

Computing

Advanced Subsidiary GCE

Unit **F452**: Programming Techniques and Logical Methods

Mark Scheme for January 2013

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

© OCR 2013

Annotations

Annotation	Meaning
	Omission mark
	Benefit of doubt
	Subordinate clause/Consequential error
	Cross
	Expansion of a point
	Follow through
	Not answered question
	Benefit of doubt not given
	Point being made
	Repeat
	Slash
	Tick
	Too vague
	Zero (big)

Question		Answer	Marks	Guidance	
1	(a)	<ul style="list-style-type: none"> • Ticket price • (Minimum) number of tickets to sell • (Maximum) duration/date and time of end of raffle. 	2		
	(b)	Award marks for: <ul style="list-style-type: none"> • Shows image • Shows description of item • Shows price of ticket • Shows number of tickets sold • Shows end time/amount of time left till end of item • Makes good use of graphical user interface to show progress (eg "thermometer") • User can input the number of tickets to buy • Button to add tickets to shopping basket. 	8	Progress bar should be specific to time or tickets sold.	
	(c)	(i)	<ul style="list-style-type: none"> • j 	1	
		(ii)	<ul style="list-style-type: none"> • 10 	1	Allow FT
		(iii)	<ul style="list-style-type: none"> • 0 	1	Allow FT
		(iv)	<ul style="list-style-type: none"> • TRUE 	1	Allow FT
	(d)	<ul style="list-style-type: none"> • SpecialChar is c • Key is 3 • 31 MOD 3 is 1 • Returns FALSE. 	4	Allow FT	
	(e)	<ul style="list-style-type: none"> • The ticket number has to be (exactly) divisible by... • ... the position in the alphabet... • ... of the third letter in the email address. 	2		

Question		Answer	Marks	Guidance
	(f)	<ul style="list-style-type: none"> Upper and lower case letters have different character codes So causes a logic error in line 03 	2	
	(g)	<ul style="list-style-type: none"> > / <> != TRUE. 	2	
2	(a)	<ul style="list-style-type: none"> Sequence Selection. 	2	
	(b)	<ul style="list-style-type: none"> The FOR Loop is set up with a fixed number of iterations The WHILE runs repeatedly depending on a condition. 	2	
	(c)	<ul style="list-style-type: none"> 3 0 (respectively)	2	

Question		Answer	Marks	Guidance								
	(d)	<p>Eg PROCEDURE B(p : INTEGER, r: REAL, t: INTEGER) i = 1 WHILE i <= t p = p + p * r OUTPUT t, p i = i + 1 END WHILE END PROCEDURE</p> <ul style="list-style-type: none"> • The procedure is correctly declared and uses a while loop • Correctly initialises i before loop starts • Increments i within loop, in correct place • Correct end condition for loop 	4	<p>Do not accept a simple substitution of the word FOR with WHILE. There must be a recognisable valid WHILE loop to award the first bullet point.</p> <p>To “correctly initialise” the loop the first line output should be for t = 1 (ie either initialise i=0 and increment before the output, or initialise i=1 and increment after the output).</p>								
	(e) (i)	<ul style="list-style-type: none"> • B, • p,r,t,i and no incorrect values. 	2	Must be the right case								
	(ii)	<ul style="list-style-type: none"> • .. to make them meaningful • ... to make the code easier to understand. 	2									
	(f)	<table border="1"> <thead> <tr> <th>Description</th> <th>Type of test</th> </tr> </thead> <tbody> <tr> <td>Myriam does a demonstration to the end user to show that all parts of the program work correctly.</td> <td>Acceptance testing</td> </tr> <tr> <td>Predefined test input data is entered and the output is compared with the expected result.</td> <td>Black box testing</td> </tr> <tr> <td>Myriam gives the program to a few of third-party testers to use and report any errors.</td> <td>Beta testing</td> </tr> </tbody> </table> <p>(1 mark per line)</p>	Description	Type of test	Myriam does a demonstration to the end user to show that all parts of the program work correctly.	Acceptance testing	Predefined test input data is entered and the output is compared with the expected result.	Black box testing	Myriam gives the program to a few of third-party testers to use and report any errors.	Beta testing	3	
Description	Type of test											
Myriam does a demonstration to the end user to show that all parts of the program work correctly.	Acceptance testing											
Predefined test input data is entered and the output is compared with the expected result.	Black box testing											
Myriam gives the program to a few of third-party testers to use and report any errors.	Beta testing											
3	(a)	<ul style="list-style-type: none"> • Setting starting values of a variable 	3									

Question		Answer	Marks	Guidance
		<ul style="list-style-type: none"> Before the variable is used in an expression / May have previous values from a previous run the wheel size needs to be set so it can be used to calculate the distance initialise the time so that it is displayed correctly. 		
	(b) (i)	Correct answer: 142	1	
	(ii)	Correct answer: 23	1	Do not accept 023
	(c)	Correct answer: AABABB <ul style="list-style-type: none"> AAB AB B and nothing more 	3	Mark from left to right
	(d) (i)	<ul style="list-style-type: none"> A whole number 	1	
	(ii)	<ul style="list-style-type: none"> 60 DIV 60 	2	
	(iii)	<ul style="list-style-type: none"> 0030 	1	CAO
	(iv)	<ul style="list-style-type: none"> The values for secs and mins (and hours) should be formatted to 2 digits ... eg if secs < 10 then secs = CONCATENTE("0", secs) Concatenate colons in line with the values ... eg OUTPUT CONCATENATE(Hours, ":", Mins, ":", Secs). 	4	

