8. (8 total points) A stage opening is bounded by the x-axis, the y-axis, the line $x = 15$, and the curve

$$y = \sqrt{10 + x^{1/3}}.$$

The units on the x and y axes are meters. Initially, the stage curtain is completely open. At time $t = 0$, a vertical pole pulling the curtain starts on the right side of the stage opening ($x = 15$) and moves to the left at a constant speed of 2 m/sec. Let $A(t)$ be the area that is not yet covered by the curtain at time t seconds (the enclosed white area in the figure below).
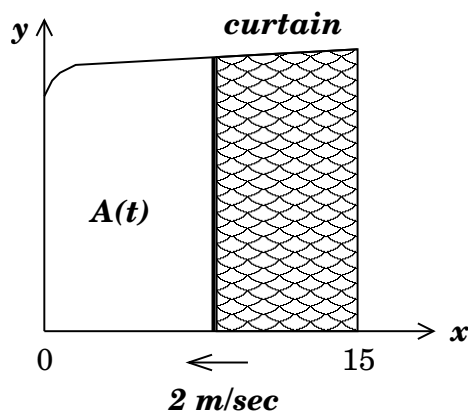
(a) (4 points) Express $A(t)$ as a definite integral.

(b) (4 points) Find $\dfrac{dA}{dt}$ when $t = 3.5$ sec. Give your answer in exact form and include correct units.