PH 221 Week 5

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This material is borrowed/adapted from PH 201 Tutorial 5 for Fall 2020 and Mastering Physics.

R5-1: Force versus Net Force

(a) If an object is at rest can you conclude that there are no forces acting on it? Explain.

(b) If a force is exerted on an object, is it possible for that object to be moving with constant velocity? Explain.

R5-2: Apparent Weight in an Elevator

Zach, whose mass is 80 kg, is on an elevator descending at 12 m/s. The elevator takes 3.0 s to brake to a stop at the ground floor.

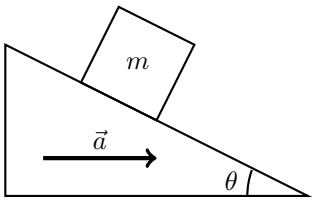
(a) Draw a free-body diagram for Zach. Which force is Zach's apparent weight?

(b) What is Zach's apparent weight before the elevator starts braking?

(c) What is Zach's apparent weight while the elevator is braking?

R5-3: Steady Block on a Sliding Ramp

A block of mass m sits upon a frictionless ramp (inclined at angle θ) that is being pushed to the right. What must the acceleration of the ramp be to prevent the block from sliding down the surface?



R5-4: Maximum Tilt

A block is placed on an inclined plane and the angle of the plane is adjusted until the block just begins to slide. The coefficient of static friction is 0.35 and the coefficient of kinetic friction is 0.25.

(a) Draw a sketch illustrating the problem.

(b) Draw a free-body diagram for the block. Use the particle model with tilted axes.

(c) Find the angle at which the block just begins to slide.

(d) Keeping the angle the same, find the acceleration of the block after it starts to slide.

R5-5: Suspended Loudspeaker

A 25 kg loudspeaker is suspended 2.0 m below the ceiling by two cables that are each 30° from vertical.

(a) Draw a sketch illustrating the problem.

(b) Draw a free-body diagram for the loudspeaker.

(c) Find the tension in each cable.