11 A balloon is being inflated. The balloon is modelled as a sphere with radius x cm at time t s. The volume V cm^3 is given by $V = \frac{4}{3}\pi x^3$.

The rate of increase of volume is inversely proportional to the radius of the balloon. Initially, when $t = 0$, the radius of the balloon is 5 cm and the volume of the balloon is increasing at a rate of 21 cm^3 s^{-1}.

(a) Show that x satisfies the differential equation $\dfrac{\mathrm{d}x}{\mathrm{d}t} = \dfrac{105}{4\pi x^3}$. [5]

(b) Find the radius of the balloon after two minutes. [5]

(c) Explain why the model may not be suitable for very large values of t. [1]