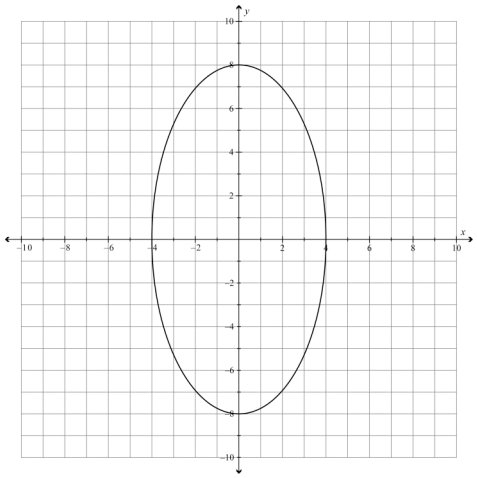
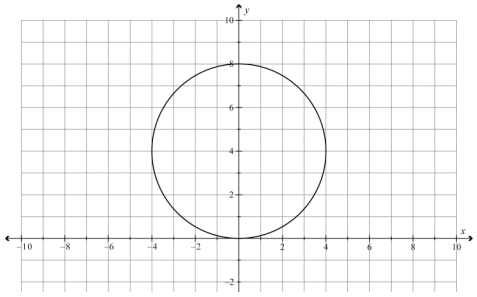
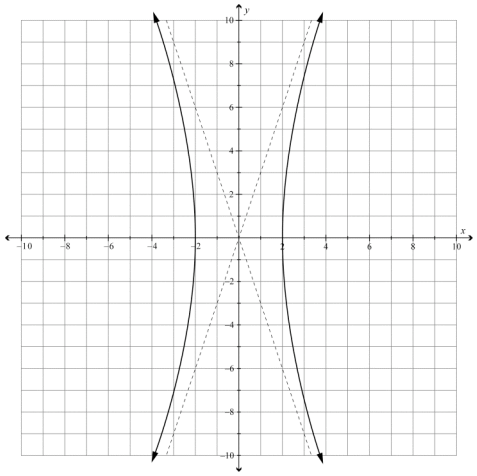
Assessment Schedule – 2008

Calculus: Sketch graphs of conic sections and write equations related to conic sections (90639)

Evidence Statement

	Achievement Criteria	Q.	Evidence	Code	Judgement	Sufficiency
Achievement	Sketch graphs of conic sections and write equations related to conic sections.	ONE	Ellipse: Centre (0,0) 	A1	Ellipse through (–4,0), (4,0), (0,–8), (0,8). Centre and intercepts indicated by sketch.	Four of code A including at least one each of code A1 and code A2 or three of code A and one of code M.
		TWO	Circle: Centre (0,4), radius 4 	A1	Circle through (0,0), (-4,4), (4,4) and (0,8). Centre and intercepts indicated by sketch.	
		THREE	Hyperbola: 	A1	Hyperbola Intercepts at (–2,0) and (2,0). Asymptotes $y = 3x$ and $y = -3x$. Intercepts and asymptotes indicated by sketch.	
		FOUR (a)	$\frac{(x-3)^2}{9} + \frac{(y-5)^2}{16} = 1$	A2	Or equivalent.	
		(b)	$y^2 = 2(x+8)$	A2	Or equivalent.	

	Achievement Criteria	Q.	Evidence	Code	Judgement	Sufficiency
Achievement with Merit	Solve problems involving conic sections.	FIVE	$\frac{2x}{100}+\frac{2y\frac{dy}{dx}}{25}=0$ $\frac{dy}{dx}=\frac{-2x}{100}\times\frac{25}{2y}$ $=\frac{-x}{4y}=\frac{3}{8}$		Must have correct derivative	**Merit:** Achievement **plus** **Two** of Code M **OR** **Three** of Code M.
			$y=\frac{3}{8}x+6\frac{1}{4}$	A / M	Or equivalent.	
		SIX	$\frac{x^2}{25}-\frac{y}{b^2}=1$ $x=\sqrt{425}$ When $y=80$ $\frac{425}{25}-\frac{80^2}{b^2}=1$ $b=20$			
			Hence $\frac{x^2}{25}-\frac{y^2}{400}=1$	A2	Correct equation of conic section.	
			$\frac{x^2}{25}-\frac{3600}{400}=1$ $\frac{x^2}{25}=10$ $x=\sqrt{250}$			
			x = 15.81 cm	A / M	Or equivalent. Units not required.	

	Achievement Criteria	Q.	Evidence	Code	Judgement	Sufficiency
Achievement with Excellence	Solve more complex conic section problems.	SEVEN	For ellipse $\frac{x^2}{400}+\frac{y^2}{100}=1$ $\frac{2x}{400}+\frac{2y}{100}\times\frac{dy}{dx}=0$ $\frac{dy}{dx}=\frac{-x}{4y}=m$ For line $y=mx+25$ $\frac{dy}{dx}=\frac{y-25}{x}$ $\frac{x}{4y}=\frac{25-y}{x}$ $x^2=100y-4y^2$ From ellipse $x^2=400-4y^2$ $400-4y^2=100y-4y^2$ $400=100y$ y = height = 4 m	A2 M E	CAO Is NS Or equivalent.	**Excellence:** Merit **plus** Code E. **OR** Two of code E.
		EIGHT	Translate so (1,2) becomes (0,2) Circle was $(x+3)^2+y^2=4$ now $(x+4)^2+y^2=4$ or $x^2+8x+16+y^2=4$ and lines through point (0,2) are $y=mx+2$ At intersection $x^2+8x+16+(mx+2)^2=4$ $x^2(m^2+1)+x(4m+8)+16=0$ If tangent $b^2-4ac=0$ $(4m+8)^2-4(m^2+1)\times16=0$ $64m-48m^2=0$ $m=0$ or m = $\frac{4}{3}$ $y=2$ or $y-2=\frac{4}{3}(x-1)$ $3y-4x-2=0$	M E	Accept any valid method. Accept minor arithmetic error. Or equivalent.	

Judgement Statement

Achievement	Achievement with Merit	Achievement with Excellence
Sketch graphs of conic sections and write equations related to conic sections. 4 × A including at least 1 × A1 and 1 × A2 OR 3 x A and 1 x M	Solve problems involving conic sections. Achievement plus 2 × M OR 3 × M	Solve more complex conic section problems. Achievement with Merit plus 1 × E OR 2 × E

The following Mathematics-specific marking conventions may also have been used when marking this paper:

- Errors are circled.
- Omissions are indicated by a caret (^).
- **NS** may have been used when there was not sufficient evidence to award a grade.
- **CON** may have been used to indicate 'consistency' where an answer is obtained using a prior, but incorrect answer and **NC** if the answer is not consistent with wrong working.
- **CAO** is used when the 'correct answer only' is given and the assessment schedule indicates that more evidence was required.
- # may have been used when a correct answer is obtained but then further (unnecessary) working results in an incorrect final answer being offered.
- **CAWW** – Correct Answer, Wrong Working. (=N)
- **R** for 'rounding error' and **PR** for 'premature rounding' resulting in a significant round-off error in the answer (if the question required evidence for rounding).
- **U** for incorrect or omitted units (if the question required evidence for units).
- **MEI** may have been used to indicate where a minor error has been made and ignored.
- Slip – transposition error, grade awarded as if response is correct.