Laffy Taffy ® is made as a molten (fluid) candy and run out on a moving belt to cool. It initially starts at 250oF and must cool to 75oF to be adequately cut/handled/packaged. The belt length is 200 ft and the speed of the belt is adjustable.

Assume the Laffy Taffy® is a rectangle (z by y) with the following properties (assumed to be constant):

Density = 2.54 gm/in3

Heat capacity = 8.26 J/gm-oF

Heat leaves the candy by convective heat transfer, q = h\*A\*(T-Tinf), where A=surface area (top and sides, assume bottom is insulated), h is convective heat transfer coefficient, T(x) is candy temperature, and Tinf is surrounding air temperature (assumed constant).

Your task is to draw a picture/define the system/flows and use this to d**evelop a mathematical model for the temperature gradient in the candy, T(x). i.e.** develop an unsteady state differential equation model for heat transfer in the cooling of the candy.

Tinf = 70oF

To = 250oF

h= 0.2 J/in2-oF-min

Determine the belt speed (ft/min) required to allow the candy to cool adequately by the time it reaches the end of the belt.