

AQA Computer Science A-Level
4.4.1 Abstraction and automation
Past Paper Mark Schemes

Additional Specimen AS Paper 1

02	1	<p>All marks AO2 (apply)</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">A</th> <th style="width: 15%;">B</th> <th style="width: 15%;">TEMP</th> <th style="width: 55%;">OUTPUT</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">100</td> <td style="text-align: center;">60</td> <td style="text-align: center;">60</td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">40</td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">60</td> <td></td> <td style="text-align: center;">40</td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">20</td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">40</td> <td></td> <td style="text-align: center;">20</td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">0</td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">20</td> <td></td> <td></td> <td style="text-align: center;">The value is 20</td> </tr> </tbody> </table> <p>One mark - first bordered area of table completed correctly; One mark - second bordered area of table completed correctly; One mark - correct output in last row of table; I. Relative positions of variables in each bordered area</p>	A	B	TEMP	OUTPUT	100	60	60			40			60		40			20			40		20			0			20			The value is 20	3
A	B	TEMP	OUTPUT																																
100	60	60																																	
	40																																		
60		40																																	
	20																																		
40		20																																	
	0																																		
20			The value is 20																																

02	2	<p>All marks AO2 (apply)</p> <p>greatest common divisor // GCD;</p>	1
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01	1	<p>Mark is for AO2 (apply)</p> <p>D;</p>	1
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01	2	<p>Mark is for AO2 (apply)</p> <p>A;</p>	1
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01	1	<p>Mark is for AO2 (apply)</p> <p>D;</p>	1
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01	2	<p>Mark is for AO2 (apply)</p> <p>A;</p>	1
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03	1	<p>Marks are for AO2 (analysis)</p> <p>The values are being stored as string; the string 007 is (alphabetically) less than 06;</p>	2
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03	2	<p>Mark is for AO3 (programming)</p> <pre> IF Value1 < Value2 THEN OUTPUT "Value 2 is larger" ELSE IF Value1 = Value2 THEN OUTPUT "Value1 and Value2 are the same" ELSE OUTPUT "Value 1 is larger" ENDIF </pre> <p>One mark - addition of check for equality and output message; One mark - statement works correctly;</p>	2
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02

3

All marks AO2 (apply)

6

Call number	S	E	M	List returned
1	1	5	3	
2	1	3	2	
3	1	2	1	
4	1	1		[6]
3	1	2	1	
5	2	2		[3]
3	1	2	1	[6, 3]
2	1	3	2	
6	3	3		[4]
2	1	3	2	[6, 4, 3]
1	1	5	3	
7	4	5	4	
8	4	4		[8]
7	4	5	4	
9	5	5		[5]
7	4	5	4	[8, 5]
1	1	5	3	[8, 6, 5, 4, 3]

Mark as follows:

- 1 mark:** Correct list returned by call number 3;
- 1 mark:** Correct lists returned by call number 6-9;
- 1 mark:** Correct list returned by call number 1;
- 1 mark:** S, M, E given correct values for call number 6;
- 1 mark:** S, M, E given correct values for call number 7;
- 1 mark:** S, M, E given correct values for call number 8-9;

Info for examiner: Ignore missing values for S, E, M after the first time a particular call number appears in the table.

