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Stationary Points | Past Paper Question | P1 CIE June 2013 Q9(i)

A curve has equation $y = f(x)$ and is such that $f'(x) = 3x^{\frac{1}{2}} + 3x^{-\frac{1}{2}} - 10$.

- (i) By using the substitution $u = x^{\frac{1}{2}}$, or otherwise, find the values of x for which the curve $y = f(x)$ has stationary points. [4]

At stationary points	$\therefore 3u - 1 = 0$ or $u - 3 = 0$
$\therefore f'(x) = 0$, let $u = x^{\frac{1}{2}}$	$\therefore u = \frac{1}{3}$ or $u = 3$
$\therefore 3u + \frac{3}{u} - 10 = 0$	$\therefore x^{\frac{1}{2}} = \frac{1}{3}$ or $x^{\frac{1}{2}} = 3$
$\therefore 3u^2 - 10u + 3 = 0$	$\therefore x = \frac{1}{9}$ or $x = 9$
$\therefore (3u - 1)(u - 3) = 0$	

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