

Answer on Question #72739-Physics-Other

To celebrate summer break some non-physics many students decide to make a waterslide. These non-physics students decide to put one end of the slide on 820 m high roof at Mooney and the other end in the teacher's parking lot heading out to Erie Street The slide ends 5 m before the street and makes an angle of 26.5° . The physics students however are worried that students will slide into the street and incoming traffic. You determine the waterslide friction will be negligible but the pavement will have a coefficient of friction with clothes of .90. How far will the students slide on the pavement?

Solution

From the conservation of energy:

$$\frac{mv^2}{2} = mgh$$

The speed of student before the flying:

$$v = \sqrt{2gh}$$

The horizontal speed at the end of waterslide:

$$v_x = v \cos \theta$$

$$v_x^2 = 2ad.$$

$$a = \mu g$$

$$v_x^2 = 2\mu g d.$$

$$d = \frac{v_x^2}{2\mu g} = \frac{(\sqrt{2gh} \cos \theta)^2}{2\mu g} = \frac{2gh}{2\mu g} \cos^2 \theta = \frac{h}{\mu} \cos^2 \theta$$

$$d = \frac{820}{0.90} \cos^2(26.5^\circ) = 730 \text{ m.}$$

Answer: 730 m.

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