June 2011 Comp 3

5	(c)	<table border="1" style="width: 100%; border-collapse: collapse; margin: 10px auto;"> <thead> <tr> <th style="padding: 5px;">String Pos</th> <th style="padding: 5px;">Token</th> <th style="padding: 5px;">Integer Val</th> <th style="padding: 5px;">Op1</th> <th style="padding: 5px;">Op2</th> <th style="padding: 5px;">Result</th> <th style="padding: 5px;">Stack</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0</td> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> <td style="text-align: center;">[]</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">6</td> <td style="text-align: center;">6</td> <td></td> <td></td> <td></td> <td style="text-align: center;">[6]</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">4</td> <td style="text-align: center;">4</td> <td></td> <td></td> <td></td> <td style="text-align: center;">[4 6]</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">+</td> <td></td> <td style="text-align: center;">6</td> <td style="text-align: center;">4</td> <td style="text-align: center;">10</td> <td style="text-align: center;">[10]</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">3</td> <td style="text-align: center;">3</td> <td></td> <td></td> <td></td> <td style="text-align: center;">[3 10]</td> </tr> <tr> <td style="text-align: center;">5</td> <td style="text-align: center;">2</td> <td style="text-align: center;">2</td> <td></td> <td></td> <td></td> <td style="text-align: center;">[2 3 10]</td> </tr> <tr> <td style="text-align: center;">6</td> <td style="text-align: center;">+</td> <td></td> <td style="text-align: center;">3</td> <td style="text-align: center;">2</td> <td style="text-align: center;">5</td> <td style="text-align: center;">[5 10]</td> </tr> <tr> <td style="text-align: center;">7</td> <td style="text-align: center;">*</td> <td></td> <td style="text-align: center;">10</td> <td style="text-align: center;">5</td> <td style="text-align: center;">50</td> <td style="text-align: center;">[50]</td> </tr> </tbody> </table> <p style="margin-top: 10px;">Output : <u>50</u></p> <p>1 mark for each of rows 1-3 1 mark for rows 4 and 5 together 1 mark for rows 6 and 7 together 1 mark for correct final output</p> <p>Values of Op1 and Op2 MUST be assigned in rows 3, 6 and 7 to award the marks for these rows. They cannot be inferred from incorrectly entered previous values.</p> <p>I values in empty cells, even if they are incorrect.</p>	String Pos	Token	Integer Val	Op1	Op2	Result	Stack	0	-	-	-	-	-	[]	1	6	6				[6]	2	4	4				[4 6]	3	+		6	4	10	[10]	4	3	3				[3 10]	5	2	2				[2 3 10]	6	+		3	2	5	[5 10]	7	*		10	5	50	[50]	6
String Pos	Token	Integer Val	Op1	Op2	Result	Stack																																																												
0	-	-	-	-	-	[]																																																												
1	6	6				[6]																																																												
2	4	4				[4 6]																																																												
3	+		6	4	10	[10]																																																												
4	3	3				[3 10]																																																												
5	2	2				[2 3 10]																																																												
6	+		3	2	5	[5 10]																																																												
7	*		10	5	50	[50]																																																												

11	(a)	<p style="margin-top: 10px;"> 1 mark for each of the top five rows 1 mark for sixth and seventh row together Must have correct tape contents and state for each mark A the blank cell symbol \square in blank cells A answers in which the initial situation of the TM is repeated A If the read/write head is not drawn on some rows, this should result in the loss of the mark on the first occasion that it is missing only. Marks should be awarded for subsequent rows, even if the read/write head is not drawn. </p>	<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;">\square S_1 ;</div> <div style="margin-bottom: 10px;">\square S_1 ;</div> <div style="margin-bottom: 10px;">\square S_1 ;</div> <div style="margin-bottom: 10px;">\square S_1 ;</div> <div style="margin-bottom: 10px;">\square S_2 ;</div> <div style="margin-bottom: 10px;">\square S_3 ;</div> <div style="margin-bottom: 10px;">\square S_4 ;</div> </div>
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June 2012 Comp 3

