
COMPUTER SCIENCE

9608/41

Paper 4 Written Paper

October/November 2017

MARK SCHEME

Maximum Mark: 75

Published

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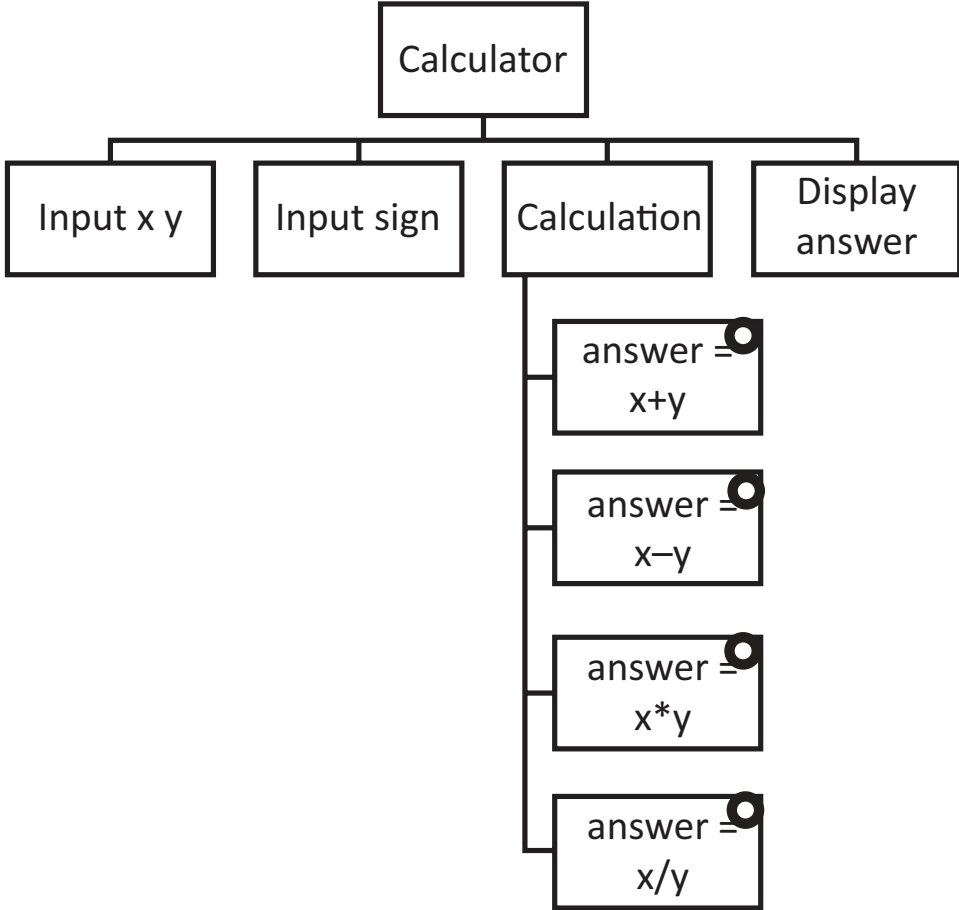
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Question	Answer	Marks
1	<p>1 mark for each completed statement</p>	7

Question	Answer	Marks
2(a)(i)	<ul style="list-style-type: none"> • Asterisk (*) in the corner/top of the box(es) 	1
2(a)(ii)	<ul style="list-style-type: none"> • Circle (o) in the corner/top of box(es) 	1

Question	Answer	Marks
2(b)	<p>1 mark per bullet</p> <ul style="list-style-type: none"> • Inputting 2 numbers, stored in x and y • Inputting sign Selection used for all four calculations • .. underneath an appropriate box at level 1 • Displaying the answer <p>For example:</p>  <pre> graph TD Calculator[Calculator] --> InputXY[Input x y] Calculator --> InputSign[Input sign] Calculator --> Calculation[Calculation] Calculator --> DisplayAnswer[Display answer] Calculation --> Calc1["answer = x+y"] Calculation --> Calc2["answer = x-y"] Calculation --> Calc3["answer = x*y"] Calculation --> Calc4["answer = x/y"] </pre>	5

