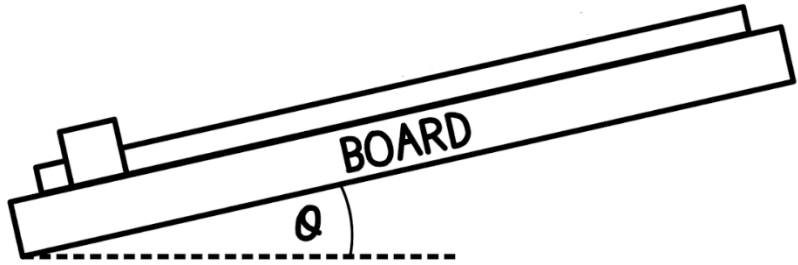


Static Friction μ_k

Determine the coefficient of friction for a block as it slides down an incline

Equipment

board/ramp
meter stick
protractor
mass / slider block



To calculate the coefficient of static friction μ_s

1. Gather the materials above.
2. Mark a starting point at the top of the track at which you will place the bottom corner of your block.
3. Prepare a protractor (or an “Angle Meter” app for measuring the angle of inclination of the board. Ensure that the “Angle Meter” app is calibrated to read the table as 0 degrees.
4. Place the block on the ramp. Starting from an angle of zero, increase the angle very slowly until the block begins to slip.
5. Repeat this five times and record the minimum angle for each trial in Table 1.

Table 1: Measurements used to determine the coefficient of static friction

Angle θ ($^\circ$)					

Find the average angle.

Find the mass of the block.

Draw and label a free-body diagram for the block. Use the mass of the block and the average angle of slip to calculate the coefficient of static friction μ_s .

Kinetic Friction μ_k

To calculate the coefficient of kinetic friction μ_s

1. Increase the angle of the ramp. Make sure the angle is large enough that the block begins to accelerate down the ramp.
2. Use a protractor or the “Angle Meter” app to record the angle.
3. Mark a starting point at the top of the track at which you will place the bottom corner of your block. Mark a finish line at the bottom of the ramp.
4. Prepare a timer.
5. Release the block from rest from the marked starting point.
6. Time how long it takes for the block to slide from the start point to the end point.
7. Repeat this five times and record the times in the table.

Table 1: Measurements used to determine the coefficient of kinetic friction

Time (s)					

Find the average time.

Measure the length of the track from start to finish.

Find the acceleration of the block using $d = v_i t + \frac{1}{2} a t^2$.

Find the mass of the block.

Draw and label a free-body diagram for the block. Then, use the mass of the block, the angle of inclination, and the acceleration of the block to calculate the coefficient of kinetic friction μ_k