8 A curve has equation $y = \dfrac{(3x^2-5)^{\frac{1}{3}}}{x+4}$.

(a) Show that $\dfrac{\mathrm{d}y}{\mathrm{d}x}$ can be written in the form $\dfrac{Ax^2+Bx+C}{(3x^2-5)^{\frac{2}{3}}(x+4)^2}$, where A, B and C are integers. [5]

(b) Hence find the x-coordinates of the stationary points on the curve. Give your answers in their simplest exact form. [3]

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9 In this question, all distances are in metres and time, t, is in seconds.

A particle P moves with a speed of 14.5 parallel to the vector $\begin{pmatrix} -20 \\ 21 \end{pmatrix}$.

(a) Find the velocity vector of P. [2]

Initially, P has position vector $\begin{pmatrix} 3 \\ 5 \end{pmatrix}$.

(b) Write down the position vector of P at time t. [2]

A second particle Q has position vector $\begin{pmatrix} -1 \\ 3 \end{pmatrix} + \begin{pmatrix} -5 \\ 7.5 \end{pmatrix} t$ at time t.

(c) Find, in terms of t, the distance between P and Q at time t. Simplify your answer. [4]

(d) Hence show that P and Q never collide. [2]

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