Please answer the questions below to the best of your ability either in the space provided. Everything should be scanned and submitted through `gradescope.com`.

> **Objective:** *I can use the Energy Principle and Work to determine an unknown speed.*

1. In the spirit of the season, you carve out a pumpkin. However, instead of putting a simple candle inside, you place a small rocket capable of outputing $300\,\text{N}$ of force. You plop your Jack-o-Rocket down on a grassy slope which makes an angle of $20°$ with the horizontal. The Jack-o-Rocket has a total mass of $20\,\text{kg}$, the hill is $40\,\text{m}$ tall, and your Jack-o-Rocket experiences a constant frictional force of $150\,\text{N}$.

$\vec{\mathbf{F}}_{Rocket}$

$20°$

$40\,\text{m}$
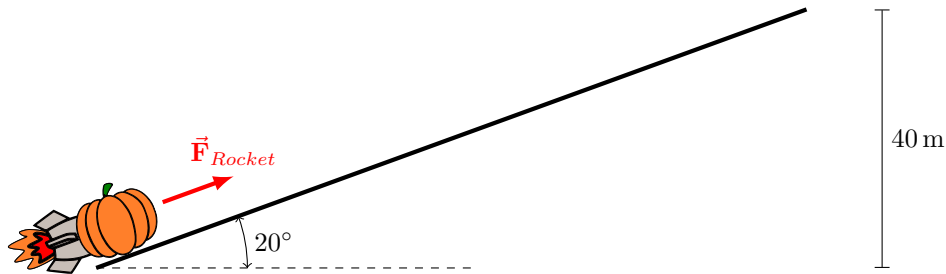
(2)   (a) Sketch out a free-body diagram for the situation.

(8)   (b) Determine the work done by *each* force in your free-body diagram over the Jack-o-Rocket's trip up the hill.

(3)   (c) How fast is the Jack-o-Rocket traveling at the top of the hill?