Question		Answer	Marks	Guidance
(e)	(i)	<ul style="list-style-type: none"> The current LatestTime is replaced/deleted... ... before it is stored as PreviousTime ... LatestTime and PreviousTime will always be the same Need to swap lines 02 and 03 around/use an intermediate variable. {2 marks for description and 1 mark for how to correct}	3	
	(ii)	<ul style="list-style-type: none"> Logic error 	1	
(f)	(i)	<ul style="list-style-type: none"> The default order in which operations in an expression are carried out 	1	
	(ii)	<ul style="list-style-type: none"> Division or multiplication done first Subtraction is done last Correction: Circumference/(LastTime – PreviousTime) * 0.036. 	3	
	(iii)	<ul style="list-style-type: none"> Another set of brackets around Circumference and PreviousTime (for clarification) Add comments explaining algorithm Break the calculation up into individual steps. Constant for 0.036 	2	Do not accept indentation

Question		Answer	Marks	Content	Guidance
					Levels of response
	(g)	<p>Points may include:</p> <p>For total distance:</p> <ul style="list-style-type: none"> • Need a variable to track the distance, with a suitable name • Should be initialised to 0 • At every wheel turn Circumference is added to the total distance • Appropriate conversion to km. <p>For maximum speed</p> <ul style="list-style-type: none"> • Need a variable to track this, with a suitable name • This should be initialised to 0 • Every time the speed is calculated, the result is compared with the stored maximum speed. If the calculated value is higher then the value is replaced. <p>General points</p> <ul style="list-style-type: none"> • A continuous loop of detecting full turns, calculating the performance data and updating the display • Some consideration of special cases – eg bicycle stopped, journey taking place across midnight. 	8		<p>High level response (6–8 marks) Candidate provides a comprehensive account of the modifications that need to be made, both for the total distance and the maximum speed. Candidate may also discuss some of the general considerations. The explanations are clear and can be used by a third party to complete the program, typically including some snippets of code to express points clearly. There will be few if any errors in spelling, grammar and punctuation. Technical terms will be used appropriately and correctly.</p> <p>Medium level response (3–5 marks) Candidate provides an explanation of some of the modifications needed, with emphasis on either total distance or maximum speed. The explanations may be incomplete and further clarification may be required for a third party to implement the suggestions. The information will be presented in a structured format. There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct.</p> <p>Low level response (0–2 marks) Candidate may state some facts relevant to implementing the new functionality needed, but very little about how this is to be carried out. The explanation may contain errors or inaccuracies. Information will be poorly expressed and there will be a limited, if any, use of technical terms. Errors of grammar, punctuation and spelling may be intrusive.</p>

Question		Answer	Marks	Guidance
4	(a)	<ul style="list-style-type: none"> • A collection of data items of the same data type • Under one identifier • Uses two index numbers • Can be represented as a grid/table/row and column/array of arrays 	4	
	(b)	The declaration specifies <ul style="list-style-type: none"> • Name of the array as Puzzle • Data type as Character/String • 2 dimensional/10 by 10 [1 mark for name plus any other 2]	3	Allow for candidates who are using 0-base arrays. (upper bounds = 9,9)
	(c)	The word contains: <ul style="list-style-type: none"> • Only characters A to Z • No more than 10 characters • At least 2 characters. 	2	Accept "check if word already used" Check for number of characters must be accurate.
	(d)	PRINCE: <ul style="list-style-type: none"> • Starts from (7,3) • Going downwards • But all on same column. IRON <ul style="list-style-type: none"> • Starts from (4,10) • Goes leftwards • ... and upwards. 	6	Accept answers in the grid or in words. If a candidate is using base 0 arrays then mark first error wrong, but award FT after that.
	(e)	<ul style="list-style-type: none"> • The algorithm does not check if the cell is already occupied/logic error • The letter R will replace the A in SUGAR... • The procedure will crash/runtime error (in the 5th iteration) • ... when current row becomes 0/negative (as there is no such row). 	4	Accept answers on the grid provided there is a clear explanation.

Question		Answer	Marks	Guidance
	(f)	<ul style="list-style-type: none">• Goes through each row/column• Goes through each cell within that row/column• Checks if value in cell is empty / ""• ... and inserts a random character• ... between A and Z• Correct indentation.	6	

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

Education and Learning

Telephone: 01223 553998

Facsimile: 01223 552627

Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

Oxford Cambridge and RSA Examinations
is a Company Limited by Guarantee
Registered in England
Registered Office; 1 Hills Road, Cambridge, CB1 2EU
Registered Company Number: 3484466
OCR is an exempt Charity

OCR (Oxford Cambridge and RSA Examinations)
Head office
Telephone: 01223 552552
Facsimile: 01223 552553

© OCR 2013

