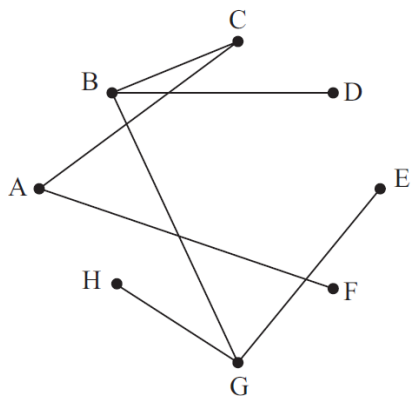
Activity	Duration	Time interval	IPA
A	8	0 - 10	-
B	6	0 - 14	-
C	9	0 - 11	-
D	11	0 - 11	-
E	13	8 - 29	A
F	9	8 - 19	A
G	5	8 - 19	A, B
H	8	11 - 19	C, D
I	6	11 - 19	D
J	13	11 - 30	D
K	7	19 - 29	F, G, H, I
L	3	19 - 28	F, G, H, I
M	11	19 - 30	F, G, H, I
N	9	26 - 38	E, K, L
P	10	22 - 38	L
Q	8	30 - 38	J, M

Question Number	Scheme	Marks
7.(a)(i)	DB, BG, BC, CA, AF, {GE, GH either order}	M1 A1
(a)(ii)	277 (miles)	A1 **(3)**
(b)		B1 **(1)**
(c)	"277" x 2 = 554 (miles)	B1ft **(1)**
(d)	Replace BC CA AF with BF $554 - 41 - 38 - 39 + 46 = 482$ (miles)	M1 A1 **(2)**

(e)	ACBGEDHFA 342 (miles) ACBGHEDFA 337 (miles)	 M1 A1 A1 **(3)**
(f)	$277 - 42 + (42 + 43)$ 320 (miles)	M1 A1 **(2)**
(g)	$321 \leqslant L \leqslant 337$	dB1**ft** **(1)**
		13 marks

	Notes for Question 7	
ai1M1	Prim's – first three arcs correctly chosen in order (DB, BG, BC, …) **or** first four nodes {D, B, G, C, …} correctly chosen in order. If any explicit rejections seen at some point then M1 (max) only. Order of nodes may be seen at the top of a matrix/table {-, 2, 4, 1 , - , -, 3, - }. Starting at any other node can score M1 only for first three arcs chosen correctly (If starting at A first 3 arcs AC AF BC)	
ai1A1	CSO – all **arcs** correctly **stated** and chosen in the correct order (with no additional arcs). They must be considering arcs for this mark (do not accept a list of nodes or numbers across the top of the matrix unless the correct list of arcs (in the correct order) is also seen)	
aii2A1	CAO (must be stated in (a))	
b1B1	CAO	
c1B1ft	Their "277" x 2	
d1M1	Attempts to use BF as shortcut (accept correct calculation or arcs listed)	
d1A1	CAO value and arcs must be stated	
e1M1	Nearest neighbour starting at A with first five nodes correct (A – C – B – G – E – or A – C – B – G – H) Accept arcs so AC, CB, BG, GE or GH	
e1A1	One route correct including return to A (may be stated as arcs) and its value correct	
e2A1	Both routes correct including return to A (may be stated as arcs) and both values correct	

f1M1	(weight of their MST from (a) **or** 277 **only**) – 42 + 42(HG) + 43(HB) (oe so may not see the –42 + 42). A correct answer of 320 with no working can imply this (and the next) mark. If (a) is incorrect and H is only connected by HG, a value of their "277" from (a) plus 43 scores M1 (Note new calculation to find RMST 235 + 42 + 43 = 320 may be seen) (If using a new calculation for the RMST award for the correct arcs DB, BG, BC, CA, AF, EG seen or a value of 235 plus the two shortest from H)	
f1A1	CAO	
g1dB1ft	Dependent on both M marks in (e) and (f). Follow through their smallest upper bound and their greatest lower bound. Do not accept strict inequalities. Accept interval notation [321, 337]	