

CHAPTER OVERVIEW

11: Rotational dynamics

Learning Objectives

- Understand how to use vector quantities for describing the kinematics of rotations.
- Understand how to use torque to determine the angular acceleration of an object.
- Understand conditions for static and dynamic equilibrium.
- Understand how to determine the moment of inertia of an object.

In this Chapter, we use Newton's Second Law to develop a formalism to describe how objects rotate. In particular, we will introduce the concept of torque which plays a similar role to that of force in non-rotational dynamics. We will also introduce the concept of moment of inertia to describe how objects resist rotational motion.

prelude

A construction worker would like to lift one end of a heavy block from the ground using a bar propped against a rock on the ground as a lever. Should he place the rock close or far from the block to make it easier to lift the block?

- A. It will be easier to lift the block if the rock is close to the block.
- B. It will be easier to lift the block if the rock is far from the block.
- C. It does not matter where he places the rock, as long as the bar is short.
- D. It does not matter where he places the rock, as long as the bar is long.

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[11.2: Rotational dynamics for a single particle](#)

[11.3: Torque](#)

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