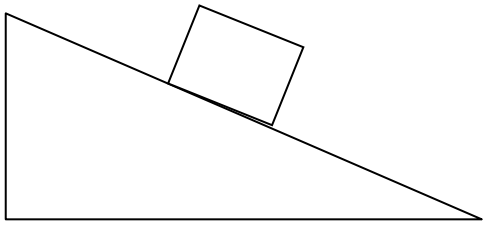
Section 4: Newton's Laws on an Incline

An object on a tilted surface will often slide down the surface. The rate at which it slides down the surface is dependent upon how tilted the surface is; the **greater the tilt (angle of inclination), the faster the object will slide.**

A **tilted surface** is called an **incline plane**. Objects accelerate down an incline plane because of an unbalanced force. What force is responsible for the object sliding down the incline?



Free Body Diagrams for Objects on an Incline

1. A 35.0 kg box sits on a plank while a worker raises one end so that the box slides down the plank to a co-worker at the other end. At the very instant the box is about to slide, the plank makes an angle of 30.0° with the ground. What is the coefficient of static friction?

2. A 45.0 kg object is placed on a ramp that makes an angle of 45° with the ground. If the coefficient of kinetic friction is 0.43, find the acceleration of the box.

3. A rocket has a mass of 1200 kg and is accelerated up a ramp at 5.0g's. The coefficient of friction between the ramp and the rocket is 0.60. What must be the thrust of the rocket if the angle of the ramp is 35°?

4. A person pushes a 25 kg box up an incline. He applies a force of 383 N parallel to the surface of the incline. The box accelerates up the incline at 0.75 m/s^2. Find the coefficient of kinetic friction between the box and the incline if the angle of the ramp is 40.0°.

5. A skier skiing downhill reaches the bottom of a hollow with a velocity of 20.0 m/s and then coasts up a hill that has a 10.0° slope. If the coefficient of kinetic friction is 0.10, how far up the hill will she travels before she stops?

Textbook: Page 196. Questions 1, 2, 4.
Page 224. Questions 6-10.

Do worksheet on incline planes.