Question	Answer	Marks
3(a)	<p>1 mark per clause</p> <ul style="list-style-type: none"> • person(mimi) . • food(lettuce) . • likes(mimi, chocolate) . • dislikes(mimi, sushi) . • dislikes(mimi, lettuce) . 	5
3(b)	<p>1 mark per answer chocolate, pizza</p>	2
3(c)	<p>1 mark per bullet</p> <ul style="list-style-type: none"> • might_like (B, A) • Person(B) • Food(A) • AND • AND NOT • Dislikes predicate <p>For example:</p> <pre> might_like(B, A) . { } IF person(B) AND food(A) { } { } { } { } AND NOT(dislikes(B, A)) . { } { } </pre>	6

Question	Answer				Marks		
4(a)	Label	Op code	Operand	Comment	Marks	11	
	START:	LDM	#63	// load ASCII value for '?'			
		OUT		// OUTPUT '?'	1		
		IN		// input GUESS	1		
		CMP	LETTERTOGUESS	// compare with stored letter	1		
		JPE	GUESSED	// if correct guess, go to GUESSED	1		
		LDD	ATTEMPTS	// increment ATTEMPTS	1		
		INC	ACC		1		
		STO	ATTEMPTS		1		
		CMP	#9	// is ATTEMPTS = 9 ?	1		
		JPE	ENDP	// if out of guesses, go to ENDP	1		
		JMP	START	// go back to beginning of loop	1		
		GUESSED:	LDM	#42	// load ASCII for '*'		
			OUT		// OUTPUT '*'		1
		ENDP:	END		// end program		
		ATTEMPTS:	0				
	LETTERTOGUESS:	'a'					

Question	Answer				Marks		
4(b)	Label	Opcode	Operand	Comment	Mark	10	
	START:	LDR	#0	// initialise the Index Register	1		
	LOOP:	LDX	NUMBERS	// load the value from NUMBERS	1 (LOOP) + 1 (LDX NUMBERS)		
		LSL	#2	// multiply by 4	1 (LSL) + 1 (#2)		
		STX	NUMBERS	// store the new value in NUMBERS	1		
		INC	IX	// increment the Index Register	1		
		LDD	COUNT	// increment COUNT	1		
		INC	ACC				
		STO	COUNT				
		CMP	#5	// is COUNT = 5 ?	1		
		JPN	LOOP	// repeat for next number	1		
		ENDP:	END				
		COUNT:	0				
		NUMBERS:	22				
			13				
			5				
			46				
			12				

Question	Answer	Marks
5(a)(i)	PERT / GANTT	1
5(a)(ii)	1 mark per bullet to max 3 For example: <ul style="list-style-type: none"> • Calculate total minimum time required for project • Identify milestones • Task dependencies • Provides the critical path analysis • Identify which tasks need to be prioritised • Determine when to begin specific tasks/stages • Identify slack time • Identify when resources need allocating • Identify tasks that can be completed in parallel 	3
5(b)(i)	Integration	1
5(b)(ii)	Beta / acceptance	1

Question	Answer	Marks
6(a)	1 mark per bullet to max 6 <ul style="list-style-type: none"> • Declaring a class with the name animal • Declaring variables for across, down and score (all Integers) • ...as private/protected • Correct constructor header and ending • Randomly generating an across between 0–39 inc. in constructor • Randomly generating a down between 0–39 inc. in constructor • Initialising Score to zero in constructor • Correct get for <code>Across</code> • Correct set for <code>Across</code> 	6

Question	Answer	Marks
6(a)	<pre> Example: VB Class Animal Private Across As Integer Private Down As Integer Private Score As Integer Function GetAcross() Return Across End Function Sub SetAcross(Value As Integer) Across = Value End Sub Sub New() Randomize() Across = randomnumber.Next(0, 40) Down = randomnumber.Next(0, 40) Score = 0 End Sub End Class </pre>	

Question	Answer	Marks
6(a)	<p>or</p> <pre> Class Animal Private Across As Integer Property _Across As Integer Get Return _Across End Get Set(Value As Integer) Across = Value End Set End Property Private Down As Integer Private _Score As Integer Sub New() Randomize() Across = randomnumber.Next(0, 40) Down = randomnumber.Next(0, 40) _Score = 0 End Sub End Class Example: Python class Animal : def __init__(self) : x = random.randint(0,39) y = random.randint(0,39) self.Across = x self.Down = y self.Score = 0 def SetAcross(A) : self.Across = A def GetAcross() : return self.Across </pre>	

Question	Answer	Marks
6(a)	<pre> Example: Pascal type Animal = class private Across: integer; Down: integer; score: integer; public constructor init; procedure SetAcross(AcrossV: integer); function GetAcross(): integer; end; constructor Animal.init(); SetAcross(random(40)); SetDown (random(40)); SetScore (0); end; procedure Animal.SetAcross(AcrossV: integer); begin Across := AcrossV; end; function Animal.GetAcross(): integer; begin GetAcross := Across; end; </pre>	

