

OPERATING INSTRUCTIONS

Center of Gravity Disk No. 31381

1. Introduction

This device demonstrates that a freely spinning body rotates around its center of gravity. The disk spins smoothly when supported at its center of gravity, but quite jerkily when supported at its geometric center. It is effective as either a classroom demonstration or as an activity for small groups of students.

2. Description

A small weight has been placed inside the disk near one edge. As a result, the center of gravity has been shifted from the geometric center towards that edge of the disk. Holes have been punched into the disk at both the geometric center and the center of gravity.

3. Operation

The center of gravity can be confirmed by suspending the disk from one of the holes near the edge of the disk. Suspend a string supporting a weight from the same point. The string should hang directly over the hole at the center of gravity. Suspending the disk and string from any other point near the edge should produce the same result; the string will pass over the center of gravity. (The center of gravity of several irregularly shaped objects can be determined by this method.)

Place a stiff wire such as a coat hanger through the hole at the geometric center of the disk. Hold the disk in a vertical plane so the side with the concentric circles around the geometric center is face up. Spin the disk rapidly, then slowly. Observe its irregular rotation. Turn the disk over so that the concentric circles surround the center of gravity. Notice how much more smoothly the disk spins when it is rotated at its center of gravity.

4. Theory

The smooth rotation of the disk when supported at its center of gravity can be related to the absence of any unbalanced torques. Each particle of the disk will have a tendency to turn the disk in either a clockwise or a counterclockwise direction. At the center of gravity, the sum of all the clockwise and counterclockwise torques is zero.

Note: This instruction is based on the rationale of Dr. Gordon Johnson, Professor, Department of Physics, Northern Arizona University, Flagstaff, Arizona.

5. Maintenance

The Center of Gravity Disk needs no special maintenance. If you should experience any difficulty with a disk, please contact Central Scientific Company, giving details of the problem. To ensure better service, please do not return any apparatus to Central Scientific Company until we have sent you authorization.

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