

- 5 Two numbers  $x$  and  $y$  are such that  $2x + y = 13$

The sum of the squares of  $2x$  and  $y$  is  $S$ .

- (a) Show that  $S = 8x^2 - 52x + 169$

(3)

Using calculus,

- (b) find the value of  $x$  for which  $S$  is a minimum, justifying that this value of  $x$  gives a minimum value for  $S$ .

(4)

- (c) find the minimum value of  $S$ .

(2)

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**Question 5 continued**

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**(Total for Question 5 is 9 marks)**