1. **In this question you must show all stages of your working.**
Solutions relying on calculator technology are not acceptable.

The curve C has equation

$$2y^2 - 6xy = 7e^{2x-1} + 13$$

The point P with x coordinate $\frac{1}{2}$ lies on C.

(a) Find the two possible y coordinates of P.

(2)

Given that P lies above the x-axis,

(b) find an equation for the tangent to C at P, giving your answer in the form $ax + by + c = 0$ where a, b and c are integers.

(6)

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Question 1 continued

(Total for Question 1 is 8 marks)

2. A spherical ball of ice with radius r cm is melting.

The volume of the ball of ice, $V\,\text{cm}^3$, is decreasing at a constant rate, $k\,\text{cm}^3$ per second, where k is a constant.

Given that $V = \frac{4}{3}\pi r^3$, show that the rate of decrease of the radius of the ball of ice with respect to time is inversely proportional to the square of the radius.

(4)

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