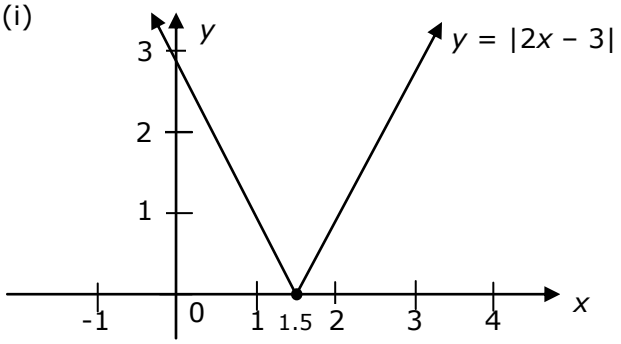
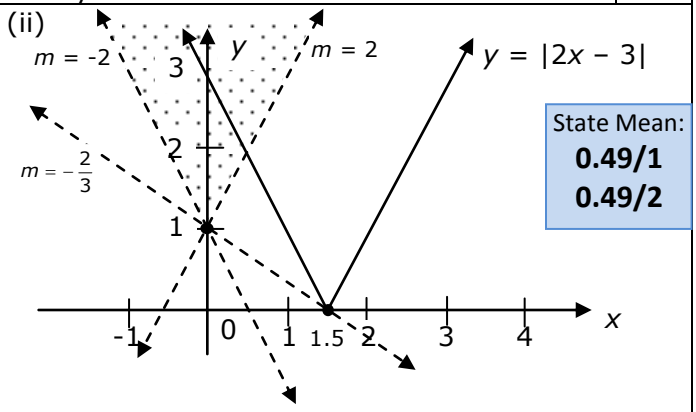
13	15 c	(i) Sketch the graph $y = \|2x - 3\|$. (ii) Using the graph from part (i), or otherwise, find all values of m for which the equation $\|2x - 3\| = mx + 1$ has exactly one solution.	1 2

(i)



(ii)



State Mean:
0.49/1
0.49/2

Gradient of $y = 2x - 3$ is 2, and

gradient of $y = -(2x - 3)$ is -2.

If only one point of intersection, then

$m < -2$, $m > 2$ and $m = -\frac{2}{3}$.

* 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

(i) Common problems were:

- not recognising the shape represented by an absolute value function
- drawing a curve that resembled a 'U' shape
- knowing it was a 'V' shape graph but not always correctly finding the x and y intercepts
- finding the x-intercept as $\frac{2}{3}$ instead of $\frac{3}{2}$
- drawing diagrams that were too small
- not using rulers, not marking intercepts and/or using an inconsistent scale.

(ii) Most candidates made the assumption that one answer for m was sufficient and did not look for all possible values of m.

Candidates who earned one mark often simply:

- stated that $m = 2$ (quoting the gradient of the right-hand branch of the absolute value curve)
- attempted to solve 2 cases of the absolute value equation
- attempted an algebraic solution, leading to a quadratic equation, and then used $\Delta = 0$ or substituted $\left(\frac{3}{2}, 0\right)$ into the given equation.

Common problems were:

- missing the value for m found by substituting the point $\left(\frac{3}{2}, 0\right)$
- making errors with the inequality signs.

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