

Friction and normal reaction

Background

Friction is a force which acts between two rough surfaces in contact when one tries to move relative to the other.

The force of friction increases so as just to prevent sliding up to a maximum value called limiting friction. The value of limiting friction F is given by

$$F = \mu R$$

The coefficient of friction μ is the ratio of the frictional force F between two surfaces and the normal reaction R between those surfaces. It has no units.

You will need...

- ✓ A uniform rod ideally timber and about 1.5 meters long.

Follow these steps

1. Identify the centre of mass of the rod and place a light visible marker there (e.g. a yellow elastic band).
2. Use the index fingers of both hands to provide horizontal supports that the rod can rest horizontally.
3. Position your index fingers at the locations shown in the picture by blue arrows.
4. Try to move both fingers simultaneously towards the visible marker.

So what happened?

Initially, only the finger further from the mark moved, no matter how hard you try to get both moving.

The reaction force R , is greater at the left arrow (in the case shown below). The frictional force is greater there and so sliding occurs first at the right side until they are both equidistant from the centre, at which time, both fingers move equally.

What next?

Use other kinds of support in place of your fingers.

Try supports that are different left and right.

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