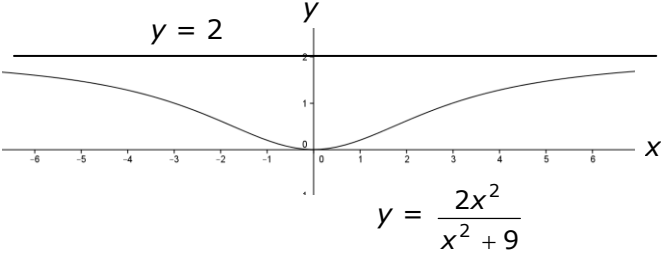


12	13b	<p>(i) Find the horizontal asymptote of the graph $y = \frac{2x^2}{x^2 + 9}$.</p> <p>(ii) Without the use of calculus, sketch the graph $y = \frac{2x^2}{x^2 + 9}$, showing the asymptote found in part (i).</p>	<p>1</p> <p>2</p>
<p>(i) $\lim_{x \rightarrow \infty} \frac{2x^2}{x^2 + 9} = \lim_{x \rightarrow \infty} \frac{2}{1 + \frac{9}{x^2}}$</p> <p style="text-align: center;">$= 2$</p> <p>\therefore asymptote at $y = 2$</p> <p>(ii) Let $x = 0$, $\therefore y = 0$</p> <p>Let $f(x) = \frac{2x^2}{x^2 + 9}$</p> <p>$f(-x) = \frac{2(-x)^2}{(-x)^2 + 9}$</p>		<p style="text-align: center;">$= \frac{2x^2}{x^2 + 9}$</p> <p style="text-align: center;">$= f(x)$</p> <p>\therefore even function</p> 	<p>State Mean:</p> <p>0.78/1</p> <p>1.25/2</p>

* These solutions have been provided by [projectmaths](http://projectmaths.com.au) and are not supplied or endorsed by the Board of Studies

Board of Studies: Notes from the Marking Centre

- (i) The two most common approaches that met with success were polynomial division or evaluating the limit as x approached infinity. While 2 was correctly identified by the majority of candidates, there did appear to be some confusion regarding what 'horizontal' meant. In some weaker responses, candidates came up with expressions such as ' $x = 2$ ' or ' $x^2 + 9 \neq 0$ and so $x \neq \pm 3$ '. These values caused problems in the next part of the question when candidates tried to incorporate their answer into a graph.
- (ii) In a significant number of weaker responses, candidates used calculus to locate stationary points, despite being told specifically 'Without the use of calculus'. In better responses, candidates incorporated their answer to part (i) into the graph. Some candidates, who were unable to find the horizontal asymptote in part (i), drew a correct graph in this part.

Source: http://www.boardofstudies.nsw.edu.au/hsc_exams/