

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 $x = \frac{-2 \pm 4}{2}$ 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)

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

Q3 (Jan 2010, Q2)

| | | |
|--|------------------------|--|
| $5x - 3 < 2x + 10$ $3x < 13$ $x < \frac{13}{3}$ o.e. | M1 M1 M1 | condone '=' used for first two Ms M0 for just $5x - 3 < 2(x + 5)$ or $-13 < -3x$ or ft or ft; isw further simplification of $13/3$; M0 for just $x < 4.3$ |
|--|------------------------|--|

Q4 (Jan 2013, Q4)

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|---------------------------------------|-----|---|
| $(5x + 2)(x - 6)$ | 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 $3(x + 1/3)(x + 3)$ |
| $x < -3$ | A1 | or for $-1/3$ and -3 found as endpoints eg by use of formula |
| [or] | A1 | mark final answers; |
| $x > -1/3$ oe | A1 | allow only A1 for $-3 > x > -1/3$ oe as final answer or for $x \leq -3$ and $x \geq -1/3$ |
| | [3] | if M0, allow SC1 for sketch of parabola the right way up with their solns fit their endpoints |

Q6 (OCR 4721, Jun 2012, Q9)

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

8(i) $2[10 + x + x] > 64$

(ii) $x(x + 10) < 299$
 $x^2 + 10x - 299 < 0$
 $(x - 13)(x + 23) < 0$

(iii) $x > 11$
 $(x - 13)(x + 23) < 0$

$-23 < x < 13$

$\therefore 11 < x < 13$

B1 1 $20 + 4x > 64$ o.e.

B1 $x(x + 10) < 299$

B1 2 Correctly shows
 $(x - 13)(x + 23) < 0$ **AG**

SR
Complete proof worked
 backward B2

B1 $\sqrt{\quad}$
 M2 $x > 11$ ft from their (i)
 Correct method to solve
 $(x - 13)(x + 23) < 0$ eg
 graph

A1 $-23 < x < 13$ seen in this
 form or as number line
SR
 if seen with no working B1

B1 5

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