

The function  $f$  is defined by  $f(x) = 2x^2 - 16x + 23$  for  $x < 3$ .

- (a) Express  $f(x)$  in the form  $2(x+a)^2 + b$ . [2]

This image shows a full page of white paper with horizontal dashed lines, typical of primary-ruled notebook paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

- (b)** Find the range of  $f$ . [1]

[illegible]

- (c) Find an expression for  $f^{-1}(x)$ . [3]

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The function  $g$  is defined by  $g(x) = 2x + 4$  for  $x < -1$ .

- (d) Find and simplify an expression for  $fg(x)$ . [2]

[illegible]