2 A particle moves in a straight line such that its displacement, s metres, from a fixed point, at time t seconds, $t \geqslant 0$, is given by $s = \left(1 + 3t\right)^{-\frac{1}{2}}$.

(a) Find the exact speed of the particle when $t = 1$. [3]

(b) Show that the acceleration of the particle will never be zero. [2]

3 A function f is such that $\mathrm{f}(x) = \ln(2x+1)$, for $x > -\frac{1}{2}$.

(a) Write down the range of f. [1]

A function g is such that $\mathrm{g}(x) = 5x - 7$, for $x \in \mathbb{R}$.

(b) Find the exact solution of the equation $\mathrm{gf}(x) = 13$. [3]

(c) Find the solution of the equation $\mathrm{f}'(x) = \mathrm{g}^{-1}(x)$. [6]

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