

Question			Answer	Marks	AO	Guidance	
2			DR				For reference only:
			$\frac{1}{2}(3x+1)^2 (2) \text{ or } (3x+1)^2$	B1*	1.1	Correct use of $A = \frac{1}{2}r^2\theta$	$\frac{1}{2}(3x+1)^2 (2) < 44x - 7$
			$9x^2 + 6x + 1 < 44x - 7 \Rightarrow 9x^2 - 38x + 8 (< 0)$	B1dep*	1.1	Expand and re-arrange to correct 3TQ expression in x	Allow any inequality sign or equals
			$9x^2 - 38x + 8 (< 0) \Rightarrow (9x - 2)(x - 4) (< 0)$	M1dep*	1.1	SEE APPENDIX for awarding this mark (solving 3TQ expressions) - dependent on first B mark only (this mark is for solving their 3TQ but not for solving $(3x+1)^2 = 0$)	Correct quadratic followed immediately by correct critical values (with no working) is M0
			c.v. of x are $\frac{2}{9}, 4$	B1	1.1	Correct critical values of x (if factorisation shown then it must imply these two c.v.)	Must be $\frac{2}{9}$ or 0.2 but B0 for 0.222...
			$\left\{x : \frac{2}{9} < x < 4\right\}$	B1FT dep*	2.5	FT their two positive critical values x_1, x_2 e.g. $\{x : x_1 < x < x_2\}$ where $x_2 > x_1$ allow $\left\{x : x > \frac{2}{9}\right\} \cap \{x : x < 4\}$ but ‘union’ is B0 B0 for interval notation e.g. $\left(\frac{2}{9}, 4\right)$	Answer must be in set notation for this mark – dependent on first B mark only
				[5]			

Rules for solving quadratics in questions 2 and 4(b)(i) ONLY In questions 2 and 4(b)(i) candidates are required to solve 3 term quadratics (3TQ) using DR – therefore we must see a correct, complete method for solving these quadratics – the correct answers do not imply the corresponding M mark, for example in question 2, $9x^2 - 38x + 8 = 0 \Rightarrow x = 4$ or $x = \frac{2}{9}$ is M0
Rules for factorising: $at^2 + bt + c \Rightarrow (mt + n)(pt + q)$ where $a = mp$ and one of $mq + np = b$ or $c = nq$ (so when expanding their factorised expression it must give the correct quadratic term and one other term correct of the preceding 3TQ expression/equation) e.g. in question 2 (and similarly for question 4(b)(i)): $9x^2 - 38x + 8 = (x - \frac{2}{9})(x - 4)$ is M0 (but the following B1 for the correct c.v. of $\frac{2}{9}$ and 4 in qu. 2 can still be awarded as they follow from these two factors) $9x^2 - 38x + 8 = (3x + 8)(3x + 1)$ is M1 (when expanded the x^2 and constant terms are correct) Allow correct part factorisation for their 3TQ expression e.g. if correct 3TQ then in question 2 the expression $9x(x - 4) - 2(x - 4)$ scores M1
Rules for the formula: Must apply the correct formula for their three-term quadratic (no errors even if correct formula is stated) – note that stating the formula (in terms of a, b and c) followed immediately by the corresponding roots is M0 – we must see the formula being applied e.g. $9x^2 - 38x + 8 = 0 \Rightarrow x = \frac{38 \pm \sqrt{38^2 - 4(9)(8)}}{2(9)}$. Minimal acceptable working would be $x = \frac{38 \pm \sqrt{1156}}{18}$ (so must explicitly see the discriminant) for M1
Rules for completing the square – using $9x^2 - 38x + 8 = 0$ as an example: The M1 is not awarded until correctly getting to the stage of $x - \frac{19}{9} = \pm \sqrt{\frac{289}{81}}$ (must include $\pm$ so implying two roots) with no errors (so consistent with applying the formula correctly)