

LC 2018: PAPER 2

QUESTION 3 (25 MARKS)

Question 3 (a)

0	7	1	7	3	7
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(i) Codes ending in zero:

1st digit	2nd digit	3rd digit	4th digit	5th digit	6th digit						
<input style="width: 30px; height: 20px;" type="text"/>	and then <input style="width: 30px; height: 20px;" type="text"/>	and then <input style="width: 30px; height: 20px;" type="text"/>	and then <input style="width: 30px; height: 20px;" type="text"/>	and then <input style="width: 30px; height: 20px;" type="text"/>	and then <input style="width: 30px; height: 20px;" type="text"/>	and then <input style="width: 30px; height: 20px;" type="text" value="0"/>					
10	×	10	×	10	×	10	×	10	×	1	= 100 000

(ii) Codes containing digits 2018 together in this order:

1st digit	2nd digit	3rd digit	
<input style="width: 30px; height: 20px;" type="text"/>	and then <input style="width: 30px; height: 20px;" type="text"/>	and then <input style="width: 30px; height: 20px;" type="text" value="2018"/>	
10	×	10	×
		1	×
			3! = 300

MARKING SCHEME NOTES

Question 3 (a) (i) [Scale 15C (0, 4, 11, 15)]

- 4: • Some use of 10
 • Identifies that 5 other digits are required to complete code
- 11: • 9^5 or equivalent
 • 10^6

Question 3 (a) (ii) [Scale 5B (0, 2, 5)]

- 2: • 10×10

Question 3 (b)

$$\frac{(n+3)!(n+2)!}{(n+1)!(n+1)!} = \frac{(n+3)(n+2)(n+1)!(n+2)(n+1)!}{(n+1)!(n+1)!} = (n+3)(n+2)^2$$

$$= (n+3)(n^2 + 4n + 4)$$

$$= n^3 + 7n^2 + 16n + 12$$

$a=1, b=7, c=16, d=12$

MARKING SCHEME NOTES

Question 3 (b) [Scale 5C (0, 2, 4, 5)]

- 2: • Factorial expansion (e.g. $(n+3)! = (n+3)(n+2)(n+1)\dots\dots\dots 1$)
 • Effort at a numerical value for n on both LHS and RHS (method 2)
- 4: • $(n+3)(n+2)(n+2)$
 • Four simultaneous equations