4. The point O is 28.4 m above a horizontal plane. A small ball is projected vertically upwards from O with speed $U\,\text{m s}^{-1}$ and first hits the plane with speed $24\,\text{m s}^{-1}$

Air resistance is assumed to be negligible.

(a) Find the value of U.

(3)

Each time the ball hits the plane, the speed of the ball is instantaneously halved.

(b) Find the **total** time, **after the ball has hit the plane for the first time**, for which the ball is at least 4 m above the plane.

(6)

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Question 4 continued

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Question 4 continued

(Total for Question 4 is 9 marks)