The Normal Force

Name: _____ Date: _____

Note: F.B.D's are required for all problems!

1. Calculate the normal force on person A of mass 84 kg standing on the ground while balancing a person B of mass 50 kg on his head.

2. What would the normal force be for the situation in *problem 1* if someone handed person B a helium balloon capable of generating a lift force of 300 N?

3. A 23 kg block is sitting on the ground. Two ropes are attached to the top of the block. Rope 1 is pulled upward with a force of 20 N and rope 2 is pulled upwards with a force of 5 N. What is the normal force on the block?

4. If a third rope was attached to the block in *question 3*, what upward force would be required so that the normal force would reduce to zero?

5. A block is sitting on a scale. A person pushes down on the block with a force of 18 N. The normal force (i.e. reading on the scale) is 300 N. Determine the mass of the block.

6. You're holding up a light fixture of mass 1.4 kg with a force of 21 N against the ceiling. What is the normal force?

7. A sled of mass 26 kg has an 18 kg child on it. If big brother is puling with a force of 30 N to the right and 10 N up and big sister is pushing at 40 N right and 16 N down, what is the normal force?

8. A person of mass 70 kg jumps up and lands on a bathroom scale, causing the scale to read 750 N. Find the persons weight and acceleration.

9. A person of mass 40 kg stands on a bathroom scale. What is the normal force (The reading on the scale)?

10. How would the reading on the scale in *question 1* change if the person is standing in an elevator on the scale and (draw the FBDs)
    a) the elevator was moving upward with constant speed?
    b) The elevator was accelerating upwards and moving upwards?
    c) The elevator was accelerating upwards and moving downwards?
    d) The elevator was moving downwards with constant speed?

11. A 75 kg person is standing on a scale in an elevator. The elevator begins to accelerate upwards at 2.4 m/s/s. What is the apparent weight of the person (i.e. the reading on the scale)? What is the reading if the elevator accelerates downward at the same rate?