3	(b)	(i)	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 5%;">N</th> <th style="width: 10%;">Pos1</th> <th style="width: 15%;">W1</th> <th style="width: 10%;">Pos2</th> <th style="width: 10%;">W2</th> <th style="width: 50%;">Output</th> </tr> </thead> <tbody> <tr> <td>3</td> <td>1</td> <td>Rope</td> <td>1</td> <td>Rope</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>2</td> <td>Dagger</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>3</td> <td>Rope</td> <td>Duplicate: Rope</td> </tr> <tr> <td></td> <td>2</td> <td>Dagger</td> <td>1</td> <td>Rope</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>2</td> <td>Dagger</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>3</td> <td>Rope</td> <td></td> </tr> <tr> <td></td> <td>3</td> <td>Rope</td> <td>1</td> <td>Rope</td> <td>Duplicate: Rope</td> </tr> <tr> <td></td> <td></td> <td></td> <td>2</td> <td>Dagger</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>3</td> <td>Rope</td> <td></td> </tr> </tbody> </table> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="text-align: right;">} 1 mark</div> <div style="text-align: right;">} 1 mark</div> <div style="text-align: right;">} 1 mark</div> </div>	N	Pos1	W1	Pos2	W2	Output	3	1	Rope	1	Rope					2	Dagger					3	Rope	Duplicate: Rope		2	Dagger	1	Rope					2	Dagger					3	Rope			3	Rope	1	Rope	Duplicate: Rope				2	Dagger					3	Rope		
N	Pos1	W1	Pos2	W2	Output																																																											
3	1	Rope	1	Rope																																																												
			2	Dagger																																																												
			3	Rope	Duplicate: Rope																																																											
	2	Dagger	1	Rope																																																												
			2	Dagger																																																												
			3	Rope																																																												
	3	Rope	1	Rope	Duplicate: Rope																																																											
			2	Dagger																																																												
			3	Rope																																																												
			<p>A answers which have correct values repeated in empty cells, but do not award a mark if there are any incorrect values within the block for which the mark is being awarded.</p> <p>A additional rows in trace table, so long as the trace is correct.</p> <p>DPT if just "Duplicate" or "Rope" are written in the Output column when it should be "Duplicate: Rope" or if the value of Pos1 is written in the output instead of W1 e.g. 1 instead of "Rope"</p> <p>If candidate has not written in the value of N, only one mark should be lost (for the top rectangular area) for this mistake</p>	3																																																												

10	(e)				Discovered							Completely Explored								
		Call	V	U	EndV	1	2	3	4	5	6	7	1	2	3	4	5	6	7	F
			-	-	7	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
		DFS(1,7)	1	2	7	T	F	F	F	F	F	F	F	F	F	F	F	F	F	F
		DFS(2,7)	2	1	7	T	T	F	F	F	F	F	F	F	F	F	F	F	F	F
				3	7	T	T	F	F	F	F	F	F	F	F	F	F	F	F	F
		DFS(3,7)	3	2	7	T	T	T	F	F	F	F	F	F	T	F	F	F	F	F
		DFS(2,7)	2	4	7	T	T	T	F	F	F	F	F	F	T	F	F	F	F	F
		DFS(4,7)	4	2	7	T	T	T	T	F	F	F	F	F	T	F	F	F	F	F
				5	7	T	T	T	T	F	F	F	F	F	T	F	F	F	F	F
		DFS(5,7)	5	4	7	T	T	T	T	T	F	F	F	F	T	F	F	F	F	F
				6	7	T	T	T	T	T	F	F	F	F	T	F	F	F	F	F
		DFS(6,7)	6	5	7	T	T	T	T	T	T	F	F	F	T	F	F	T	F	F
		DFS(5,7)	5	7	7	T	T	T	T	T	T	F	F	F	T	F	F	T	F	F
		DFS(7,7)	7	5	7	T	T	T	T	T	T	T	F	F	T	F	F	T	T	T
		DFS(5,7)	5	-	7	T	T	T	T	T	T	T	F	F	T	F	T	T	T	T
		DFS(4,7)	4	-	7	T	T	T	T	T	T	T	F	F	T	T	T	T	T	T
		DFS(2,7)	2	-	7	T	T	T	T	T	T	T	F	T	T	T	T	T	T	T
		DFS(1,7)	1	-	7	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T

1 mark for having the correct values changes in each region highlighted by a rectangle and no incorrect changes in the region. Ignore the contents of any cells that are not changed.
A alternative indicators that clearly mean True and False.
A it is not necessary to repeat values that are already set (shown lighter in table)

