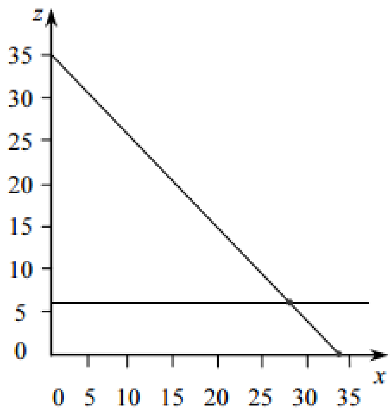
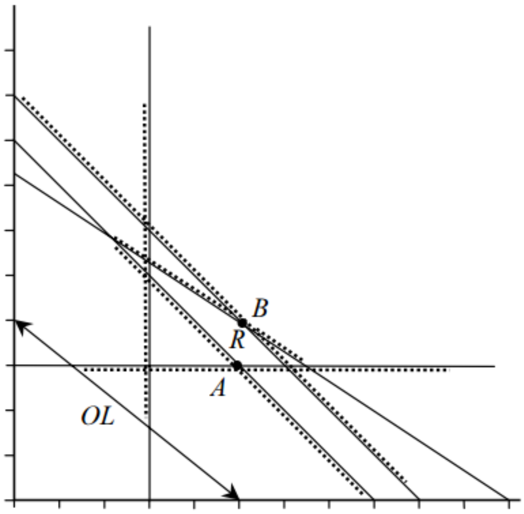
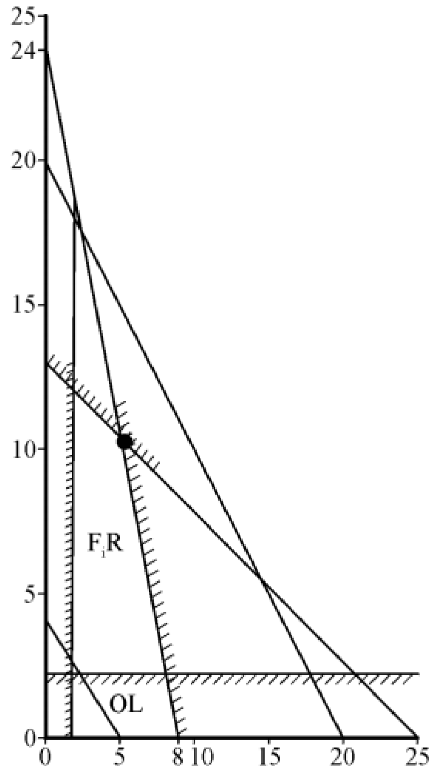
4	**(a)**	Extreme points (0, 120), (50, 100), (100, 0)	M1		
		Values 360, 400, 200	A1		any of or by drawing objective
		Maximum = 400	A1	3	CAO
	(b)	Extreme points (0, 50), (50, 0)	M1		
		Values 50, 200			or by drawing objective
		Minimum = 50	A1	2	
	(c)	$x \geq 0,\ y \geq 0$	B1		Allow strict inequalities
		$x + y \geq 50$	B1		
		$2x + y \leq 200$	M1 A1		for negative gradient OE
		$2x + 5y \leq 600$	M1 A1	6	for fractional gradient OE
		Total		**11**	

Q	Solution	Marks	Total	Comments
7 (a)	$x > y + z$	B1		
	$y \le \frac{15}{100}(x+y+z)$	M1		
	$\Rightarrow 17y \le 3x + 3z$	A1		allow integer multiples
	$y \ge z$	B1		
	$z < \frac{3}{5}x$	M1		
	$5z < 3x$	A1		as above
	$(C =)\quad 8x + 12y + 14z$	B1	7	
(b)	$y = 6$			
	$\Rightarrow x + z \ge 34$	M1		attempt at substituting $y = 6$
	$z \le 6$			
	$3x > 5z$	A1F		at least two correct
	$x > z + 6$			
		G2		one for each line
	$x = 34, \quad z = 0$	M1	6	attempt at considering extreme points
	Cost = £344 000	A1		c.a.o.
	Alternative:			
	$y = 6, \quad z \le 6$			
	$\therefore x > 6 + z$	B1		
	$(17 \times 6) \le 3x + 3z$	M1		
	$102 - 3z \le 3x$	A1		
	$x > 10$	B1		
	$\Rightarrow x \ge 28$			
	Minimum at $(34 \times 8) + (6 \times 12)$	M1		attempt at points $(28, 6) \to (34, 0)$
	= £344 000	A1		
	Total		**13**	

Q	Solution	Marks	Total	Comments
6(a)	$8x + 8y \leq 7200$	B1		-1 for any extra
	$2x + 3y \leq 2200$	B1		-1 for strict inequalities
	$x \geq 300,\ y \geq 300$	B1		
	$x + y \geq 800$	B1		
	$T = 20x + 25y$	B1	5	
(b)		B1		$x + y = 900$
		B1		$2x + 3y = 2200$
		B1		$x = 300$ and $y = 300$
		B1		$x + y = 800$
		B1		region – pentagon
		B1	6	line
(c)	Minimum T at A (500, 300)	M1		c.a.o } method allowed even if with wrong graph
	$T = £17\,500$	A1		
	Maximum I at B (500, 400)	M1		c.a.o } method allowed even if with wrong graph
	$I = £20\,000$	A1	4	
	Total		**15**	

Q	Solution	Marks	Total	Comments
5 **(a)**	$2x+4y \le 50$	B1		OE (Strict inequalities −1)
	$3x+y \le 24$	B1		(equalities −1)
	$x+y \le 20$	B1		(A & B −1)
	$x \ge 2,\ y \ge 2$	B1		Both
	$(T=)20x+25y$	B1	5	
(b)		B1 × 3		3 lines
		B1		$x=2,\ y=2$ (both)
		B1F		closed region marked
		B1	6	objective line

(c)	$T=20x+25y$	M1		Considering extreme points on their region
	(Min at (2,2) =) £90	A1		
	Max at (4.6, 10.2) Impossible	B2,1		Considering (3, 11) (4, 10) (5, 9)
	Max = £335	B2	6	(B1 for 330, 325)
	Total		**17**	