

OXFORD

INTERNATIONAL  
AQA EXAMINATIONS

# INTERNATIONAL GCSE COMPUTER SCIENCE

(9210)

Mark scheme

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Paper 2: Concepts and principles of computer science  
Specimen 2017

Mark schemes are prepared by the lead assessment writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the lead assessment writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

# International GCSE Computer Science mark scheme

## How to mark

### Aims

When you are marking your allocation of scripts your main aims should be to:

- recognise and identify the achievements of students
- where relevant, place students in the appropriate mark band and in the appropriate part of that mark band (high, low, middle) for **each** assessment objective
- record your judgements with brief notes, annotations and comments that are relevant to the mark scheme and make it clear to other associates how you have arrived at the numerical mark awarded for each assessment objective
- ensure comparability of assessment for all students, regardless of question or examiner.

### Approach

It is important to be **open minded** and **positive** when marking scripts.

The specification recognises the variety of experiences and knowledge that students will have. It encourages them to study computer science in a way that is relevant to them. The questions have been designed to give them opportunities to discuss what they have found out about computer science. It is important to assess the quality of **what the student offers**.

Do not mark scripts based on the answer **you** would have written. The mark schemes have been composed to assess **quality of response** and not to identify expected items of knowledge.

### Assessment Objectives

This component requires students to:

AO1: Demonstrate knowledge and understand of the key concepts and principles of computer science.

AO2: Apply knowledge and understanding of key concepts and principles of computer science.

AO3: Analyse problems in computational terms in order to develop and test programmed solutions and demonstrate an understanding of programming concepts.

### Annotating scripts

You should write a summative comment at the end for each assessment objective. Indicate the marks for each assessment objective being tested at the end of the answer in the margin in sequence. It is vital that the way you arrive at a mark should be recorded on the script. This will help you with making accurate judgements and it will help any subsequent markers to identify how you are thinking. Please do not write negative comments about students' work or their alleged aptitudes.

**STATUS:** **Sample questions mark scheme**

The following annotation is used in the mark scheme.

**;** means a single mark

**//** means alternative response

**/** means an alternative word or sub-phrase

**A** means acceptable creditworthy answer

**R** means reject answer as not creditworthy

**NE** means not enough

**I** means ignore

**DPT** in some questions a specific error made by a candidate, if repeated, could result in the loss of more than one mark. The **DPT** label indicates that this mistake should result in a candidate losing only one mark, on the first occasion that the error is made.

Provided that the answer remains understandable, subsequent marks should be awarded as if the error was not being repeated.

Question	Part	Marking guidance	Total marks
01	1	01101011; A leading zeroes.	1 AO2=1
01	2	9C;	1 AO2=1
01	3	Hexadecimal is easier to read/understand; Hexadecimal can be displayed/printed more compactly; Less likely to be entered inaccurately; Quicker to type in; <b>Max2</b>  <b>NE</b> uses less space <b>R</b> implication that it uses less memory/storage	2       <b>AO1=2</b>
01	4	63;	1 AO2=1
01	5	1000;1011; Marks should be awarded only if working shown, ie adding individual bits together and carrying. Working may contain errors.	2  <b>AO2=2</b>
01	6	128;	1 AO2=1
01	7	1;	1 AO2=1
02	1	Award <b>1 mark</b> for naming any high-level language eg Python, (Visual) Basic, C#, Java, Pascal  Examiners – please look up any unusual examples or refer to a senior examiner for marking.	1    <b>AO1=1</b>
02	2	HLL problem-oriented; LLL processor/machine-oriented; HLL uses English-like keywords; LLL uses mnemonics; HLL provides data structures ( <b>A</b> example eg arrays); HLL provides mechanism for calling subroutines; HLL code must be translated before it can be executed; <b>Max3</b>	3       <b>AO1=3</b>
03	1	$8 \times 8 / 8 = 8$ (bytes)  Award <b>2 marks</b> for correct final answer. If final answer incorrect, award <b>1 mark</b> for working for either multiplying $8 \times 8$ or dividing any number by 8.	2    <b>AO2=2</b>
03	2	16 (bytes); A An incorrect response to question part 03.1 multiplied by 2.	1 AO2=1
03	3	0 2 1 4 0 2; A Frequency and value the other way around ie 2 0 4 1 2 0 A Letter or words used for colours eg W 2 B 4 W 2	1  <b>AO2=1</b>
03	4	(Some) images contain (long) sequences of pixels of the same colour; In text files it is unlikely that there will be (long) sequences of the same letter // consecutive letters are usually different;	2  <b>AO1=2</b>

