4.(a)(i)	$z = 14 - 2x - y$ substituted into both $x + 2y + z \geq 15$ and $3x - 4y + 2z \ldots 1$	M1	
	$-x + y \geq 1$	A1	
	$x + 6y \geq 27$	A1	
(a)(ii)	The maximum possible value of P is 1	A1	**(4)**
(b)(i)	$-x + y = 1 \Rightarrow x + 6(1 + x) \geq 27$	M1	
	$7x \geq 21 \Rightarrow$ maximum possible value of x is 3	A1	
(b)(ii)	$x = 3$, $y = 4$ and $z = 4$	A1	**(3)**
		7 marks	

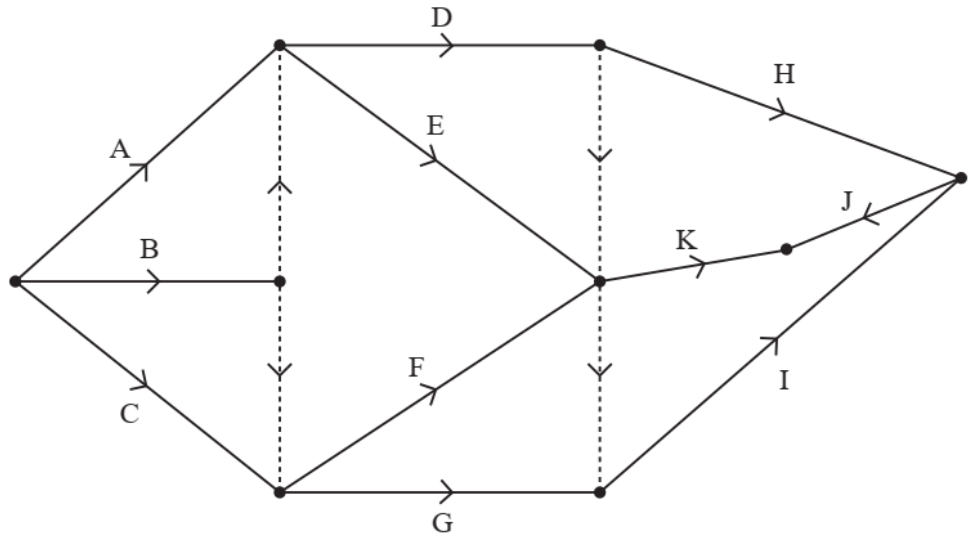
Notes for Question 4

Mark parts (a) and (b) together (so ignore labelling of parts in this question)

ai1M1: substituting $z = 14 - 2x - y$ into **both** correct inequality constraints – allow sign errors in re-arranging to make z the subject. This mark can also be awarded for **one** correct simplified inequality
ai1A1: cao ($-x + y \geq 1$) – or equivalent (e.g. $x - y + 1 \ldots 0$) but must be three terms only – ISW if candidates incorrectly re-arrange after a correct three term inequality seen
ai2A1: cao ($x + 6y \geq 27$) – or equivalent but must be three terms only – ISW if candidates incorrectly re-arrange after a correct three term inequality seen

aii3A1: cao - this mark can be awarded after correctly finding x and y – note that this mark is not dependent on the previous A mark. Just stating $P = 1$ is fine (so do not need to mention 'maximum')

bi1M1: substitute their $-x + y = 1$ into their $x + 6y \geq 27$ or their $x + 6y = 27$
bi1A1: correct value of x (if using equations then they do not need to justify that this is the maximum value)
bii2A1: cao for x, y **and** z – accept if seen as a coordinate

5. (a)	e.g.  	M1 A1 A1 A1 A1 **(5)**
(b)(i)	24 (hours)	B1
(b)(ii)	C, F, I and J	B1
(b)(iii)	Total float for G is 3 (hours) Total float for K is 1 (hour)	B1 B1 **(4)**
		9 marks

Notes for Question 5

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. 'D dealt with correctly' requires the correct precedences for this activity, i.e. A and B labelled correctly and leading into the same node and D starting from that node but do not consider the end event for D. **Activity on node is M0**

If an arc is not labelled, for example, if the arc for activity C 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 A mark 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: At least eight activities (labelled on arc), one start and at least two dummies placed
a1A1: Activities A, B, C **and** two of activities D, E, F or G dealt with correctly (so at least one dummy (+ correct arrow) required)
a2A1: Activities D, E, F and G dealt with correctly – so first two dummies (+ correct arrows) are required for this mark
a3A1: Activities H and I dealt with correctly (so must have the final two dummies + correct arrows)
a4A1: cso – activities J and K dealt with corrctly. All arrows correctly placed for each activity with one finish and at most four dummies. Note that some candidates are drawing the graph non-planar which is fine

Please check all arcs carefully for arrows – if there are no arrows on any dummies then M1 only. **Note that additional (but unnecessary) 'correct' dummies that still maintain precedence for the network should only be penalised with the final A mark if earned**

bi1B1: cao (24)
bii1B1: cao (C, F, I and J with no others)
biii1B1: cao (total float for G as 3)