5. $$f(x) = 2x^2 + 8x + 11, \ x \in \mathbb{R}$$

(a) Write f (x) in the form $a(x + b)^2 + c$, where a, b and c are integers to be found.

(3)

(b) Sketch the curve with equation $y = f(x)$ showing any points of intersection with the coordinate axes and the coordinates of any turning point.

(3)

(c) (i) Describe fully the transformation that maps the curve with equation $y = f(x)$ onto the curve with equation $y = g(x)$ where

$$g(x) = 2(x - 3)^2 + 8x - 19, \quad x \in \mathbb{R}$$

(ii) Find the range of the function

$$h(x) = \frac{15}{2x^2 + 8x + 11}, \qquad x \in \mathbb{R}$$

(4)

(Total for Question 5 is 10 marks)