Physics 121 – September 21, 2009

Assignments:

This week:

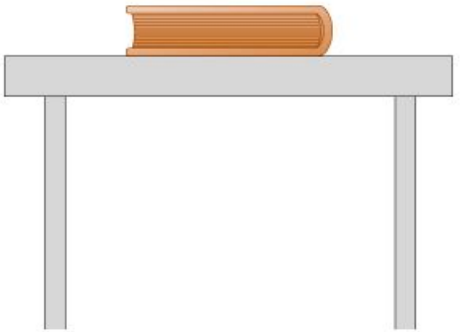
- Homework problems due Friday Sept 25
  Chap 5, # 14, 19, 24, 26, 27, 29, 30, 47
- Review Chaps 4-5 (stress **free-body diagrams**, **uniform circular motion**, **frictional forces**)
- Mastering Physics Assignment 5 due by Sunday, Sept 27 @ 11pm.

Next week:

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

Iclicker Question

A book rests on a table. A **downward** force of 5 N is exerted on the book by gravity. An **upward** force of 5 N is exerted on the book by the table.
Which pair of forces constitute an action-reaction pair according to Newton's 3rd law?



A. Downward force of gravity on book, upward force of table on book.

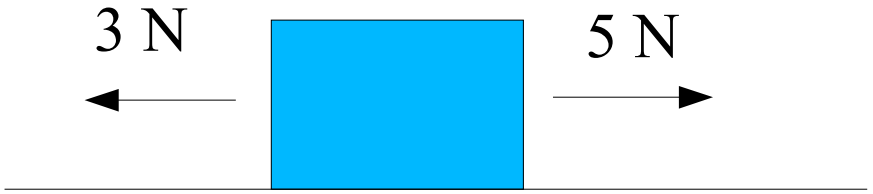
B. Downward force of gravity on book, upward force of gravity on Earth.

C. Downward force of book on table, upward force of gravity on Earth.

D. There are no 3rd law force pairs in this problem because the book is at rest.

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

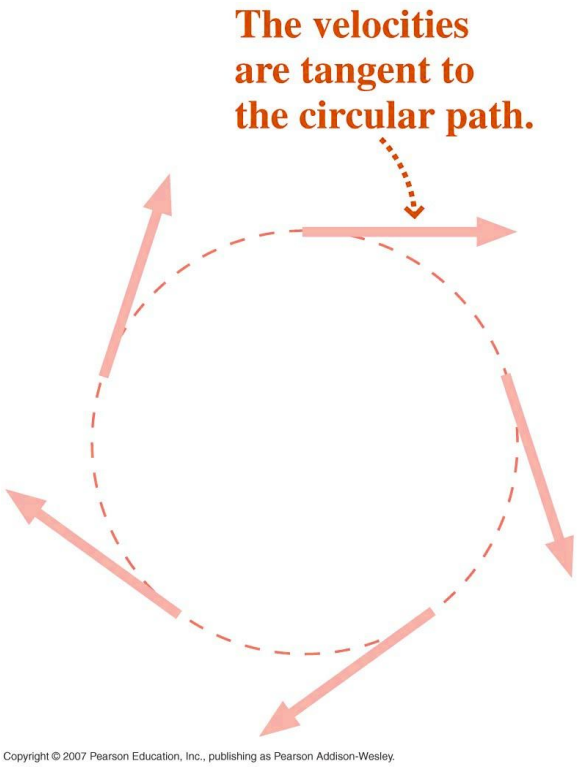
C. 2 N, rightward

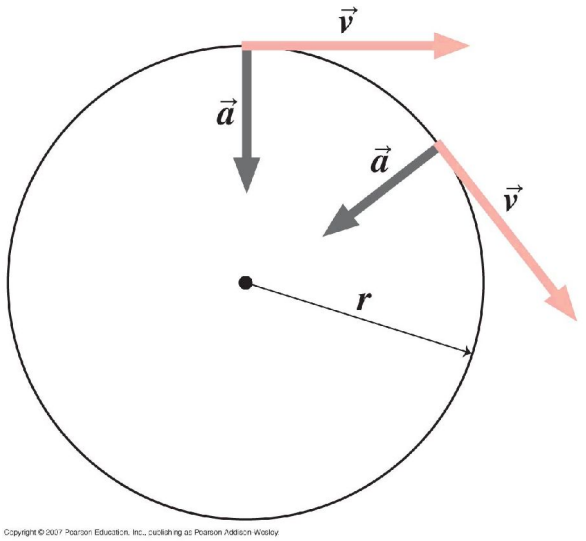
D. 5 N, leftward

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

Uniform Circular Motion:

Special case of constant acceleration, but only the **magnitude** of acceleration is constant. (**Direction** of acceleration changes so it's always perpendicular to velocity.) Note what efffect this has on velocity: the magnitude of **v** is also constant, and the direction of **v** also changes with time.





$$a = \frac{v^2}{r} \qquad \text{(uniform circular motion)} \qquad (3.16)$$

"**a**" here is called the radial acceleration (or centripetal acceleration)

Circular freeway entrance and exit ramps are commonly designed to handle a car moving at 30 mph. To make a similar ramp for 60 mph and **keeping the radial acceleration constant**, one could:

A. increase the turn radius by a factor of 2.
B. decrease the turn radius by a factor of 2.
C. increase the turn radius by a factor of 4.
D. increase the turn radius by a factor of $\sqrt{2}$
E. simply change the speed limit sign.