Question	Scheme	Marks
1	$4x^2-3x+7 \geqslant 4x+9$ $\Rightarrow 4x^2-7x-2\ldots 0 \Rightarrow (4x+1)(x-2)\ldots 0 \Rightarrow x=\ldots$ or $\Rightarrow 4x^2-7x-2\ldots 0 \Rightarrow x=\dfrac{-(-7)\pm\sqrt{(-7)^2-4(4)(-2)}}{2\times 4} \Rightarrow x=\ldots$ or $\Rightarrow 4x^2-7x-2\ldots 0 \Rightarrow 4\left(x^2-\dfrac{7}{4}x-\dfrac{1}{2}\right)\ldots 0 \Rightarrow 4\left(\left(x-\dfrac{7}{8}\right)^2-\left(\dfrac{7}{8}\right)^2-\dfrac{1}{2}\right)\ldots 0 \Rightarrow x=\ldots$	**M1**
	$x=-\dfrac{1}{4}, 2$	**A1**
	$x \leqslant "-\dfrac{1}{4}"$, $x \geqslant "2"$	**M1**
	$x \leqslant -\dfrac{1}{4}$ or $x \geqslant 2$ oe	**A1**
		(4)
		(4 marks)

Notes:

M1: Gathers terms to one side and solves their 3TQ which is not $4x^2-3x+7=0$ to obtain at least one critical value for *x*. Allow by factorisation, the quadratic formula or completing the square. Do not be concerned about the inequality symbol for the first two marks and the "…0" can be implied.

Note that $4x^2-7x-2\ldots 0 \Rightarrow \left(x+\dfrac{1}{4}\right)(x-2)\ldots 0 \Rightarrow x=\ldots$ scores M0

For completing the square, the conditions for their $4x^2-7x-2\ldots 0$ are as follows:

Either $4x^2-7x-2\ldots 0 \Rightarrow 4\left(x^2+bx+c\right)\ldots 0$ then as general guidance

Or $4x^2-7x-2\ldots 0 \Rightarrow \left(2x-\dfrac{7}{4}\right)^2 \pm q \pm 2\ldots 0 \Rightarrow x=\ldots$

A1: Both correct critical values. Allow unsimplified but must be single fractions e.g. allow $-\dfrac{2}{8}, \dfrac{16}{8}$

These values may be seen embedded in their final answer but the **first M1 must have been scored**.

M1: Chooses the <u>outside</u> region for their 2 critical values. Allow with < and > for this mark.

Condone poor notation e.g. $"-\dfrac{1}{4}" \geqslant x \geqslant "2"$ or e.g. $"-\dfrac{1}{4}" > x > "2"$ or e.g. $"2" < x < "-\dfrac{1}{4}"$

A1: Correct solution only – **depends on all previous marks**. Allow e.g. $x \leqslant -\dfrac{1}{4}$, $x \geqslant 2$;

$x \leqslant -\dfrac{1}{4}$ and $x \geqslant 2$; $\left(-\infty, -\dfrac{1}{4}\right], [2, \infty)$; $\left(-\infty, -\dfrac{1}{4}\right]$ or $[2, \infty)$; $\left(-\infty, -\dfrac{1}{4}\right]$ and $[2, \infty)$

Do **not** allow $-\dfrac{1}{4} \geqslant x \geqslant 2$; $x \leqslant -\dfrac{1}{4} \cap x \geqslant 2$; $\left(-\infty, -\dfrac{1}{4}\right] \cap [2, \infty)$

Allow unsimplified constants but must be single fractions e.g. allow $-\dfrac{2}{8}, \dfrac{16}{8}$ as above.

Apply isw if possible if there is no contradiction so e.g. correct work leading to $x \leqslant -\frac{1}{4},\ x \geqslant 2$ followed by $-\frac{1}{4} \geqslant x \geqslant 2$ can score full marks. If several different answers are offered, mark the final answer.

Particular cases and how to mark them:

Case 1

$4x^2 - 3x + 7 \geqslant 4x + 9 \Rightarrow 4x^2 - 7x - 2 \geqslant 0$

$x = -\frac{1}{4},\ 2 \Rightarrow x \leqslant -\frac{1}{4},\ x \geqslant 2$

Scores M0A0 M1A0

Case 2

$4x^2 - 3x + 7 \geqslant 4x + 9 \Rightarrow 4x^2 - 7x - 2 \geqslant 0$

$\Rightarrow x \leqslant -\frac{1}{4},\ x \geqslant 2$

Scores M0A0M0A0

Question	Scheme	Marks
2(a)	$2x+2y=350$	B1
		(1)
(b)	E.g. $xy=7350,\ \ x\times y=7350$	B1
		(1)
(c)	$x(175-x)=7350$ or $(175-y)y=7350$	M1
	E.g. $x^2-175x+7350=0\Rightarrow\left(x-70\right)\left(x-105\right)=0\Rightarrow x=...$	dM1
	x = 70 or 105	A1
	$(x>y\Rightarrow)x=105, y=70$	A1
		(4)
		(6 marks)

Notes:

Ignore labelling and mark all parts together.
Ignore any units given whether correct or incorrect.

(a)

B1: Correct equation. Accept any correct equation e.g. $2\left(x+y\right)=350,\ x+y=175$

(b)

B1: Correct equation. Accept any correct equation e.g. $y=\frac{7350}{x}$

(c)

M1: Substitutes for x or y into either of their equations to produce a 2 or 3 term quadratic equation in one variable. Note that terms do not need to be collected for this mark so e.g. $x(175-x)=7350$ or $(175-y)y=7350$ oe is acceptable for this mark.

Condone slips when substituting if the intention is clear e.g. substituting for $2x$ rather than x: $x(350-2x)=7350$

(Note, if substituting $x=\frac{7350}{y}$ into $2x+2y=350$ they will need to multiply through by y to score this mark. Condone slips but must produce a 2 or 3 term quadratic equation.)

dM1: Depends on the first method mark. Solves their 3 term quadratic equation, any suitable means such as formula or by calculator (may be implied by correct values for their quadratic).

A1: Correct **simplified** roots of the quadratic. Do not be concerned about which is x and y for this mark so just look for the values 70 and 105. It is possible that candidates may only select the larger value for x (105) or the smaller value for y (70) **but** if both roots are found they must both be correct.

A1: Both x and y correct and correctly assigned and all previous marks scored.

Special Case:

Candidates who use Trial and Improvement in part (c) or guess the correct answers with no quadratic formed allow a special case of M1M1A0A0. If the values are the wrong way round or both sets of answers are offered then score special case of M1M0A0A0.