An Edexcel GCSE 9-1 Mathematics sample question on functions

10 The function f is such that

$$f(x) = 4x - 1$$

(a) Find $f^{-1}(x)$

Let $y = 4x - 1$

$$y + 1 = 4x$$

$$x = \frac{y + 1}{4}$$

$$f^{-1}(x) = \frac{x + 1}{4}$$

Alternatively

$$f(f^{-1}(x)) = x$$

$$4f^{-1}(x) - 1 = x$$

$$4f^{-1}(x) = x + 1$$

$$f^{-1}(x) = \frac{x + 1}{4}$$

The function g is such that

$$g(x) = kx^2 \text{ where } k \text{ is a constant.}$$

Given that $fg(2) = 12$

(b) work out the value of k

$$fg(2) = 12$$

$$f(4k) = 12$$

$$16k - 1 = 12$$

$$16k = 13$$

$$k = \frac{13}{16}$$

Alternatively

$$fg(2) = 12$$

$$g(2) = f^{-1}(12)$$

$$g(2) = \frac{13}{4}$$

$$4k = \frac{13}{4}$$

$$k = \frac{13}{16}$$