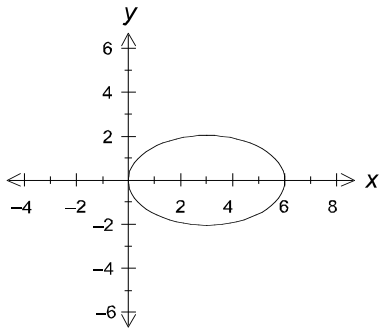
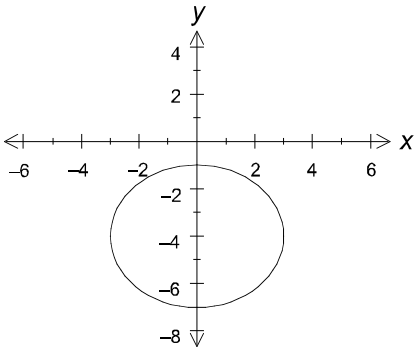
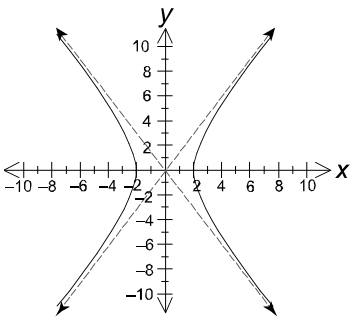
Assessment Schedule – 2005

Calculus: Sketch graphs and find equations of conic sections (90639)

Evidence Statement

	Achievement Criteria	Q	Evidence	Code	Judgement	Sufficiency
Achievement	Sketch graphs of conic sections.	1	Ellipse centre (3,0) Major axis 6 Minor axis 4 	A1	Ellipse through (0,0), (6,0) and (3,±2). Centre and intercepts indicated by sketch.	**Achievement:** 2 × code A1 **and** 2 × code A2.
		2	Circle radius 3, centre (0, –4) 	A1	Circle through (0,–1) and (0,–7). Centre and intercepts indicated by sketch.	
		3	Hyperbola, centre (0,0) Asymptotes $y = \frac{3x}{2},\ y = -\frac{3x}{2}$ 	A1	Hyperbola through (–2,0) and (2,0) approaching drawn asymptotes.	
	Find equations of conic sections from given information.	4(a)	$\frac{x^2}{16} + \frac{(y-2)^2}{9} = 1$ **OR** $x = 4\cos t$ $y = 3\sin t + 2$	A2	Or equivalent.	
		4(b)	$\frac{x^2}{9} - \frac{y^2}{36} = 1$ **OR** $x = 3\sec t$ $y = 6\tan t$ **OR** $\frac{y^2}{9} - \frac{x^2}{2.25} = 1$ **OR** $x = 1.5\tan t$ $y = 3\sec t$	A2	Or equivalent.	
		4(c)	$y^2 = 8(x+2)$ **OR** $x = 2t^2 - 2$ $y = 4t$ **OR** $x = 0.125y^2 - 2$	A2	Or equivalent.	

	Achievement Criteria	Q	Evidence	Code	Judgement	Sufficiency
Achievement with Merit	Solve problems involving conic sections.	5	$x^2 = 25y$ **OR** $y = 0.04x^2$ $y = 8$ radius : $x = 5\sqrt{8} = 14.142$ area = $\pi(5\sqrt{8})^2$ $= 200\pi$ $= 628\ \text{cm}^2$	A2 A or M	Equation of parabola. Or equivalent. Units not necessary.	**Achievement with Merit:** As for Achievement **plus** 2 × code M
		6	Equation of ellipse: $\frac{x^2}{12^2} + \frac{y^2}{b^2} = 1$ Use the point (9,6) to find b $\frac{9^2}{12^2} + \frac{6^2}{b^2} = 1$ $b^2 = 82.3$ $b = 9.07$ Total height (of original egg) = 18.1 cm	A2 A or M	a and b values identified in working. Or equivalent.	
		7	$\frac{dy}{dx} = \frac{3(5-x)}{4y}$ $\frac{dy}{dx} = -\frac{1}{2}$ $y - 3 = -\frac{1}{2}(x-7)$ $y = -\frac{1}{2}x + \frac{13}{2}$ $x + 2y - 13 = 0$	 A or M	 Or equivalent.	

	Achievement Criteria	Q	Evidence	Code	Judgement	Sufficiency
Achievement with Excellence	Solve more difficult conic section problems.	8	$y = kx^2$ $x = 3 \quad y = 5.4$ $y = 0.6x^2$ $\frac{dy}{dx} = 1.2x$ $\frac{dy}{dx} = \frac{4+y}{x}$ $x^2 = \frac{4}{0.6} = 6\frac{2}{3}$ $x = \frac{2}{\sqrt{0.6}} = 2.582$ Distance $= \frac{4}{\sqrt{0.6}}$ $= 5.164$ m	A2 A or M or E	Equation of parabola. Accept any valid method of finding distance. Ignore minor errors. Units not necessary.	**Achievement with Excellence:** As for Merit **plus** code E.
			<u>Alternative method:</u> $y = kx^2$ $x = 3 \quad y = 5.4$ $y = 0.6x^2$ $y = mx + c$ $0.6x^2 = mx - 4$ $\Delta = m^2 - 4(4)(0.6) = 0$ $m = \pm\frac{4\sqrt{3}}{\sqrt{5}} = \pm 3.098$ $0.6x^2 = \pm 3.098x - 4$ $x = 2.582$ Distance = 5.164 m	A2 A or M or E	Equation of parabola. Accept any valid method of finding distance. Ignore minor errors. Units not necessary.	

Judgement Statement

Achievement	Achievement with Merit	Achievement with Excellence
Sketch graphs of conic sections. 2 × A1 *and* 2 × A2	Solve problems involving conic sections. Achievement *plus* 2 × M	Solve more difficult conic section problems. Merit *plus* 1 × E