Question Number	Scheme	Marks
4 (a)	(In second pass) 44 compared with x and does not swap x compared with 58 and does not swap	B1 B1 **(2)**
(b)	35 24 44 32 21 x 54 31 58 61 73	M1 A1 **(2)**
(c)	$21+24+31+32+35+44+54+58+61+73+x>480$ $x>47$ Bin 1: 73 61 24 Bin 2: 58 54 x $x+58+54\leqslant 160$ $x\leqslant 48$ $x=48$	M1 M1 A1 **(3)**
		7 marks
	Notes for Question 4	
a1B1	Compares 44 with x and states does not change or equivalent. Whilst a reference to the second pass needn't be stated, incorrect statements should be penalised, e.g. "x is compared **to 44 in the first pass**…" is B0.	
a2B1	Compares x with 58 and states does not change or equivalent.	
bM1	Eleven terms including the x present, works L to R with 44 swapped with 24, and 58 in correct position.	
bA1	CAO	
c1M1	Considers sum of all values >480 and obtains inequality for x **or equivalent work,** such as setting up lower bound calculation of total weights e.g. $\frac{433+x}{120}>4$ leading to $x>47$ or $x\geqslant 48$ or $48\leqslant x\leqslant 57$.	
c2M1	Considers bin 2 and obtains inequality for x **or equivalent**.	
cA1	CSO	

Question Number	Scheme	
5.	$1.2x + 2.5y + 4z \leqslant 60 \quad \Rightarrow \quad 12x + 25y + 40z \leqslant 600$ $4\frac{1}{3}x + 7\frac{1}{2}y + 9z \leqslant 200 \quad \Rightarrow 26x + 45y + 54z \leqslant 1200$ $x \geqslant \frac{40}{100}(x + y + z) \quad \Rightarrow \quad 3x \geqslant 2y + 2z$ $x \geqslant 2y$ $z \leqslant \frac{30}{100}(x + y + z) \quad \Rightarrow \quad 7z \leqslant 3x + 3y$ $x,\ y,\ z \geqslant 0$ Maximise $(P =)\ 275x + 425y + 650z$	M1 A1 A1 M1 A1 A1 B1B1
		7 marks

	Notes for Question 5	
a1M1	Attempts constraints for quantity of wood and production time (do not need to be simplified) Look for $1.2x + 2.5y + 4z \bullet 60$ and $4\frac{1}{3}x + 7\frac{1}{2}y + 9z \bullet 200$ where $\bullet$ is any inequality or equals. Condone e.g. 4.33 or 4.2 instead of $4\frac{1}{3}$ for the M mark	
a1A1	CAO One of these constraints fully simplified	
a2A1	CAO Both constraints fully simplified	
a2M1	Attempts at least two other non-trivial constraints (any inequality or equals)	
a3A1	Two other non-trivial constraints correct – fully simplified with integer coefficients	
a4A1	All other non-trivial constraints correct – fully simplified with integer coefficients – and trivial constraints stated	
a1B1	Objective function correct	
a2B1	Maximise stated and objective function correct Accept e.g. '$P_{\max}$ = …' or 'Max' but not 'Maximum P='.	