

Answer on question #56694, Physics / Other

Question A bike coasts up a long hill. The hill has an incline of 38 degrees. The mass of the bike and rider is 129kg. If the bike starts up the hill at a velocity of 10 m/s, how far will the rider go up the hill before stopping? The coefficient of kinetic friction is .30 .

Solution Let us find deceleration

$$a = \frac{F}{m} = \frac{mg \sin \alpha + \mu mg \cos \alpha}{m} = g(\sin \alpha + \mu \cos \alpha) =$$
$$= 9.8(\sin 38^\circ + 0.3 \cos 38^\circ) = 8.36 \text{ m/s}^2$$

Now lets find time of riding:

$$t = \frac{v}{a} = \frac{10}{8.36} \approx 1.2 \text{ s}$$

Now we can find how far will the rider go up the hill before stopping

$$s = v_0 t - at^2/2 = 10 \cdot 1.2 - 8.36 \cdot 1.2^2/2 \approx 6 \text{ m}$$