Question	Part	Marking guidance	Total marks																																																
04	1	OR;	<b>1</b> <b>AO1=1</b>																																																
04	2	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th colspan="4">Inputs</th> <th colspan="4">Outputs</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>E</th> <th>F</th> <th>X</th> <th>Y</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>1</td> <td>1</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>0</td> <td>1</td> <td>1</td> <td>0</td> <td>1</td> <td>0</td> <td>0</td> <td>1</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> <td>1</td> <td>0</td> <td>1</td> <td>0</td> <td>1</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>1</td> <td>0</td> </tr> </tbody> </table> <p> <b>1 mark:</b> Columns C and D both completed correctly.  <b>1 mark:</b> Column E completed correctly.  <b>1 mark:</b> Column F completed correctly.  <b>1 mark:</b> Column X completed correctly.  <b>1 mark:</b> Column Y completed correctly.  <b>A</b> Follow-through errors when working out columns E, F, X and Y.                 </p>	Inputs				Outputs				A	B	C	D	E	F	X	Y	0	0	1	1	0	0	0	0	0	1	1	0	1	0	0	1	1	0	0	1	0	1	0	1	1	1	0	0	0	0	1	0	<b>5</b>  <b>AO2=5</b>
Inputs				Outputs																																															
A	B	C	D	E	F	X	Y																																												
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1	0	0	1	0	1	0	1																																												
1	1	0	0	0	0	1	0																																												
04	3	It adds two bits ( <b>A</b> numbers) together;	<b>1</b> <b>AO2=1</b>																																																
05	1	Magnetic (medium); Binary digits/bits/0s and 1s/data represented by magnetising spots on disk // changing magnetic properties of disk; Disk made up of platter(s); Disk divided into tracks and sectors; <b>A</b> Either tracks or sectors alone Tracks are concentric circles // organised into cylinders; Drive head can move in/out // moves to track/cylinder // moves radially; Disk continuously spinning (while in operation); Disk spins at high speed // feasible example of speed; Data read/written as correct sector passes under read/write head; <b>A</b> Drive head. Data transferred in sectors/blocks; Medium and drive/device in sealed enclosure; Hard disk drive is a random access device; <b>A</b> Head parked / not over disk when not in use // head must not touch surface when in use; <b>A</b> Use of cache/buffer to speed up data transfer; <b>Max6</b>	<b>6</b>  <b>AO1=6</b>																																																
05	2	Lower power consumption; Less susceptible to damage from shock / impact; Quieter; More compact; Faster access; Generates less heat; Lighter; <b>Max 2</b>	<b>2</b>  <b>AO1=2</b>																																																

Question	Part	Marking guidance	Total marks
06	1	No need to run wires through walls (or similar); Accessible from anywhere // devices can be easily moved around; Some devices may not support a wired connection (eg phone); May be easier to add devices // no physical limit of number of ports; <b>NE</b> Cheaper <b>Max 2</b>	2  <b>AO1=2</b>
06	2	Faster data transmission; More secure; More reliable // no issues re interference/signal dropping; <b>Max 2</b>	2  <b>AO1=2</b>
07	1	Each core can process instructions independently; More cores mean that more instructions can be processed in parallel;	2  <b>AO1=2</b>
07	2	Cache memory stores data/instructions that are frequently accessed; Fetching data/instructions from cache memory is faster than fetching from (main) memory; Having more cache memory means it is more likely that an instruction/some data that is needed will be in the cache; <b>Max 2</b>	2  <b>AO1=2</b>
07	3	Clock speed; <b>A</b> Other factors that would affect processor performance (not just system performance) <b>Max 1</b>	1  <b>AO1=1</b>
07	4	<b>2 marks:</b> All three stages listed in the correct order <b>or 1 mark:</b> All three stages listed, but in an incorrect order <b>or</b> two correct stages listed in the correct positions and one stage incorrectly named.  <div style="text-align: center;"> <pre> graph TD     Fetch[Fetch] --&gt; Decode[Decode]     Decode --&gt; Execute[Execute]     Execute --&gt; Fetch             </pre> </div>	2  <b>AO1=2</b>
08	1	Network/internet;	1 <b>AO1=1</b>
08	2	Link/network interface; <b>A</b> Data link	1 <b>AO1=1</b>
08	3	Set of rules; that determine how data is communicated between devices;	2 <b>AO1=2</b>
08	4	Retrieving/accessing/loading web pages;	1 <b>AO1=1</b>
08	5	Managing emails on a server; <b>A</b> Fetching emails from a server.	1 <b>AO1=1</b>

