AP Physics 1

Extra Credit – Marking Period 1

Baldwin Street, in Dunedin, New Zealand, is considered the world's steepest residential street. The 161.23m long top section of the road climbs 47.24 ft vertically. The grade of the hill is about 19° above the horizontal.



47.24m

161.23 m

19°





(1pt) What is the minimum coefficient of friction needed between the tires of a car and the road to ensure a car will stay where you parked it?   
  
  
(1pt) Imagine a stationary car of mass 1200kg left in neutral (μs,k = 0) at the top of the hill. What will be its final velocity when it reaches the bottom of the hill?   
  
  
(1pt) A homeowner notices that the coefficient of friction between the road and the tires of parked cars is lessened by *half* when ice covers the road. Three cars are parked at the top of the road, where Car 1 = μ1 = 0.415, Car 2 = μ2 = 0.671. and Car 3 = μ3 = 0.513 in dry, ideal conditions. Which, if any, of the following cars will remain at the top of the hill if a flash freeze occurs?   
  
  
(1pt) A stationary car of mass 1440kg is parked halfway down the hill, with coefficient of friction μs=0.318 and μk=0.301. What is the acceleration of this car down the hill (if any)  
  
  
(2pt) What is the final velocity at the bottom of the hill of this same car in neutral (μs,k = 0) compared to the car in park? Write your answer as Vf-neutral in terms of   
Vf-parked