**3** A continuous random variable $X$ has probability density function f given by

$$\mathrm{f}(x) = \begin{cases} kx & 0 \leqslant x < 1, \\ k(8-x) & 1 \leqslant x \leqslant 8, \\ 0 & \text{otherwise,} \end{cases}$$

where $k$ is a constant.

**(a)** Show that $k = \frac{1}{25}$. [2]

**(b)** Find the median value of $X$. [3]

The random variable $Y$ is defined by $Y = \sqrt[3]{X}$.

**(c)** Find the probability density function of $Y$. [5]