

Answer on Question #50548-Physics-Other

One day while Eleanor the Eskimo goes hunting for baby seals, her pet Percy the Puffy Penguin decides to make some modifications to their igloo. Percy modifies their igloo spin fast enough so that one will stick to the wall even if the ice floor disappears. The igloo has a radius of 2 meters and the coefficient of static friction between the igloo wall and a person (or penguin) is .1. How fast must the igloo wall spin in meters per second?

Solution

The normal force is

$$N = \frac{mv^2}{r}.$$

One will stick to the wall even if the ice floor disappears:

$$F_{fr} = W,$$

where $F_{fr} = \mu N$ is the friction force and $W = mg$ is weight.

So,

$$\mu \frac{mv^2}{r} = mg.$$

The speed of the igloo wall is

$$v = \sqrt{\frac{gr}{\mu}} = \sqrt{\frac{9.8 \cdot 2}{0.1}} = 14 \frac{m}{s}.$$

Answer: $14 \frac{m}{s}$.