Inequalities Exam Questions MS (From Legacy OCR MEI C1 4751)

Q1 (Jun 2006, Q6)

$-3 < x < 1$ [condone $x < 1$, $x > -3$]	4	B3 for –3 and 1 or M1 for $x^2 + 2x - 3$ [< 0]or $(x + 1)^2 < / = 4$ and M1 for $(x + 3)(x - 1)$ or $x = (-2 \pm 4)/2$ or for $(x + 1)$ and ± 2 on opp. sides of eqn or inequality; if 0, then SC1 for one of $x < 1$, $x > -3$	4

Q2 (Jun 2009, Q4)

$x < 0$ or $x > 6$ (both required)	2	B1 each; if B0 then M1 for 0 and 6 identified;	2

Q3 (Jan 2010, Q2)

$5x - 3 < 2x + 10$	**M1**	condone '=' used forfirst two Ms **M0** forjust $5x - 3 < 2(x + 5)$
$3x < 13$	**M1**	or $-13 < -3x$ orft
$x < \frac{13}{3}$ o.e.	**M1**	orft; isw furthersimplification of 13/3; M0 forjust $x < 4.3$

Q4 (Jan 2013, Q4)

$(5x + 2)(x - 6)$	M1	for factors giving at least two out of three terms correct when expanded and collected
boundary values –0.4 oe and 6 soi	A1	A0 for just $\frac{28 \pm \sqrt{1024}}{10}$
$-0.4 \leq x \leq 6$ oe	A2	may be separate inequalities; mark final answer A1 for one end correct eg $x \leq 6$ or for $-0.4 < x < 6$ oe or B1 for $a \leq x \leq b$ ft their boundary values
	[4]	

Q5 (Jun 2014, Q6)

$(3x + 1)(x + 3)$	M1	or $3(x + 1/3)(x + 3)$ or for $-1/3$ and -3 found as endpoints eg by use of formula
$x < -3$	A1	
[or]		
$x > -1/3$ oe	A1	mark final answers; allow only A1 for $-3 > x > -1/3$ oe as final answer or for $x \leq -3$ and $x \geq -1/3$ if M0, allow SC1 for sketch of parabola the right way up with their solns ft their endpoints
	[3]	

Q6 (OCR 4721, Jun 2012, Q9)

(i)		Area of tile = $4x(x + 3)$	B1	Correct expression for area of rectangle (may be unsimplified)
		$4x(x + 3) < 112$ $4x^2 + 12x - 112 < 0$	B1 √	Correct inequality for their expression
		$4(x + 7)(x - 4) < 0$	M1	Correct method to solve a three term quadratic
			M1	Chooses correct region for the quadratic inequality i.e. lower root < x < higher root
		$-7 < x < 4$	A1	(May be implied by correct final answer)
		$\therefore\ 0 < x < 4$	A1	Restricts range to positive values of x **CWO**
			[6]	
(ii)		Perimeter = $4y + (y + 3) + 2y + y + 2y + 3$	M1	**Clear** attempt to add lengths of all **6** edges
			A1	Correct perimeter simplified to $10y + 6$ seen
		$20 < 10y + 6 < 54$	B1 FT	Correct inequalities for their expression
			M1	Solving 2 linear equations or inequalities dealing with all 3 terms
		$1.4 < y < 4.8$	A1	Accept "$1.4 < y$, $y < 4.8$", "$1.4 < y$ ***and*** $y < 4.8$" but **NOT** "$1.4 < y$ ***or*** $y < 4.8$".
			[5]	

Q7 (OCR 4721, Jun 2005, Q8)

8(i)	$2[10+x+x]>64$	B1	1	$20+4x>64$ o.e.
(ii)	$x(x+10)<299$	B1		$x(x+10)<299$
	$x^2+10x-299<0$			
	$(x-13)(x+23)<0$	B1	2	Correctly shows $(x-13)(x+23)<0$ **AG** SR Complete proof worked backward B2
(iii)	$x>11$	B1√		$x>11$ ft from their (i)
	$(x-13)(x+23)<0$	M2		Correct method to solve $(x-13)(x+23)<0$ eg graph
	$-23<x<13$	A1		$-23<x<13$ seen in this form or as number line SR if seen with no working B1
	$\therefore 11<x<13$	B1	5	
			8	