QUESTION

Find the general solution of the differential equation $\dfrac{dx}{dt} = \dfrac{1}{xt^3}$.

ANSWER

$\dfrac{dx}{dt} = \dfrac{1}{xt^3}$, therefore $\displaystyle\int x\,dx = \int \frac{1}{t^3}\,dt = \int t^{-3}\,dt$

Therefore $\dfrac{x^2}{2} = \dfrac{t^{-2}}{-2} + c,\ x^2 = 2c - \dfrac{1}{t^2}$

Therefore $x = \pm\left(2c - \dfrac{1}{t^2}\right)^{\frac{1}{2}}$