Physics 121 – September 23, 2009

Assignments:

This week:

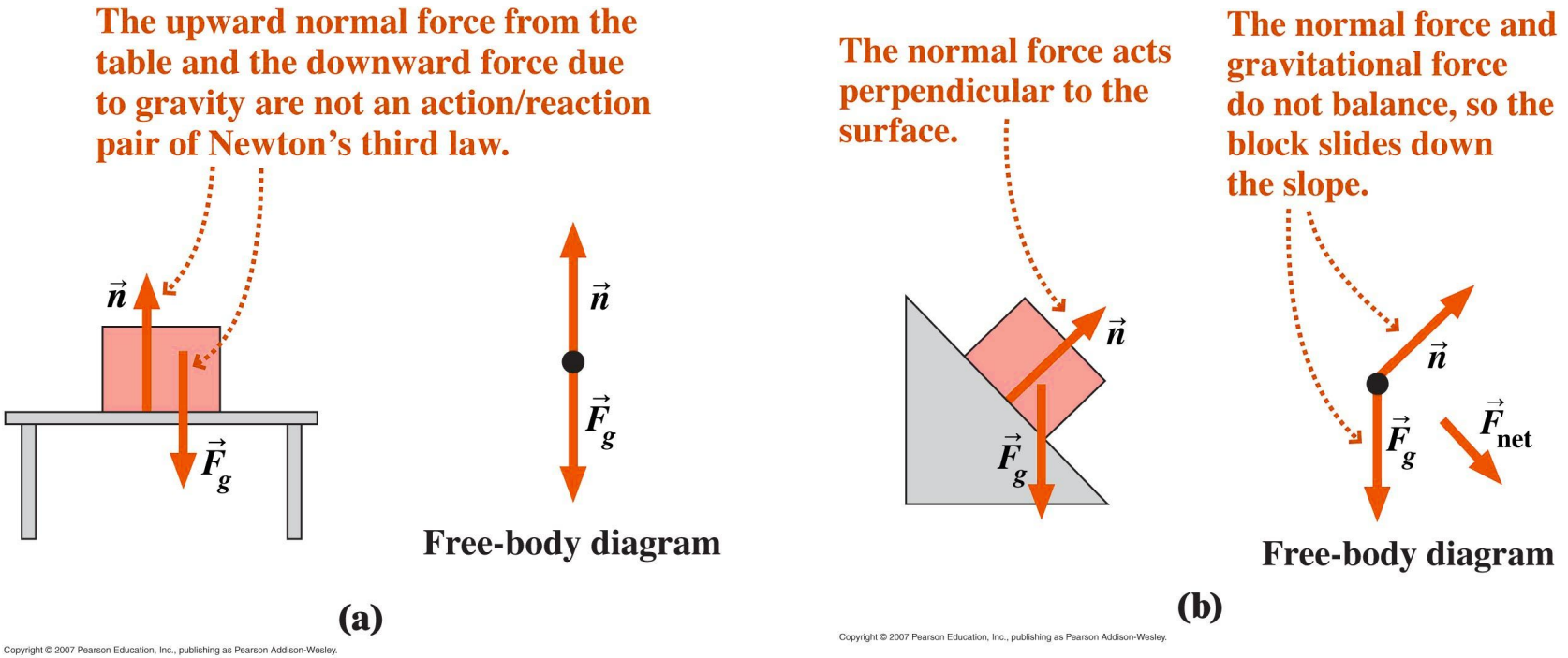
- Homework problems due Friday Sept 25
  Chap 5, # 14, 19, 24, 26, 27, 29, 30, 47
- Review Chaps 4-5 (stress **free-body diagrams**, **uniform circular motion**, **frictional forces**)
- Mastering Physics Assignment 5 due by Sunday, Sept 27 @ 11pm.

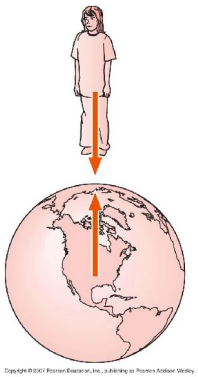
Next week:

- Read Chap 6 (Work, Energy, and Power)
- Start reviewing for first exam (exam date is Monday Oct 5)

Quick Review from last class: Newton's 3rd law

Forces always come in pairs. These 3rd-law pairs are **equal** in magnitude and **opposite** in direction. They always act on **different objects** (and hence, should *never* appear together in the same free-body diagram.





Here is a situation with a 3rd-law pair of forces. Be sure to read pp. 58-60 for a good discussion with examples.

