

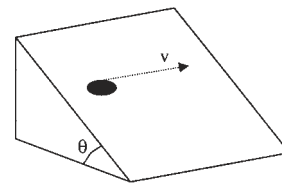
# Physics Challenges for Teachers and Students

*A Worldwide Problem-Solving Contest*



## ► Neither Up Nor Down (J2)

An object of mass  $m$  rests on an inclined plane that makes angle  $\theta$  with the horizontal floor. What is the minimum force  $F$  that must be applied to the object in order to move it along the plane *parallel to the floor* as shown? The coefficient of static friction between the object and the plane is  $\mu_s$ .



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### Submission Guidelines:

The deadline for submitting solutions to this problem is Jan. 22, 2005.

- only email submissions will be considered;
- email your solutions to Boris Korsunsky at [korsunbo@post.harvard.edu](mailto:korsunbo@post.harvard.edu);
- please email the solutions as Word files;
- please email *each solution* as a separate file;
- note that each problem, in addition to a very clever title, has a code such as J1. Please name each file as “problem code-first initial-last name.” For instance, “J1DVader” if your name is Darth Vader and you are sending the solution to problem J1;
- please state your name, hometown, and professional affiliation in each file.

We look forward to your (and your students’) participation.

### Please send correspondence to:

Boris Korsunsky  
[korsunbo@post.harvard.edu](mailto:korsunbo@post.harvard.edu)

The next Challenge problem will be posted online Jan. 18.