Computer Science Accelerator diagnostic tool

Purpose

The Computer Science Accelerator Programme is designed to meet the needs of the widest range of potential and existing GCSE Computer Science teachers. Through participating in a 40 hour programme of online and face-to-face CPD you will develop your subject knowledge. This short diagnostic tool is designed to help you identify the areas of subject knowledge where you need most support so you focus on the courses that are right for you.

You will be able to use the results to select at least two face-to-face, and two online courses, from the list later in this document to plan your Computer Science Accelerator Programme.

As the programme progresses and the number and range of the courses grows, we will develop this diagnostic tool further. Our ambition is to produce a fully interactive version, building on feedback from teachers and the growing number of courses available.

How it works

The 25 questions in the diagnostic tool cover different aspects of the GCSE in computer science. Give yourself 30 minutes to answer the questions. Don't guess answers if you do not know them – it is important that you review your subject knowledge honestly.

Once you have recorded your responses, look at the answers to see how you got on. The diagnostic tool helps you identify the stage you are at in your computer science subject knowledge. Individual questions are targeted at individual topics. Correct answers will indicate where your subject knowledge is strongest. You will then see suggestions of what to do next.

Finally, the aim of this diagnostic tool is to help you plan your Computer Science Accelerator Programme. It is deliberately short and cannot be comprehensive. It can only provide indicators of areas of strength and weakness rather than a definitive view. You know yourself best. Please use this diagnostic tool to help you reflect and to inform your planning.

The questions

Question 1: Which of the following statements is **false**?

A.   An algorithm contains step-by-step instructions

B.   An algorithm contains an ordered set of instructions

C.   An algorithm is a solution to a problem

D.   An algorithm has to be written in pseudocode

Question 2: Below is a list of numbers:

17, 12, 29, 5, 48

What would be the order of the list after 2 passes of a Bubble Sort to arrange them in ascending order?

A.   29, 5, 12, 17, 48

B.   12, 17, 5, 29, 48

C.   5, 12, 17, 29, 48

D.   12, 5, 17, 29, 48

Question 3: A binary search is to be performed on a list 500 items. What is the maximum number of selections needed to find any item in the list?

A.   9

B.   500

C.   250

D.   25

Question 4: Which one of these statements is **true**?

A.   A binary search algorithm can only be used on a sorted list.

B.   A linear search algorithm is more efficient than a binary search.

C.   A binary search algorithm can only be used with lists of numbers.

D.   A linear search algorithm is a divide and conquer algorithm.

Question 5: Which of these statements is **false**?

A.   A merge sort algorithm is more efficient than a bubble sort algorithm.

B.   A merge sort algorithm does not use comparisons.

C.   A merge sort algorithm combines unsorted lists to make a sorted one.

D.   The bubble sort compares items that are next to each other.

Question 6: Which programming construct is illustrated in this example (pseudocode)?

Print "Hello"

Print "Welcome to my program"

Print "In this game you will conquer dragons"

Print "You must kill all ten"

A.   Assignment

B.   Iteration

C.   Sequence

D.   Selection

Question 7: Which programming construct is being used in the following line of pseudocode?

IF length is less than 5 THEN SEND 'This is too short' TO DISPLAY

A.   Abstraction

B.   Sequence

C.   Selection

D.   Iteration

Question 8: Which statement is **false**?

A.   Using subprograms makes programs easier to read.

B.   Using subprograms makes programs longer.

C.   Subprograms need to be defined.

D.   Subprograms can be called within the main program.

Question 9: Here is a short program written in pseudocode.

INPUT X, Y

      IF X>Y THEN Output= X-Y

      ELSE Output = X+Y

END IF

Which statement is **true**?

A.   If X is 5 and Y is 2 then the output is 7.

B.   If X is 5 and Y is 10 then the output is 5.

C.   If X is 6 and Y is 6 then the output is 0

D.   If X is 7 and Y is 6 then the output is 1.

Question 10: Which of the following statements is **true**?

A.   Processors can be programmed directly using high level-languages.

B.   Different microprocessors may have different instruction sets.

C.   Computers using different microprocessors must be programmed using different high-level languages.

D.   Programs written in high-level languages are harder for humans to understand.

Question 11: Which of the following statements is true?

A.   Using arrays in programs makes them less efficient.

B.   Arrays store multiple data items.

C.   The data items in an array can be different data types.

D.   The data items in an array must be in alphabetical order.

Question 12: A user attempts to enter an incorrect password, what method would identify this issue?

A.   Authentication

B.   Data Validation

C. Input Check

D. Verification

Question 13: What is the denary number 18 in binary?

A. 10111111111

B. 10010

C. AH

D. 1100

Question 14: How many distinct bit patterns can be represented in 6 bits?

A. 64

B. 63

C. 60

D. 6

Question 15: What is the result of adding the binary number 1011 to the binary number 0101?

A. 10110101

B. 01011011

C. 11111

D. 10000

Question 16: What does lossy compression do to files?

A. Decreases the file size but retain the same quality.

B. Does not remove any information at all.

C. Removes information in a file that is not important to reduce file size.

D. Increases the file size and retains the same quality.

Question 17: Look at the following picture.
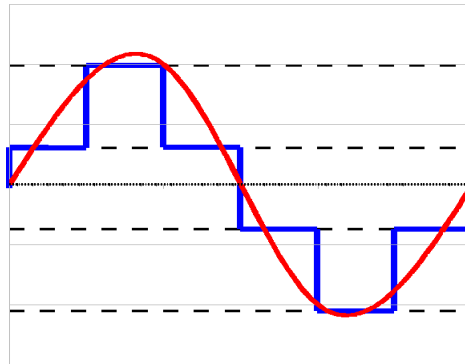
(Source: https://commons.wikimedia.org/wiki/File:2-bit_resolution_analog_comparison.png)

Which of the following statements is **true**?

