bytes required to describe it

30062
Appreciate the difference between a vector image and a bitmap, and how file extensions may be used to indicate which type is present

40055
Understand colour depth

30065
Perform binary addition

40058
Perform binary addition with overflows

20060
Understand how a bit string may be used to represent whole numbers (counting in binary)

A0029
Understand the concept of high and low voltage and the relationship to binary

40008
Know how numbers with a fractional part may be represented in binary

A0068
understand the impact of the uses of digital devices on the way organisations/ individuals operate .e.g. GPS

A0037
Understand the relationship between character sets and parity bits

A0041
Understand the importance of compressing files transferred through the internet

A0039
Know common file standards associated with the internet

30060
Be aware of a range of commonly used audio file types

40053
Appreciate the role of sampling rate and bit depth in determining the fidelity of digital data streams that represent sound

20057
Understand what a sensor is, and use one to collect input data

40052
Understand the basic operation of a digital-analogue converter (DAC)

30069
Be aware of what a modem does

30070
Be aware of what an Internet Service Provider is and does

30061
Understand what an Analogue-Digital Converter does

A0069
Awareness of the criteria for selecting an Internet Service Provider

30041
Appreciate that every processor has a set of instructions that it can interpret, that these are encoded as bit patterns, and that each of them identifies one of the low-level operations that the processor can perform

A0036
Understand the need for metadata

A0038
Know how computers distinguish between instructions and data

A0060
Predict the potential value and uses of new technologies and technologies to education, industry and home

A0003
identify common uses of computers beyond the classroom

A0033
Know how changes in memory technology are leading to innovative computer design

20013
Understand that computers are general-purpose machines, and programs turn them into special purpose machines

20037
Understand what a computer virus is

30047
Appreciate that there are different types of malicious software and understand the threats they pose to security

20038
Appreciate what anti virus software can and cannot do

30048
Appreciate what a firewall can and cannot do

30043
Be aware of major system maintenance tasks and the extent to which they can be automated

20039
Appreciate the need for system security

20036
appreciate the need for system maintenance

40049
Be aware of the main functions of an operating system

40042
Be aware that the same operating system may run on different types of device and the same device may run different operating systems

20040
Be aware that users can fix or prevent problems using utility software

30046d
Appreciate how typical system files is organised

30044
Understand what disk formatting is and why it is necessary

30045
Appreciate what disk defragmentation is and why it is necessary

A0030
Understand that Random Access Memory is volatile memory

A0029
Understand what is, and know the purpose of virtual memory

40029
Understand the basic function and operation of location addressable memory

40022
Appreciate what a bootstrap routine does and why it is necessary

30050
Be aware that current technology is based on past technology