

Answer on Question #71211-Physics-Other

Lance Armstrong is accelerating up one of the hills on his bike in The Tour de France. The combined mass is 80.0 kg. The hill is 650 m long and the total elevation change of the hill is 25 m. His speed at the bottom of the hill is 2.0 m/s. Lance reaches the top of the hill in 150 seconds and is traveling at 7.5 m/s. If force of friction on the bike wheels is 35 N, find the average human power

Solution

Total work is

$$W = \Delta KE + \Delta PE + W_{fr}$$

$$\Delta KE = \frac{1}{2} m (v_f^2 - v_i^2) = \frac{1}{2} 80 (7.5^2 - 2^2) = 2090 J$$

$$\Delta PE = 80 \cdot 9.8 \cdot 25 = 19600 J$$

Work done by the friction force is

$$W_{fr} = F_{fr} l = 35 \cdot 650 = 22750 J$$

Total work is

$$W = 2090 + 19600 + 22750 = 44440 J$$

Power is

$$P = \frac{44440}{150} = 300 W.$$

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