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11	6b	A point $P(x, y)$ moves so that the sum of the square of its distance from each of the points $A(-1, 0)$ and $B(3, 0)$ is equal to 40. Show that the locus of $P(x, y)$ is a circle, and state its radius and centre.	3
<p>Using $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$,</p> $\left[\sqrt{(x - (-1))^2 + (y - 0)^2} \right]^2 + \left[\sqrt{(x - 3)^2 + (y - 0)^2} \right]^2 = 40$ $(x + 1)^2 + y^2 + (x - 3)^2 + y^2 = 40$ $x^2 + 2x + 1 + y^2 + x^2 - 6x + 9 + y^2 = 40$ $2x^2 - 4x + 2y^2 + 10 = 40$ $2x^2 - 4x + 2y^2 = 30$ $x^2 - 2x + y^2 = 15$ $x^2 - 2x + 1 + y^2 = 15 + 1$ $(x - 1)^2 + y^2 = 16$ <p>which is a circle with centre at $(1, 0)$ and radius 4</p>			<p>State Mean:</p> <p>1.17/3</p>

* These solutions have been provided by [projectmaths](#) and are not supplied or endorsed by the Board of Studies

Board of Studies: Notes from the Marking Centre

This was a challenging question. In responses with correct substitution into $PA^2 + PB^2 = 40$, simple algebraic errors occurred in expanding and simplifying the expression, as well as in completing the square to find the centre and radius of the circle.

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