June 2016 AS Paper 1

01	1	Mark is for AO2 (apply) B;	1
01	2	Mark is for AO2 (apply) C;	1

04	1	All marks AO2 (apply)	5																																																																																																																																											
<table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <thead> <tr> <th rowspan="2" style="width: 15%;">ItemsCount</th> <th rowspan="2" style="width: 15%;">NewItemsCount</th> <th rowspan="2" style="width: 10%;">LoopA</th> <th rowspan="2" style="width: 10%;">Done</th> <th rowspan="2" style="width: 10%;">LoopB</th> <th colspan="4" style="width: 40%;">NewItems</th> </tr> <tr> <th style="width: 10%;">[0]</th> <th style="width: 10%;">[1]</th> <th style="width: 10%;">[2]</th> <th style="width: 10%;">[3]</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">1</td> <td></td> <td></td> <td></td> <td style="text-align: center;">12</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> </tr> <tr> <td></td> <td style="text-align: center;">2</td> <td style="text-align: center;">1</td> <td style="text-align: center;">False</td> <td style="text-align: center;">0</td> <td></td> <td style="text-align: center;">25</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td style="text-align: center;">2</td> <td style="text-align: center;">False</td> <td style="text-align: center;">0</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td style="text-align: center;">True</td> <td style="text-align: center;">1</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td style="text-align: center;">3</td> <td style="text-align: center;">False</td> <td style="text-align: center;">0</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">3</td> <td></td> <td></td> <td style="text-align: center;">1</td> <td></td> <td></td> <td style="text-align: center;">53</td> <td></td> </tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>				ItemsCount	NewItemsCount	LoopA	Done	LoopB	NewItems				[0]	[1]	[2]	[3]	4	1				12	0	0	0		2	1	False	0		25					2	False	0								True	1							3	False	0						3			1			53																																																																									
ItemsCount	NewItemsCount	LoopA	Done						LoopB	NewItems																																																																																																																																				
				[0]	[1]	[2]	[3]																																																																																																																																							
4	1				12	0	0	0																																																																																																																																						
	2	1	False	0		25																																																																																																																																								
		2	False	0																																																																																																																																										
			True	1																																																																																																																																										
		3	False	0																																																																																																																																										
	3			1			53																																																																																																																																							
<ol style="list-style-type: none"> 1. LoopA running over the values 1, 2, 3 and stops at 3; 2. LoopB is set to 0 then changes to 1 then changes to 0 then changes to 1 and no further changes; 3. NewItems becoming 12, 25, 0, 0 at the end of LoopA value 1; 4. NewItems not changing during LoopA value 2; <div style="margin-left: 20px;">R. if NewItems has not changed previously</div> 5. NewItems having value 12, 25, 53, 0 at end of table; <p style="margin-top: 10px;"> A. NewItems without trailing zeroes A. NewItems without repeated values for 12 and 25 </p> <p style="margin-top: 10px;"> Note: 12 might not be seen in NewItems[0] as does not need to be copied across into EAD in which case column should be blank </p> <p style="margin-top: 10px;"> I. columns NewItemsCount and Done (first and third columns in EAD) </p>																																																																																																																																														

04	2	<p>Mark is for AO2 (apply)</p> <p>NewItems contains an array/list of the unique items from the Items array/list; Remove duplicate items from an array/list;</p> <p>Max 1</p>	1
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June 2017 AS Paper 1

