

Quiz #4: Forces and Newton's Laws of Motion

Problem 1 (1.5 points)

A book at rest on the table has two forces on it: gravity pulling it down and the normal force pushing it up. Are these two forces an action/reaction pair?

- B** a) yes
 b) no
- Action/reaction forces never act on the same object.

Problem 2 (1.5 points)

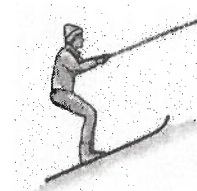
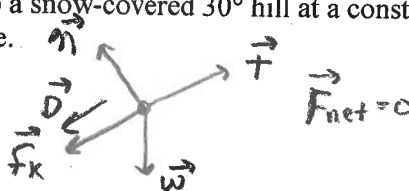
You throw a ball straight upward in the absence of air resistance. After you have released it, just before it reaches its maximum height, what force(s) are acting on the ball?

- A** a) Gravity (down)
 b) Gravity (down) and inertia (up)
 c) Gravity (down) and the force of the throw (up)
 d) Inertia (up)
- Inertia is not a force

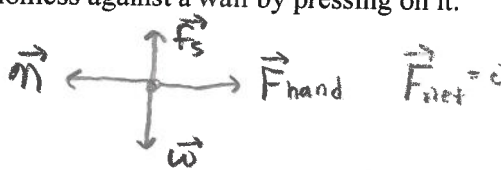
Problem 3 (4 points)

For each situation described below, draw a free-body diagram showing all of the forces acting on the object (as well as the net force)

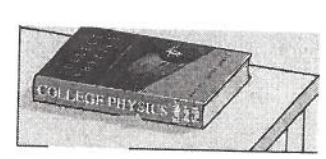
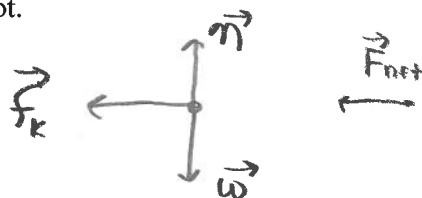
- a) A tow rope pulls a skier up a snow-covered 30° hill at a constant speed. Friction is present and air resistance is **not** negligible.



- b) You hold a picture motionless against a wall by pressing on it.



- c) Your physics textbook is sliding to the right across the table. Air resistance is negligible but friction is not.



Problem 4 (3 points)

A constant force is applied to an object, causing it to accelerated at 5.0 m/s². What will be the acceleration (in m/s²) if:

a) The force is halved? $a' = \frac{F'}{m'} = \frac{(F/2)}{m} = \frac{1}{2} (F/m) = \frac{1}{2} (5.0 \text{ m/s}^2) = 2.5 \text{ m/s}^2$

b) The force is tripled and the object's mass is doubled? $a' = (3F)/(2m) = \frac{3}{2} (F/m) = 7.5 \text{ m/s}^2$

c) The force is doubled and the object's mass is tripled? $a' = (2F)/(3m) = \frac{2}{3} (F/m) = 3.3 \text{ m/s}^2$