GNG 1105E – Engineering Mechanics
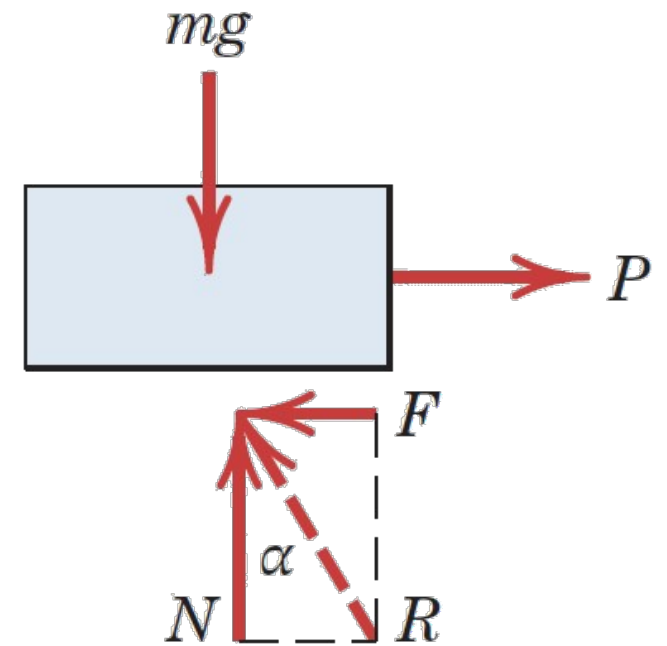
CHAPTER S6 - FRICTION

Assigned readings
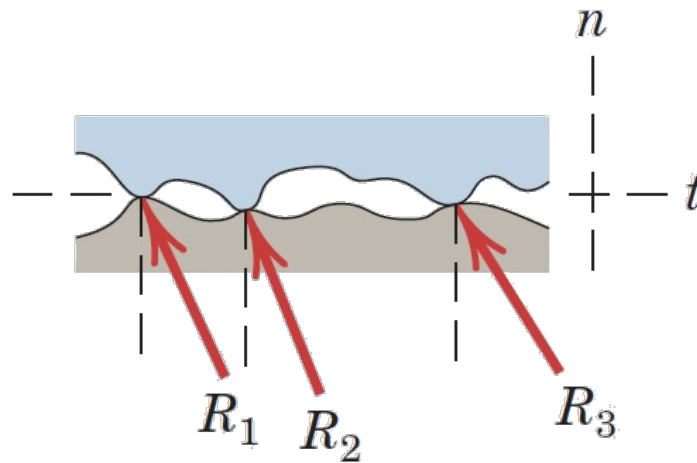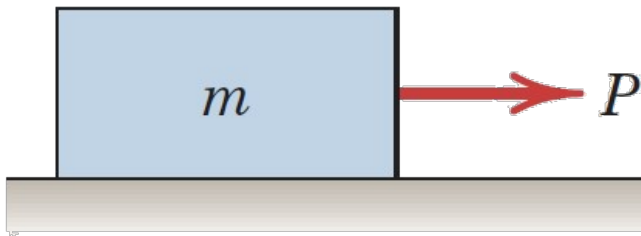
6/1 Introduction