Qu						Marks																																																						
02	1	<p>All marks AO2 (apply)</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Count</th> <th>HexString</th> <th>Number</th> <th>HexDigit</th> <th>Value</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>"A2"</td> <td>0</td> <td>"A"</td> <td>10</td> <td></td> </tr> <tr> <td></td> <td></td> <td>10</td> <td>"2"</td> <td>2</td> <td></td> </tr> <tr> <td></td> <td></td> <td>162</td> <td></td> <td></td> <td>162</td> </tr> <tr> <td>2</td> <td>"1G"</td> <td>0</td> <td>"1"</td> <td>1</td> <td></td> </tr> <tr> <td></td> <td></td> <td>1</td> <td>"G"</td> <td>-1</td> <td></td> </tr> <tr> <td></td> <td></td> <td>15</td> <td></td> <td></td> <td>15</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>Mark as follows:</p> <ol style="list-style-type: none"> 1. Count running over the values 1, 2 with correct sequence of values for HexString ("A2", "1G"); 2. The correct sequence of values in Number column (0, 10, 162, 0, 1, 15); 3. The correct sequence of values in HexDigit column ("A", "2", "1", "G"); 4. The correct sequence of values in Value column (10, 2, 1, -1); 5. The correct sequence of values in Output column (162, 15); <p>A. repeating values in first two columns A. "1G" before "A2" A. string values without quotes</p>				Count	HexString	Number	HexDigit	Value	Output	1	"A2"	0	"A"	10				10	"2"	2				162			162	2	"1G"	0	"1"	1				1	"G"	-1				15			15													5
Count	HexString	Number	HexDigit	Value	Output																																																							
1	"A2"	0	"A"	10																																																								
		10	"2"	2																																																								
		162			162																																																							
2	"1G"	0	"1"	1																																																								
		1	"G"	-1																																																								
		15			15																																																							

02	2	<p>All marks for AO2 (analyse)</p> <ol style="list-style-type: none"> 1. invalid character produces value -1 from subroutine; 2. -1 should not be used to calculate // deal with -1 seperately // using -1 gives a misleading result; 3. final output should be -1 / error message; <p>MAX 2</p>	2
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June 2017 Paper 1

04	1	<p>Mark is for AO1 (knowledge)</p> <p>A subroutine that calls itself;</p>	1								
04	2	<p>Mark is for AO1 (understanding)</p> <p>When target equals node // (When target does not equal node and) node is a leaf // <code>node = target;</code></p>	1								
04	3	<p>Marks are for AO2 (apply)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: left;">Function Call</th> <th style="text-align: left;">Output</th> </tr> </thead> <tbody> <tr> <td><code>TreeSearch(Olivia, Norbert)</code></td> <td>(Visited) Norbert;</td> </tr> <tr> <td><code>TreeSearch(Olivia, Phil);</code></td> <td>(Visited) Phil;</td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table> <p>MAX 2 if any errors eg additional outputs / function calls after output of Phil</p> <p>I. minor spelling and punctuation errors</p>	Function Call	Output	<code>TreeSearch(Olivia, Norbert)</code>	(Visited) Norbert;	<code>TreeSearch(Olivia, Phil);</code>	(Visited) Phil;			3
Function Call	Output										
<code>TreeSearch(Olivia, Norbert)</code>	(Visited) Norbert;										
<code>TreeSearch(Olivia, Phil);</code>	(Visited) Phil;										

June 2011 Comp 1

18	<p>18, 23, 21, 36, 40, 45, 58, 59</p> <p>Mark as follows: 18 in the first place; 23 and 21 in correct order and in the second and third places; 21 and 36 in the correct order and in the third and fourth places; 40, 45, 58 and 59 in the correct order and in the last four places;</p> <p>A. Table 3 instead of Table 2 as long as the bottom cell of each of the scores column is correct (I. any working out)</p>	4
19	<p>Bubble sort; NE. sort</p>	1

