

Question	Answer	Marks	Guidance
(a)	${}^{12}C_5 \times {}^7C_4 [\times {}^3C_3]$	<b>M1</b>	${}^{12}C_r \times q, r = 3, 4, 5$ $q$ a positive integer $> 1$ , no + or - .__
		<b>M1</b>	${}^{12}C_s \times {}^{12-s}C_t [\times {}^{12-s-t}C_u]$ $s = 3, 4, 5; t = 3, 4, 5 \neq s; u = 3, 4, 5 \neq s, t$
	<b>Alternative method for question (a)</b>		
	$\frac{12!}{5! \times 3! \times 4!}$	<b>M1</b>	12! ÷ by a product of three factorials.
		<b>M1</b>	$\frac{n!}{5! \times 3! \times 4!}$
	$[792 \times 35 =] 27\,720$	<b>A1</b>	CAO
		<b>3</b>	

Question	Answer	Marks	Guidance
(b)	$4! \text{ (Lizo)} \times 6! \text{ (Kenny)} \times 2! \text{ (Martin)} \times 2! \text{ (Nantes)}$	<b>M1</b>	Product involving at least 3 of 4!, 6!, 2!, 2!
	$\times 3! \text{ (orders of K, M and N)}$	<b>M1</b>	$w \times 3!$ , $w$ integer $> 1$ .
	414 720	<b>A1</b>	WWW CAO
		<b>3</b>	
(c)	${}^7C_4 \text{ (adults)} \times {}^4C_1 \times {}^3C_1$	<b>M1</b>	${}^7C_4 \times b$ , $b$ integer $> 1$ no + or –.
	420	<b>A1</b>	
		<b>2</b>	
(d)	K not L ${}^5C_3 \times {}^8C_3 = 560$ L not K ${}^5C_3 \times {}^8C_3 = 560$ L and K ${}^5C_2 \times {}^8C_3 = 560$	<b>M1</b>	${}^8C_3 \text{ (or } {}^8P_3) \times c$ for one of the products or ${}^5C_3 \text{ (or } {}^5P_3) \times c$ , positive integer $> 1$ for first 2 products only.
		<b>M1</b>	Add 2 or 3 correct scenarios only values, no additional incorrect scenarios, no repeated scenarios. Accept unsimplified.
	[Total or Difference=] 1680	<b>A1</b>	
	<b>Alternative method for question (d)</b>		
	Total no of ways – neither L nor K Total = ${}^7C_4 \times {}^8C_3 = 1960$ Neither K nor L = ${}^5C_4 \times {}^8C_3 = 280$	<b>M1</b>	${}^8C_3 \times c$ , $c$ a positive integer $> 1$ .
		<b>M1</b>	Subtracting the number of ways with neither from their total number of ways.
	[Total or Difference=] 1680	<b>A1</b>	

Question	Answer	Marks	Guidance
(d)	<b>Alternative method for question (d)</b>		
	Subtracting K and L from sum of K and L K ${}^6C_3 \times {}^8C_3 = 1120$ L ${}^6C_3 \times {}^8C_3 = 1120$ L and K ${}^5C_2 \times {}^8C_3 = 560$ $1120 + 1120 - 560 = 1680$	<b>M1</b>	${}^8C_3 \times c$ , $c$ a positive integer $>1$ .
		<b>M1</b>	Subtracting number of ways with both from sum of number of ways with K and number of ways with L.
	[Total or Difference=] 1680	<b>A1</b>	
		<b>3</b>	