8 Functions f and g are defined for $0 \leqslant x \leqslant 2\pi$ by $\mathrm{f}(x) = 2\tan x$ and $\mathrm{g}(x) = \sec x$.

(a) (i) State the range of f. **[1]**

(ii) State the range of g. **[1]**

(b) (i) Show that $\mathrm{fg}(0.6) = 5.33$, correct to **3** significant figures. **[2]**

(ii) Explain why $\mathrm{f}^{-1}\mathrm{g}(0.6)$ is not defined. **[1]**

(c) In this question you must show detailed reasoning.

Solve the equation $(\mathrm{f}(x))^2 + 6\mathrm{g}(x) = 0$. **[5]**