June 2013 Comp 3

4	(d)	<p>One mark for each area outlined with a dark rectangle. Lines that are not outlined can be missed out.</p> <div style="display: flex; justify-content: space-around; margin-bottom: 10px;"> <div style="text-align: center;"> <p><u>Alternative 1</u></p> <table border="1" style="border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="padding: 5px;">Pos</th> <th style="padding: 5px;">Output</th> </tr> </thead> <tbody> <tr><td style="padding: 5px;">1</td><td style="padding: 5px;"></td></tr> <tr><td style="padding: 5px;">2</td><td style="padding: 5px;">4</td></tr> <tr><td style="padding: 5px;">1</td><td style="padding: 5px;"></td></tr> <tr><td style="padding: 5px;">3</td><td style="padding: 5px;"></td></tr> <tr><td style="padding: 5px;">4</td><td style="padding: 5px;">9</td></tr> <tr><td style="padding: 5px;">3</td><td style="padding: 5px;"></td></tr> <tr><td style="padding: 5px;">5</td><td style="padding: 5px;">6</td></tr> <tr><td style="padding: 5px;">3</td><td style="padding: 5px;">*</td></tr> <tr><td style="padding: 5px;">1</td><td style="padding: 5px;">+</td></tr> </tbody> </table> </div> <div style="text-align: center;"> <p><u>Alternative 2</u></p> <table border="1" style="border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="padding: 5px;">Pos</th> <th style="padding: 5px;">Output</th> </tr> </thead> <tbody> <tr><td style="padding: 5px;">1</td><td style="padding: 5px;">4</td></tr> <tr><td style="padding: 5px;">2</td><td style="padding: 5px;">9</td></tr> <tr><td style="padding: 5px;">1</td><td style="padding: 5px;">6</td></tr> <tr><td style="padding: 5px;">3</td><td style="padding: 5px;">*</td></tr> <tr><td style="padding: 5px;">4</td><td style="padding: 5px;">+</td></tr> <tr><td style="padding: 5px;">3</td><td style="padding: 5px;"></td></tr> <tr><td style="padding: 5px;">5</td><td style="padding: 5px;"></td></tr> <tr><td style="padding: 5px;">3</td><td style="padding: 5px;"></td></tr> <tr><td style="padding: 5px;">1</td><td style="padding: 5px;"></td></tr> </tbody> </table> </div> </div> <p style="text-align: right; margin-right: 20px;">4</p> <p>Mark against whichever alternative gives the highest mark.</p> <p>Stop marking as soon as incorrect output is given.</p>	Pos	Output	1		2	4	1		3		4	9	3		5	6	3	*	1	+	Pos	Output	1	4	2	9	1	6	3	*	4	+	3		5		3		1		
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4	(e)	Post-order; A. Depth-first A. Depth-first search as BOD TO. Depth-first pre/in-order	1
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4	(f)	(4 + 9 * 6 in) Reverse Polish (Notation) // Postfix (Notation) // RPN;	1
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Specimen Paper 1

01	1	Mark is for AO2 (apply) 1 mark: B;	1
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01	2	All marks AO2 (analyse) Nathan was not killed with poison (rule a); therefore Peter was not in the kitchen (rule c); therefore Martin was not in the dining room (rule e); therefore Suzanne was in the dining room (rule b); therefore Steve murdered Nathan (rule d). Mark as follows: 1 mark: Any correct point from the list above; 1 mark: Any two further correct points from the list above;	2
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03	4	All marks AO2 (apply)	6																																																																																																																																																																																									
<table border="1"> <thead> <tr> <th rowspan="2">NoOfCats</th> <th colspan="5">Cat</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> </tr> </thead> <tbody> <tr> <td>5</td> <td></td> <td></td> <td></td> <td>1</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>2</td> <td>1</td> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>1</td> <td>2</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>2</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>3</td> <td>1</td> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>1</td> <td>2</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></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>1</td> <td>3</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></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>3</td> <td></td> <td></td> <td></td> <td>3</td> <td></td> <td></td> </tr> <tr> <td></td> <td>4</td> <td>1</td> <td>1</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></td> <td></td> <td></td> </tr> <tr> <td></td> <td></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>1</td> <td></td> </tr> <tr> <td></td> <td>5</td> <td>1</td> <td>1</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></td> <td></td> <td></td> </tr> <tr> <td></td> <td></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>5</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>1</td> </tr> </tbody> </table>				NoOfCats	Cat					A	B	C	1	2	3	4	5	5				1						2	1	1								1	2								2			2					3	1	1								1	2								2									1	3								2									3				3				4	1	1								2									3									4					1			5	1	1								2									3									4									5						1
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03	5	<p>Mark is for AO2 (analyse)</p> <p>To work out which cats will travel together to the show //</p> <p>To plan which cats will be in the van on which journey to the cat show //</p> <p>To colour the vertices of a graph //</p> <p>To create a decomposition of a graph;</p> <p>Max 1</p>	1
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