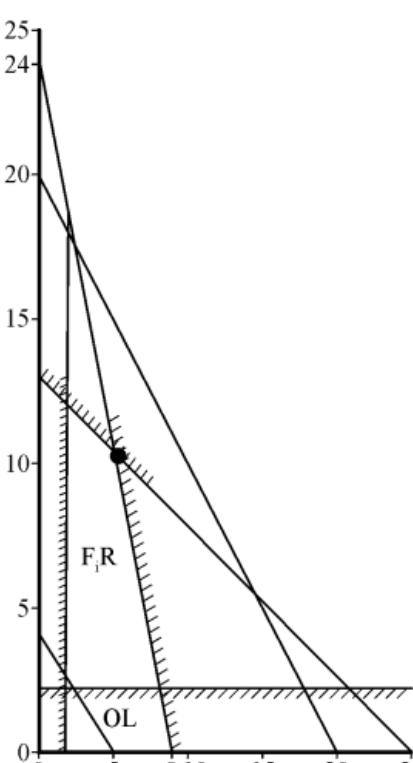


<b>4</b>	<b>(a)</b>	Extreme points (0, 120), (50, 100), (100, 0)  Values 360, 400, 200	M1  A1		any of or by drawing objective
	<b>(b)</b>	Maximum = 400  Extreme points (0, 50), (50, 0)	A1  M1	3	CAO
		Values 50, 200			or by drawing objective
		Minimum = 50	A1	2	
	<b>(c)</b>	$x \geq 0, y \geq 0$	B1		Allow 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
		<b>Total</b>		<b>11</b>	

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

<b>Q</b>	<b>Solution</b>	<b>Marks</b>	<b>Total</b>	<b>Comments</b>
6(a)	$8x + 8y \leq 7200$ $2x + 3y \leq 2200$ $x \geq 300, y \geq 300$ $x + y \geq 800$ $T = 20x + 25y$	B1 B1 B1 B1 B1	5	-1 for any extra -1 for strict inequalities
(b)		B1 B1 B1 B1 B1	6	$x + y = 900$ $2x + 3y = 2200$ $x = 300$ and $y = 300$ $x + y = 800$ region – pentagon line
(c)	Minimum $T$ at $A(500, 300)$ $T = £17500$  Maximum $I$ at $B(500, 400)$ $I = £20000$	M1 A1  M1 A1	4	c.a.o c.a.o
	<b>Total</b>		<b>15</b>	method allowed even if with wrong graph

<b>Q</b>	<b>Solution</b>	<b>Marks</b>	<b>Total</b>	<b>Comments</b>
<b>5 (a)</b>	$2x + 4y \leq 50$ $3x + y \leq 24$ $x + y \leq 20$ $x \geq 2, y \geq 2$ $(T =) 20x + 25y$	B1 B1 B1 B1 B1	5	OE (Strict inequalities -1) ( equalities -1) (A & B -1) Both
<b>(b)</b>	 <p>The graph shows a Cartesian coordinate system with the x-axis and y-axis both ranging from 0 to 25. Five lines are plotted: <math>x=2</math>, <math>y=2</math>, <math>x+y=20</math>, <math>3x+y=24</math>, and <math>2x+4y=50</math>. The feasible region, labeled <b>FR</b>, is the shaded area in the first quadrant bounded by these lines. The objective function line, labeled <b>OL</b>, is <math>T=20x+25y</math>. The intersection point of the lines <math>x=2</math> and <math>y=2</math> is marked at (2, 2).</p>	B1 × 3 B1 B1F B1	6	3 lines $x = 2, y = 2$ (both) closed region marked objective line
<b>(c)</b>	$T = 20x + 25y$ (Min at (2,2) = £90 Max at (4.6, 10.2) Impossible $\text{Max} = \text{£}335$	M1 A1 B2,1 B2	6	Considering extreme points on their region Considering (3, 11) (4, 10) (5, 9) (B1 for 330, 325)
	<b>Total</b>		<b>17</b>	