Question	Part	Marking guidance	Total marks																																																																																																			
09	1	<table border="1"> <thead> <tr> <th>A</th> <th>B</th> <th>P</th> <th>Length</th> <th colspan="5">List</th> </tr> <tr> <th></th> <th></th> <th></th> <th></th> <th>[0]</th> <th>[1]</th> <th>[2]</th> <th>[3]</th> <th>[4]</th> </tr> </thead> <tbody> <tr> <td>99</td> <td>-</td> <td>-</td> <td>5</td> <td>92</td> <td>50</td> <td>26</td> <td>82</td> <td>73</td> </tr> <tr> <td></td> <td></td> <td>0</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>92</td> <td>0</td> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>50</td> <td>1</td> <td>2</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>26</td> <td>2</td> <td>3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>4</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>2</td> <td></td> <td></td> <td></td> <td>82</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>3</td> <td></td> <td></td> <td></td> <td></td> <td>73</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>4</td> <td></td> <td></td> <td></td> <td></td> <td>NULL</td> </tr> </tbody> </table> <p>                     1 mark: Correct sequence of values for A                      1 mark: Correct sequence of values for B                      1 mark: P correctly runs from 0 to 3                      1 mark: Then P runs again from 2 to 3                      1 mark: Final value of Length is 4                      1 mark: Final contents of List is 92, 50, 82, 73, NULL                 </p>	A	B	P	Length	List									[0]	[1]	[2]	[3]	[4]	99	-	-	5	92	50	26	82	73			0							92	0	1							50	1	2							26	2	3									4									2				82					3					73					4					NULL	6
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			4					NULL																																																																																														
09	2	It deletes the lowest/smallest number from a list;	1 AO2=1																																																																																																			
09	3	That one of the numbers in the list is lower/smaller than 99;	1 AO2=1																																																																																																			
10	1	7;	1 AO2=1																																																																																																			
10	2	2;	1 AO2=1																																																																																																			
10	3	False; False; True; False;	4 AO1=4																																																																																																			
11	1	6;	1 AO2=1																																																																																																			
11	2	AppointmentID;	1 AO2=1																																																																																																			
11	3	PetID;	1 AO2=1																																																																																																			
11	4	20/11/2016, Lynch, Gerbil 19/11/2016, Kress, Horse 1 mark: for correct fields 1 mark: fields in correct order I additional fields 1 mark: for having the two correct records 1 mark: for having the records (even if incorrect records) in the correct order	4 AO2=4																																																																																																			



Question	Part	Marking guidance	Total marks
11	5	<p>= 'Cat' OR TypeOfAnimal = 'Bird'</p> <p><b>Alternative answer</b> = 'Bird' OR TypeOfAnimal = 'Cat'</p> <p><b>Alternative answer</b> IN ('Bird', 'Cat')</p> <p><b>1 mark:</b> field values enclosed in quotes <b>A</b> double quotes  <b>1 mark:</b> correct logic for one of the two types of animal eg = 'Cat'  <b>1 mark:</b> correct logic for two types of animal</p>	<p><b>3</b></p> <p><b>AO3=3</b></p>
12	1	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p>A web page <span style="float: right;">_ □ X</span></p> </div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p>Hello</p> <p>Bye</p> </div> <p><b>1 mark:</b> correct text in title bar  <b>1 mark:</b> correct text in two paragraphs  <b>1 mark:</b> blank line between two paragraphs</p>	<p><b>3</b></p> <p><b>AO2=3</b></p>
12	2	<p>“colour” should have been “color”;  “=” should have been “:”;  “paragraphs” should be “p”;  <b>MAX 2</b></p>	<p><b>2</b></p> <p><b>AO2=2</b></p>

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