

Rolling Objects (Rotational Motion)

Equipment

- Motion detector and track
- Various objects: balls, disks and rings

Objective

Data collection

- Quantitative analysis of rolling objects

Data analysis

- Find acceleration of object rolling down incline

Physics Concepts

- Rotational kinematics
- Rotational energy and energy conservation

Conceptual (C-Level)

You have an object (soccer ball) and it is rolling without slipping down an inclined plane.

- Determine an equation for the acceleration of the ball rolling down an inclined track.
- Would a tennis ball roll down an inclined plane faster than a soccer ball?
- Would a solid disk roll down an inclined plane faster than a soccer ball?
- Determine a general equation for the acceleration of an object rolling with out slipping down an inclined track.

Basic Lab (B-level)

- Measure the acceleration of an object rolling without slipping down an inclined plane.
- Compare your measured value to what you expect.
- How much energy is used to rotate the object?

Advanced/Extended Lab Ideas (A-level)

Note: An advanced lab includes a quantitative component with error analysis. The exact question(s) explored is your choice but it should relate to the basic lab.

- Determine the amount of energy lost due to friction.
- Does it matter if the object rolls on its edge or (in the case of a sphere) along the edges at some reduced radius?
- What might you be curious to investigate?