Quadratics Inequalities Past Paper Answers GCSE Edexcel – Non-Calculator

1.

$9 < m < 11$ $-11 < m < -9$	M1	for a correct method to begin rearranging to solve for m^2 eg $88 < m^2 + 7$ or $m^2 + 7 < 128$ or $81 < m^2 < 121$	It is insufficient to just multiply all three elements by 4; some rearrangement must occur such as showing as two separate inequalities or isolating m^2
	M1	for a complete method to $m^2 = 81$ or $m^2 = 121$ or better	Accept an inequality used in place of "=". m^2 must be isolated at this stage.
	M1	for a set of critical values: at least two out of 9, 11, −9, −11	Do not award if other values are also given eg 10
	M1	for selecting a correct inequality for one set of critical values eg $9 < m$ and $m < -9$ **or** $m < 11$ and $-11 < m$ **or** $9 < m$ and $m < 11$ or a set of inequalities with some error eg $9 \; ? \; m \; ? \; 11$ and $-11 \; ? \; m \; ? \; -9$ where ? is an incorrect inequality symbol like $9 < m \leq 11$ or $9 \geq m \geq 11$ or answer given as $\pm 9 < m < \pm 11$	Could be shown as $9 < m < 11$ or $-11 < m < -9$ or $-11 < m < 11$
	A1	$9 < m < 11$ and $-11 < m < -9$ given as boundaries of m	Accept with an "and" or an "or" or neither

2.

estion	Answer	Mark	Mark scheme	Additional guidance
	2, 3, 4	M1	for method to solve $3n + 2 \leq 14$ eg $n \leq (14 - 2) \div 3$ oe	This could be shown within an equation rather than an inequality at this stage
		M1	for complete method to rearrange $\frac{6n}{n^2 + 5} > 1$ to the form $an^2 + bn + c \; (< 0)$	For the 2rd and 3rd M marks condone no '< 0' and condone use of incorrect inequality signs or '='
		M1	for method to begin to solve $n^2 - 6n + 5 \; (< 0)$ eg $(n \pm 5)(n \pm 1) \; (< 0)$	Accept $\frac{--6 \pm \sqrt{(-6)^2 - 4 \times 1 \times 5}}{2 \times 1}$ (condone one sign error)
		M1	(dep on previous M2) for $n > 1$ and $n \leq 4$ **or** $1 < n < 5$	Must come from correct working Could be shown on a number line
		A1	(dep M4) cao	
			Alternative method	
		M1	for method to solve $3n + 2 \leq 14$ eg $n \leq (14 - 2) \div 3$ oe **OR** for $3 \times 4 + 2 = 14$	This could be shown within an equation rather than an inequality at this stage
		M3	for trials with 1, 2, 3 and 4 in the quadratic inequality, correctly evaluated	The values from the trials may be given as improper fractions eg $\frac{24}{21}, \frac{18}{14}, \frac{12}{9}, \frac{6}{6}$
		(M2	for trials with three of 1, 2, 3 and 4, correctly evaluated)	
		(M1	for trials with two of 1, 2, 3 and 4, correctly evaluated)	
		A1	(dep M4) cao	

3.

$x > 2$	P1	for process to derive algebraic expressions for area of both rectangle and triangle eg $(x-1)(3x-2)$ and $(2x \times x) \div 2$ (condone missing brackets)
	M1	for method to rearrange inequality to $2x^2-5x+2>0$ oe providing in the form $ax^2+bx+c>0$
	M1	for a correct method to solve $2x^2-5x+2>0$
	M1	for establishing critical values 2 and $\frac{1}{2}$
	A1	$x > 2$

4.

$x < -2, x > \frac{1}{2}$	M1	for a first step to solve the quadratic e.g. factorisation: $(2x+4)(x-\frac{1}{2})$ or $(2x-1)(x+2)$ or using the formula $\frac{-3\pm\sqrt{3^2-4\times2\times(-2)}}{2\times2}$
	A1	for -2 and $\frac{1}{2}$
	A1	

5.

$x < -3, x > 6$	M1	Rearrange to $x^2-3x-18>0$
	M1	Correct method to solve $x^2-3x-18=0$
	M1	Establish critical values -3 and 6
	A1	$x < -3, x > 6$

6.

$x > 4$, $x < -1$	M1	rearrange quadratic and factorise
	M1	critical values of 4 and -1 found
	A1	