WORK-ENERGY

Injury and Danger No Match for Record-Seeking Freeskier
By MATT HIGGINS The inspiration for setting a new standard for soaring into the air came to Simon Dumont in January, some six stories above the snow.

An elite freeskier, Dumont was at a contest in Aspen, riding a 30-foot ramp constructed of sculptured snow, when he began soaring close to what is considered a **world record, 32.5 feet above a quarterpipe,** set by the snowboarder Terje Haakonsen in Norway in 2007. On Tuesday, Dumont will again try to set a record, this time on a specially built quarterpipe at Sunday River, a ski resort near his hometown of Bethel, Me. By going higher than anyone has before, Dumont hopes to make a statement for his sport, and himself. On Thursday, four **snowcats and a crew of 10 began construction on a ramp that will be 90 feet wide and 30 feet high, with a three-foot vertical extension.** "It's a monster," said Jack Fleming, project manager for the ramp, which has been funded by Red Bull, one of Dumont's sponsors. "It's up above the treetops."

Dumont's height will be measured by a 46-foot tower and triangulated cameras, then submitted to Guinness for certification. **To reach 33 feet or higher, Dumont will need to travel almost 50 miles per hour down an in-ramp. At the apex of his flight, he will be seven stories above the snow.** Question: (a) Find the vertical speed Dumont must have at point E(top of 33 ft high pipe) to achieve a record breaking big air of 33 feet? Find this velocity in ft/s and mph. (b) Introduction: D to E Dumont is experiencing a large centripetal force due to his body turning through a circle. This also is a increase in the normal force which causes more friction D to E. This increased friction force might cause him to slow down due to work due to friction. He also is heading up hill from D to E which is a further loss of kinetic energy which he needs to fly vertically up off the lip of the pipe and achieve his record 33 feet of big air. Question (b): Explain how pumping(force) toward the center(distance) of the quarter pipe center would add energy to his motion and thus overcome the reduction in speed due to a increase of potential energy and work due to friction from D to E ? Answer: (a) 45.96 ft/s , 31.33 mph

A: KE + PE here

B: Has some v here & go down 33 ft hill.

C: All KE + some friction work

D: < 50 mph here

F: ? 33 ft above top of pipe. All PE here.

E; Top of 33 ft high pipe hill. Some KE & PE here.

D to E: Centripetal force here & you do work [Fr] pumping. Thus, you have a net energy gain.