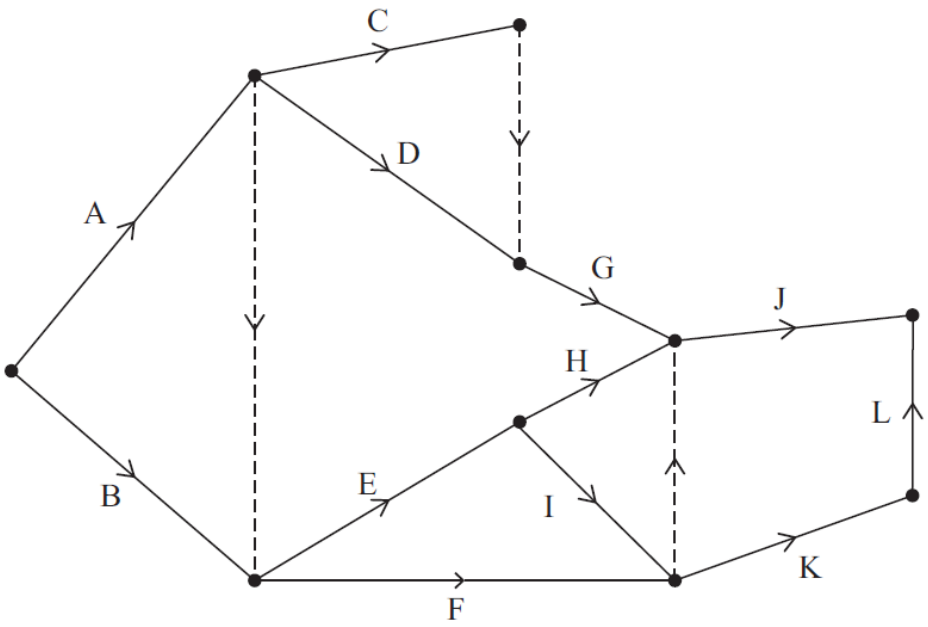
Question Number	Scheme	Marks
4.(a)	AGFEDCBHA $14x + 177$	M1 A1 A1
		(3)
(b)	$6x + 7 > 34$ *or* $8x - 2 > 34$ (accept $\geq$) ($\Rightarrow x > 4.5$) $14x + 177 < 256$ ($\Rightarrow x < 5.64 \ldots$) $x = 5$	B1 M1 A1
		(3)
(c)	RMST $27 + 28 + 25 + 30 + 31 + 34 \ (= 175)$ Plus two shortest from A (28 and 29) Lower bound 232 (miles)	B1 M1 A1
		(3)
(d)	$232 \leqslant L \leqslant 247$	B1
		(1)
		10 marks
	Notes for Question 4	
a1M1	**Mark (a) and (b) together.** NN route attempted – first six nodes correct AGFEDC (accept arcs for this mark, so first five arcs correct AG GF FE ED DC) (if no route stated accept correct numbers across the top of the table 1, -, 6, 5, 4, 3, 2, -)	
a1A1	CAO – route correct (accept arcs AG GF FE ED DC CB BH HA) (do not accept top of table numbers for this mark)	
a2A1	CAO – distance $14x + 177$	
b1B1	Compares AH or BH and HG to form correct inequality	
b1M1	Forms an inequality using "answer to (a)" < 256	
b1A1	CAO $x = 5$ following from $177 + 14x < 256$ plus at least one of the other correct inequalities	
c1B1	Finds the "RMST" (may list lengths of arcs or name arcs or circle correct figures on the table or sight of 175) Correct arcs are BC BE ED EF FG GH	
c1M1	Adds the two shortest arcs from A (sight of AG and AD or 28 and 29) to their RMST, which must comprise six arcs	
c1A1	CAO 232 (Do not accept 232 with no working)	
d1B1	CAO – Accept strict inequalities. Accept interval notation	

Question Number	Scheme	Marks
5.(a)	e.g.  	M1 A1 A1 A1 A1 **(5)**
(b)	Activities A, B, E, I, K and L are critical	B1 **(1)**
		6 marks
	Notes for Question 5	
	Activity on node is M0 Condone lack of, or incorrect, numbered events throughout. 'Dealt with correctly' means that the activity starts from the correct event but need not necessarily finish at the correct event, e.g. 'G dealt with correctly' requires the correct precedences for this activity, i.e. C and D labelled correctly, with a dummy from the end of C into the same node as D and G starting from that node but do not consider the end event.	
	If an arc is not labelled, for example, if the arc for activity E is not labelled (but the arc is present) then this will lose the first A mark and the final (CSO) A mark – they can still earn the second and third A marks on the bod. If two or more arcs are not labelled then mark according to the scheme. Assume that a solid line is an activity which has not been labelled rather than a dummy (even if in the correct place for where a dummy should be). **Ignore incorrect or lack of arrows on the activities for the first four marks only**	
a1M1	Eight activities (labelled on arc), one start and at least two dummies placed	
a1A1	Activities A, B, C, 1st dummy, from A to B (including correct arrow), D, E and F dealt with correctly	
a2A1	2nd dummy, between C and D (including correct arrow), activities G, H and I dealt with correctly	
a3A1	Activities J, K and L dealt with correctly, so 3rd dummy at the end of F and I required + correct arrow	
a4A1	CSO – all arrows correctly placed for each activity with one finish and exactly three dummies	