A   The blue signal is stored on the computer as metadata and the red signal is stored on the computer as sound.

B   The blue signal is analogue.

C   The red signal is converted to the blue signal before storing on a computer.

D   The red signal is metadata.

Question 18: Which of the following statements is **false**.

A.   Run length encoding is used to compress files.

B.   A file that has been compressed using run length encoding is always smaller than the original file.

C.   When files are compressed using run length encoding some data is lost.

D.   Run length encoding can be used to compress images.

Question 19: Which of the following is **not** a component of the microprocessor?

A.   Cache

B.   The control unit

C.   The arithmetic logic unit

D.   RAM

Question 20: Which of the following will **NOT** increase the performance of a CPU?

A. Increasing the capacity of the hard drive.

B. Storing regularly used instructions in the CPU's cache.

C. Increasing the clock speed.

D. Increasing the number of cores.

Question 21: Below are statements about the function of the CPU, which statement is **NOT** true?

A. The CPU stores data/instructions to be performed in the cache.

B. Input and out devices are plugged into the CPU.

C. The CPU performs arithmetic calculations.

D. The CPU carries out the Fetch-Execute-Decode cycle.

Question 22: Which of the following statements about computer memory is **true**?

A. The data in ROM is lost when the computer is turned off

B. Data cannot be written to RAM.

C. The sets of instructions needed to start up a computer are stored in ROM.

D. The data stored in RAM is fixed and cannot be changed.

Question 23: Which of the following statements about computer networks is **true**?

A. Peer-to-peer networks require file servers.

B. In a peer-to-peer network data is stored on each client not centrally.

C. Peer-to-peer networks allow data to be backed up centrally.

D. Peer-to-peer networks are always more secure than client-server networks.

Question 24: HTTP operates at which layer within the TCP/IP stack?

A. The application layer

B. The transport layer

C. The Internet layer

D. The link layer

Question 25: Which statement about network security is false?

A   Phishing emails appear to be from trusted organisations or people.

B   Devices with embedded systems are not vulnerable to cyber attacks.

C   A firewall is a piece of hardware or software that protects a computer network.

D   Penetration testing tests a computer system to identify vulnerabilities.

The Answers   Total marks___/25

ALGORITHMIC THINKING   **Total marks for this section: ____/5**

Question 1: Answer. D

Question 2: Answer. D

Question 3: Answer. A

Question 4: Answer. A

Question 5: Answer. B

PROGRAMMING   **Total marks for this section:___/7**

Question 6: Answer. C

Question 7: Answer. C

Question 8: Answer. B

Question 9: Answer. D

Question 10: Answer. B

Question 11: Answer. B

Question 12: Answer. A

DATA AND INFORMATION   Total marks for this section:___/6

Question 13: Answer. B

Question 14: Answer. A

Question 15: Answer. D

Question 16: Answer. C

Question 17: Answer. C

Question 18: Answer. B

COMPUTER SYSTEMS   Total marks for this section:___/4

Question 19: Answer. D

Question 20: Answer: A
Question 21: Answer: B
Question 22: Answer: C

COMPUTER NETWORKS AND SECURITY   Total marks for this section:___/3
Question 23: Answer: B
Question 24: Answer: A
Question 25: Answer: B

What to do next

Review your answers to help you select at least two face-to-face, and two online courses as part of your 40 hour Computer Science Accelerator Programme.

If you answered 10 or fewer questions correctly, start by taking one or more of our stage 1 courses.

- Programming 101: Python for Educators

- Representing Data with Images and Sound

- How the Internet works (available from April)

If you answered 10 to 20 of these questions correctly, we suggest that you look at our intermediate courses. The questions you answered incorrectly will point you towards the specific topics to look at in the following table

	Online CPD	Face-to-face CPD
Algorithmic thinking	Maths and Logic for Computing	Algorithms in GCSE computer science
Programming	Programming 102: Think like a programmer	Python programming essentials for GCSE computer science

Data and Information		Data and computer systems in GCSE computer science
Computer systems	How computers work Computer architecture	Data and computer systems in GCSE computer science
Computer networks and security	How the Internet works	Networks and cyber-security in GCSE computer science

If you answered more than 20 questions correctly, you're in great shape. We recommend that you choose one or two courses from the table above in any areas that you feel less sure of, and consolidate with some stage 3 courses such as:

- Practical programming projects
- Physical computing (online)
- Object-oriented programming (online)
- Computer architecture (available from April - online)

Use the table on the following page to record your scores and the courses you plan to take.

My Computer Science Accelerator course plan

My diagnostic scores

Topic	My Score	Possible score
Algorithmic Thinking		5
Programming		7
Data and Information		6
Computer Systems		4
Networks and security		3
TOTAL		25

Priorities for my CPD

1. _____

2. _____

3. _____

4. _____

The Computer Science Accelerator courses I will take

Name of course	Date I will take it	Online or face-to-face

Remember, your Computer Science Accelerator Programme entitles you to select at least 2 face-to-face and 2 online courses.