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Please complete the following homework assignment in the space provided. It is due on Tuesday, January 24<sup>th</sup> at 9:30 am.

1. For each of the following describe the other member of the force pair.
  - (a) The force of a bat hitting a ball.
  - (b) The force of a rope pulling forward on a water skier.
  - (c) The weight of an apple on a tree pulling it down?
  - (d) The force of your arms as you pull a box across the floor?
  
2.
  - (a) A 12 N book rest on the palm of your hand. What two forces act on the book? How strong is each force and in what direction do they act? Do these two forces form part of a third law force pair?
  
  - (b) If you wish to accelerate the book upwards. Describe the individual forces acting on the book now. What can you say about the strengths of each of the two forces. Are they equal and opposite to each other?
  
3. Your friend (mass 100 kg) and you (mass 50 kg) are both wearing frictionless roller skates. You are at rest behind your friend who is also at rest. You push your friend on his back with a force of 40 N. What is your friend's acceleration? Do you accelerate? If so what is your acceleration?

4. A person stands on a set of scales inside a closed elevator. The scales register the magnitude of the force applied to whatever rests upon them. The mass of the person is 50.0 kg
- (a) Explain the terms mass and weight.
- (b) (i) Draw a free body diagram of the person labeling all the forces acting on her when the elevator is stationary. If any of the forces are equal indicate that and explain why.
- (ii) Determine the scale reading when the elevator is stationary.
- (c) For each of the situations below draw a free body diagram of the person labeling all the forces acting on her and showing their relative magnitudes. Also determine the reading on the scale in the elevator
- (i) moving downward at a constant speed of 2.00 m/s.
- (ii) accelerating upward at a constant acceleration of  $2.00 \text{ m/s}^2$ .
- (iii) free falling, since the cable has broken.