6/2 Types of friction
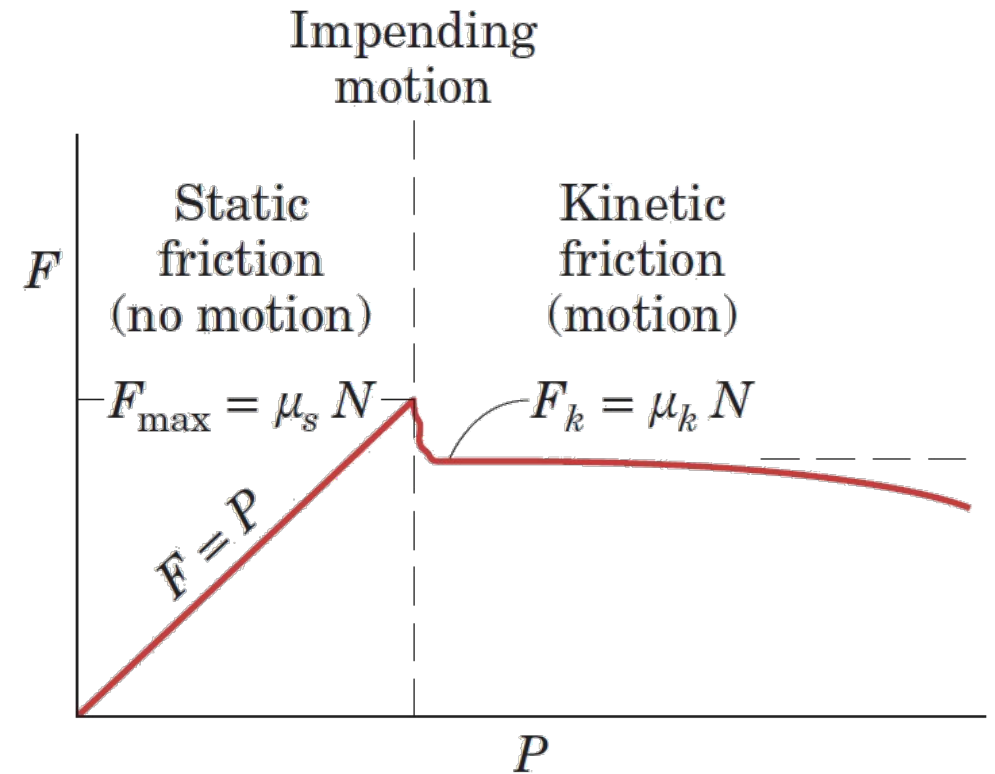
6/3 Dry Friction

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Mechanism of dry friction

6/3 Dry Friction

Regions of significance
◦ Static friction range

◦ Impending motion

◦ Kinetic friction

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Friction angles
- Static friction angle, ϕ_s

- Kinetic friction angle, ϕ_k

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Types of friction problems

◦ Type I: Impending motion

◦ Body is on the verge of slipping

◦ Equilibrium holds for the body

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Types of friction problems
- Type II: Relative motion exists
  - Body is slipping
 - Equilibrium does not hold in the direction of slip

6/3 Dry Friction

Types of friction problems
- Type III: Unknown – body may or may not be slipping
  - Assume equilibrium
  - Solve for the friction force F
  - Check the assumption of equilibrium

Sample problem 6/1

Determine the maximum angle θ which the adjustable incline may have with the horizontal before the block of mass m begins to slip. The coefficient of static friction between the block and the inclined surface is μ_s.
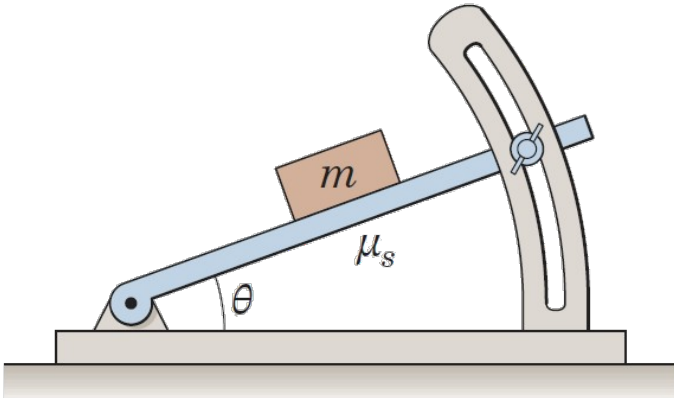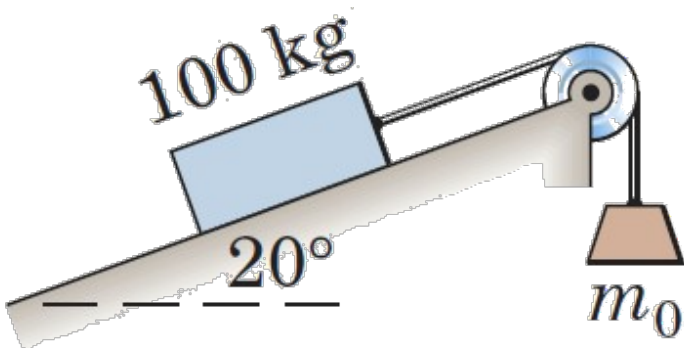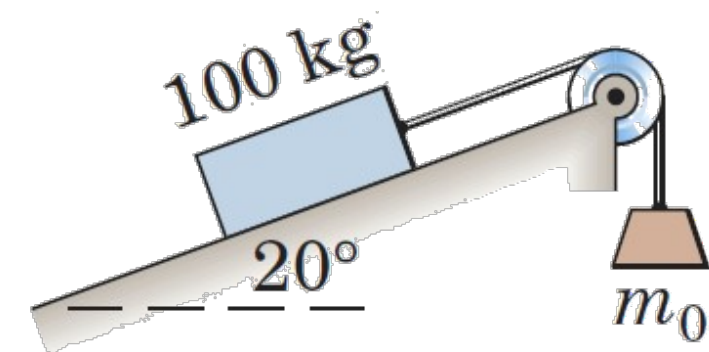
Sample problem 6/1
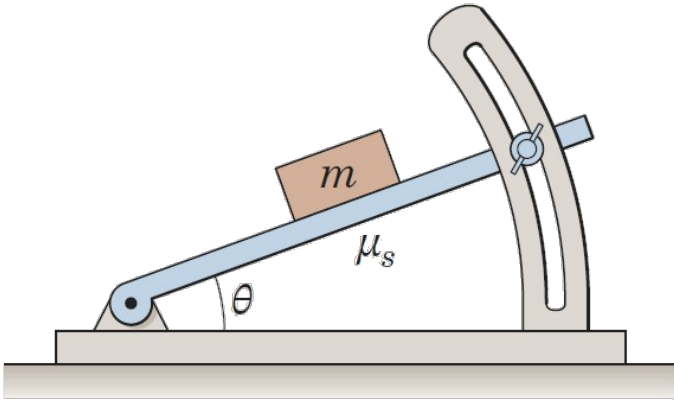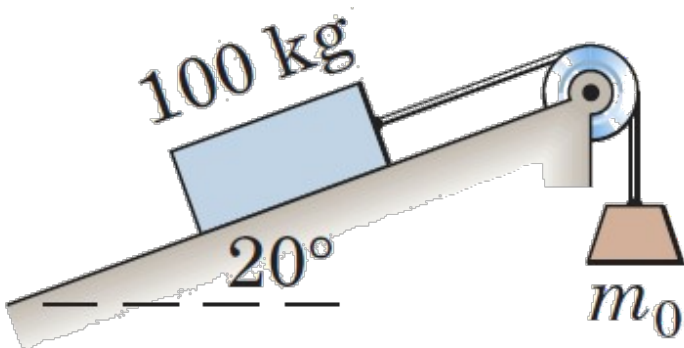
Sample problem 6/2

