Physics Honors: Inclined Planes

Inclined Planes

An inclined plane is also known as a ramp. It is a flat surface that is on an angle so that one end is higher than the other.

Inclined planes are often used a simple machine to raise loads vertically.





Normal forces are always directed perpendicular to the surface.

Free Body Diagram of an object on an inclined plane



Redefine the coordinate system

When objects are on an inclined plane, gravity is the only force that is acting perfectly in either the x/y direction.

In order to find the net force on objects, we'll need to have forces acting in the x/y direction.

So let's redefine the coordinate system so that the x direction is along the plane. Now only gravity is at an angle



In order to break gravity into components, use trigonometry





Practice

A 2 Kg box is put on the surface of an inclined plane at 27 ° with the horizontal. The surface of the inclined plane is assumed to be frictionless.

a) Draw a free body diagram of the box on the inclined plane and label all forces acting on the box.

b) Determine the acceleration a of the box down the plane.

A skier, shown below, with a mass of 62 kg is sliding down a snowy slope at a constant speed, and at an angle of 25 degrees. Find the coefficient of kinetic friction for the skier if friction is known to be 45.0 N.

