19 (a)	E.g. $x+y+x+y+x=100$ oe or $3x + 2y = 100$ oe $\left(y=\frac{100-3x}{2}\right)$			3	M1 for a correct equation for the perimeter of the shape **or** for a correct expression for the area of triangle *CED*
	E.g. $\frac{1}{2}\times x\times x\times\sin 60$ $\left(=\frac{1}{2}\times x\times x\times\frac{\sqrt{3}}{2}\right)$ $\left(=\frac{x^2\sqrt{3}}{4}\right)$	E.g. $x^2=\left(\frac{x}{2}\right)^2+h^2$ **and** $=\frac{1}{2}\times x\times\frac{x\sqrt{3}}{2}\left(=\frac{x^2\sqrt{3}}{4}\right)$			
	x"$\left(\frac{100-3x}{2}\right)$"+"$\frac{x^2\sqrt{3}}{4}$" oe				M1 for the area of the shape in terms of x only
	E.g. $x\left(\frac{200-6x}{4}\right)+\frac{x^2\sqrt{3}}{4}$ or $\frac{x}{4}(200-6x+x\sqrt{3})$ or $\frac{200x-6x^2}{4}+\frac{x^2\sqrt{3}}{4}$ or $\frac{x}{4}(200x-6x^2+x^2\sqrt{3})$		Shown		A1 for the area given in correct form with full working shown (at least one intermediate step before the answer)
(b) (i)	$\left(\frac{dR}{dx}=\right)50-\frac{3}{2}\times 2\times x+2\times\frac{x\sqrt{3}}{4}=0$ oe			2	M1 for differentiation of correct expression with 2 out of 3 terms correct and equated to 0 (can be implied by subsequent working)
	Correct answer scores full marks (unless from obvious incorrect working)		$\frac{100}{6-\sqrt{3}}$		A1 for a correct expression
(ii)			Correct reason	1	B1 for correct reason R is a quadratic with negative coefficient of x^2 E.g. the graph of R is $\cap$ shaped or (allow $\frac{d^2R}{dx^2}<0$ oe)
					Total 6 marks