Question	Answer	Marks
6(b)	<p>1 mark per bullet to max 5</p> <ul style="list-style-type: none"> • constructor method heading and ending • Initialise all 40 by 40 elements of Grid as " or equivalent • Loop 5 times... • ...Creates a new instance of animal inside loop... • ...and adds it to array <code>AnimalList</code> <p>• Call generate food and initialise <code>StepCounter</code> to 0</p> <p>Example Python</p> <pre>def __init__(self) : self.grid = [[' ' for i in range(40)] for j in range(40)] self.AnimalList = [] self.StepCounter = 0 for i in range(5) : newAnimal = Animal () self.AnimalList.append(newAnimal) self.GenerateFood()</pre> <p>Example VB</p> <pre>Sub New() For x = 0 To 39 For y = 0 To 39 grid(x, y) = "" Next Next For z = 0 To 4 AnimalList(z) = New Animal Next Call GenerateFood() End Sub</pre>	5

Question	Answer	Marks
6(b)	<p>Example Pascal</p> <pre> constructor Desert.init(); for x := 0 to 39 do begin for y := 0 to 39 do begin grid(x,y) = ""; end end for x := 0 to 4 do begin AnimalList(x) = object (Animal); end GenerateFood(); end; </pre>	
6(c)(i)	<p>1 mark per bullet:</p> <ul style="list-style-type: none"> • Function header and ending taking one value as parameter • Check if coordinate = 0 (on lower bound) • ...generate random number (0 or 1) • Check if coordinate = 39 (on upper bound) • ...generate random number (-1 or 0) • Generate random number (e.g. -1, 0, 1) • Return the generated value 	max 4

Question	Answer	Marks
6(c)(i)	<p>Example VB</p> <pre>Function GenerateDirection(ByRef coord As Integer) Dim lowerbound As Integer = -1 Dim upperbound As Integer = 1 If coord = 0 Then lowerbound = 0 ElseIf coord = 39 Then upperbound = 0 End If GenerateDirection = randomnumber.Next(lowerbound, upperbound) End Function</pre> <p>Example Python</p> <pre>def GenerateDirection(Coord) : lowerBound = -1 upperBound = 1 if Coord == 0 : lowerBound = 0 elif Coord == 39 : upperBound = 0 return random.randint(lowerBound, upperBound)</pre>	

Question	Answer	Marks
6(c)(i)	<p>Example Pascal</p> <pre>function GenerateDirection(coord : Integer): Integer; begin lowerbound = -1; upperbound = 1; if coord = 0 then lowerbound = 0; else if coord = 39 then upperbound = 0; GenerateDirection = random(39); end;</pre>	
6(c)(ii)	<p>1 mark per bullet to max 4</p> <ul style="list-style-type: none"> • Procedure move header, no parameters • Calling GenerateDirection twice sending across and down as separate parameters • Add return value to Across • Add return value to Down • Check if the grid, at the (new) coordinates == "F" • ..if true, Call EatFood <p>Example python</p> <pre>def Move(self) : self.Across += GenerateChangeInCoordinate(self.Across) self.Down += GenerateChangeInCoordinate(self.Down) if grid[self.Across][self.Down] == 'F' : self.EatFood() return</pre>	4

Question	Answer	Marks
6(c)(ii)	<p>Example VB</p> <pre>Sub Move(ByRef thisAnimal As Animal) thisAnimal.across += GenerateChangeInCoordinate (thisAnimal.across) thisAnimal.down += GenerateChangeInCoordinate (thisAnimal.down) If thegrid._grid(thisAnimal.across, thisAnimal.down) = "F" Then Call EatFood() End If End Sub</pre> <p>Example Pascal</p> <pre>procedure Move(thisAnimal : Animal); begin thisAnimal.across = this.Animal.across + GenerateChangeInCoordinate (thisAnimal.across); thisAnimal.down = thisAnimal.down + GenerateChangeInCoordinate (thisAnimal.down); if (thisgrid.grid(thisAnimal.across, thisAnimal.down) = "F") then EatFood(); End;</pre>	
6(d)	<p>1 mark per bullet to max 3</p> <ul style="list-style-type: none"> • Pre-compiled • Collection of Code/modules/routines • Each module performs a specific purpose/task • Each module can be linked/imported into the program 	2