Determine the range of values which the mass m_0 may have so that the 100-kg block shown in the figure will neither start moving up the plane nor slip down the plane. The coefficient of static friction for the contact surfaces is 0.30.
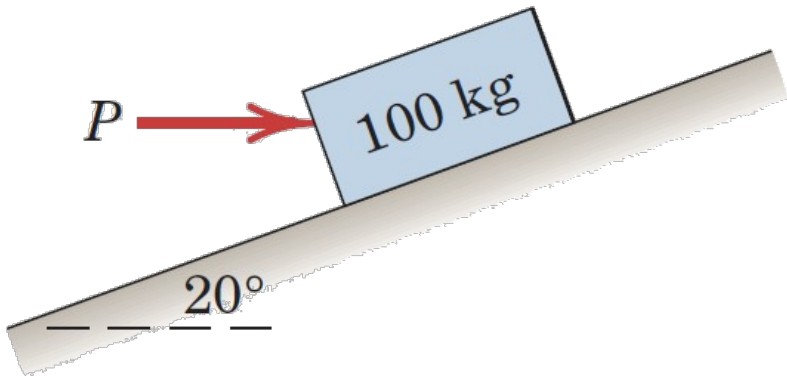
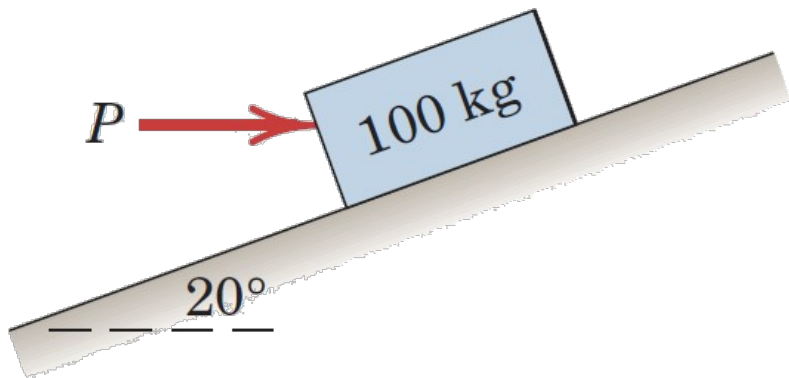# Sample problem 6/2

Sample problem 6/2
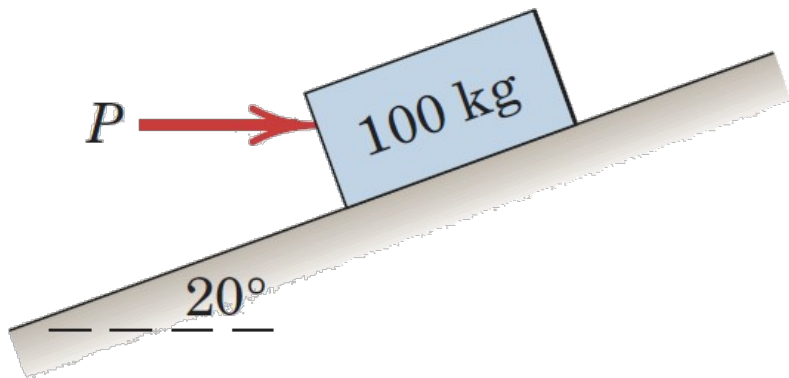
Sample problem 6/3

Determine the magnitude and direction of the friction force acting on the 100-kg block shown if, first, *P* = 500 N and, second, *P* = 100 N. The coefficient of static friction is 0.20, and the coefficient of kinetic friction is 0.17. The forces are applied with the block initially at rest.

Sample problem 6/3

Sample problem 6/3

Sample problem 6/3