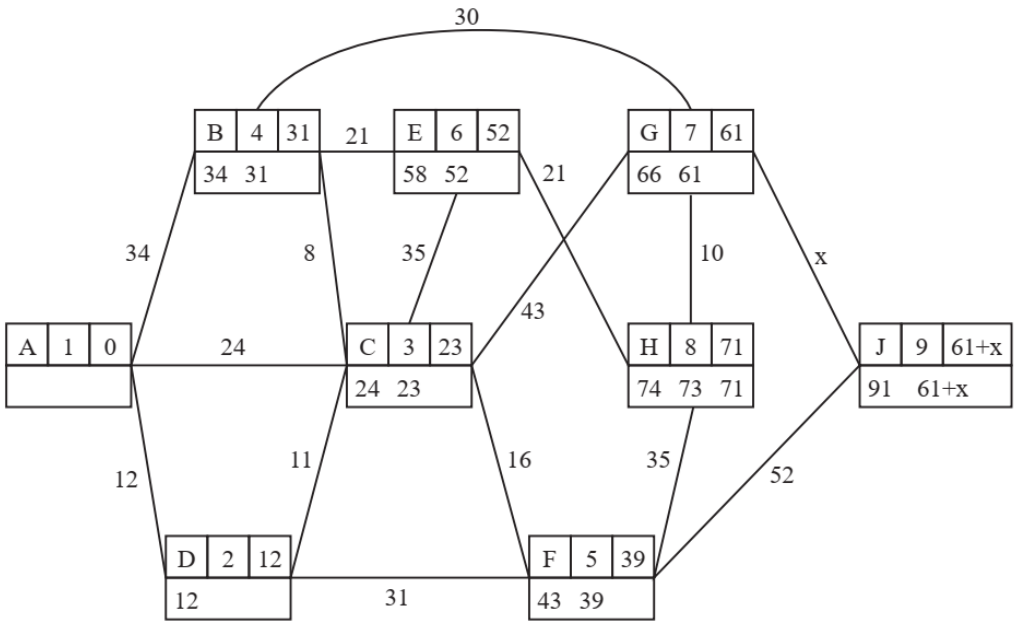
6.(a)	 Fastest time: 71 (minutes) Quickest route: ADCBGH	M1 A1 (DCB) A1 (FE) A1ft (GH) A1ft A1 **(6)**
(b)	AD + EH = 12 + 21 = 33*	M1 A1
	A(DCB)E + D(CBG)H = 52 + 59 = 111	A1
	A(DCBG)H + D(CB)E = 71 + 40 = 111	A1
	$(383+x)+33\ldots440 \Rightarrow x\ldots..$	depM1
	$24,, x<30$	A1 **(6)**
(c)	e.g. ABCEBGCDADFJGHEHFCA	B1 **(1)**
(d)	If a direct road DH opens then only A and E are odd therefore the shortest inspection route is (383 + x) + 25 (DH) + 52 (AE)	M1
	460 + x = 488 therefore x = 28	A1 **(2)**
		15 marks
	Notes for Question 6	

In (a) it is important that all values at each node are checked very carefully – the order of the working values must be correct for the corresponding A mark to be awarded e.g. at H the working values must be 74 73 71 in that order (so 74 71 73 is incorrect)
It is also important that the order of labelling is checked carefully. The order of labelling must be a strictly increasing sequence – so 1, 2, 3, 3, 4, … will be penalised once (see notes below) but 1, 2, 3, 5, 6, … is fine. Errors in the final values and working values are penalised before errors in the order of labelling

a1M1: A larger value replaced by a smaller value at least twice in the working values at either B, C, E, F, G, H
a1A1: All values at D, C and B correct and the working values in the correct order
a2A1: All values at F and E correct and the working values in the correct order
a3A1ft: All values in G and H correct on the follow through and the working values in the correct order. To follow through G check that the working values at G follow from the candidate's final values for the nodes that are directly attached to G (which are C and B). For example, **if** correct then the order of labelling of nodes C and B are 3 and 4 respectively so the working values at G should come from C and B in that order. The first working value at G should be their 23 (the Final value at C) + 43 (the weight of the arc CG), the second working value at G should be their 31 (the Final value at B) + 30 (the weight of the arc BG). Repeat the process for H (which will have working values from F, E and G with the order of these nodes determined by the candidate's order of labelling at F, E and G)
a4A1ft: Follow through their final value at H **only** – if answer is 71 but this is not the Final Value at H then A0
a5A1: CAO (ADCBGH)

b1M1: Three distinct pairings of the nodes A, D, E and H
b1A1: Any one row correct including pairing **and** total
b2A1: Any two rows correct including pairings **and** totals
b3A1: All three rows correct including pairings **and** totals
b2dM1: (383 + x) + (their least pairing total) with any inequality sign or equal to 440 – dependent on first M mark in (b). Give bod if not all totals are shown (so if they only give two totals then they should be using the least of these two) but they must have shown all three distinct pairings of the four odd nodes
b4A1: cao (24 ,, $x < 30$) – condone 24 ,, x ,, 29

c1B1: cao (check: starting and finishing at A, 19 nodes, AD and EH repeated in route, with A(3), B(2), C(3), D(2), E(2), F(2), G(2), H(2), J(1)) – can be given in terms of arcs

d1M1: (383 + x) + 25 + their 52 (where 'their 52' must be the length of their shortest path from A to E in either (a) **or** (b) **or** they state/imply the shortest path from A to E is 52) - a correct value of 28 with no working can imply this mark only
d1A1: cao (28) from correct working **and** correct reasoning that A and E are the only odd nodes **or** that we only need to pair A and E (as a minimum accept mention of A and E only but ignore any mention of the new direct road from D to H)