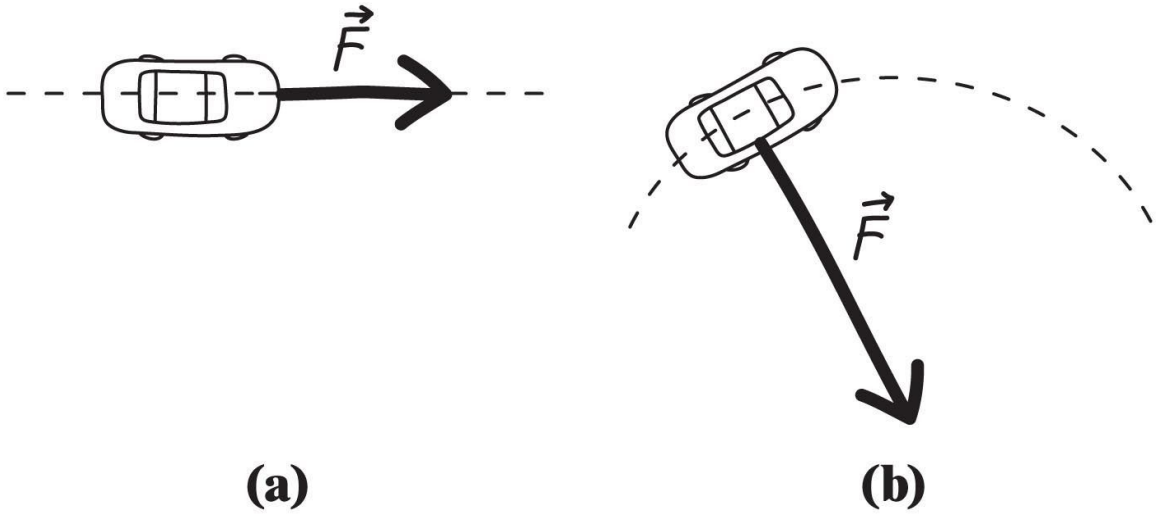
Iclicker: A large truck breaks down on the road and receives a push back into town by a small compact car as shown in the figure below. While the car, still pushing the truck, is speeding up get up to cruising speed:

A. the amount of force with which the car pushes on the truck is **equal to** that with which the truck pushes back on the car.

B. the car's engine is running so the car pushes against the truck, but the truck's engine is not running so the truck **cannot push** back against the car. The truck is pushed forward because it is in the way of the car.

C. the amount of force with which the car pushes on the truck is **smaller than** that with which the truck pushes back on the car.

D. since both objects are accelerating, the amount of force with which the car pushes on the truck is **greater than** that with which the truck pushes back on the car.



F=ma. Car accelerates along a line in the x-direction

F=ma. Car accelerates toward the center of a circular turn.

What provides the force in case (b)? Friction between the tires and road. Since $a = v^2/R$ in uniform circular motion, then $F=mv^2/R$ = centripetal force in uniform circular motion, so there must be a limit to v if F is fixed by the tire design. Unless....

33° at Talladega

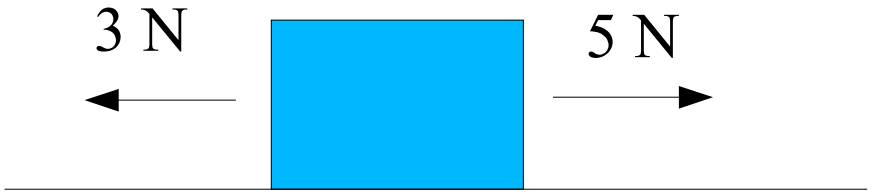
See example 5.6 in textbook.

If a satellite moves above the Earth's atmosphere in a circular orbit with constant speed, then:

A. its acceleration and velocity are in the same direction.
B. the net force on it is zero.
C. its velocity is constant.
D. it will fall back to Earth when its fuel is used up.
E. its acceleration is toward the Earth.

Iclicker question:

The block shown moves with constant velocity on a horizontal surface. Two of the forces acting on the block are shown. The only other force acting on the block is **friction**, which must be



A. zero

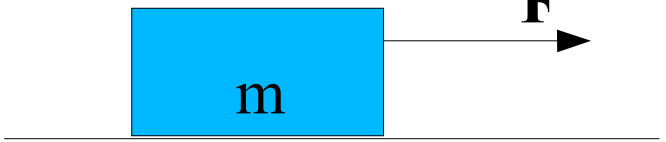
B. 2 N, leftward

C. 2 N, rightward

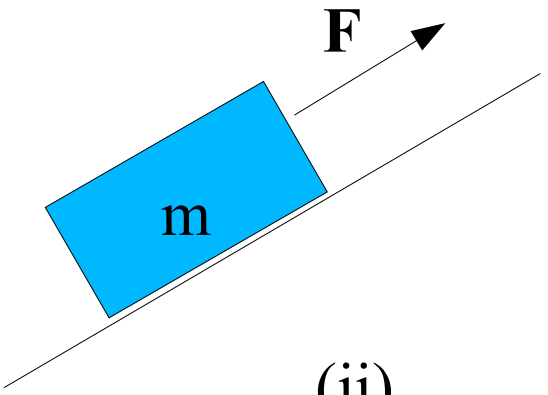
D. 5 N, leftward

E. 8 N (can be in *any* direction)

A heavy wooden block is dragged by a force **F** along a rough surface, as shown below for two possible situations. The magnitude of **F** is the same. The frictional force in (i), as compared with that in (ii), is:



(i)



(ii)

A. the same
B. greater
C. less
D. less for some angles, and greater for others
E. can be less or greater, depending on the magnitude of **F**