Physics
Newton's Laws of Motion #3

1. A 10.0 kg object is held up by a string that will break when the tension exceeds 1.00×10^2 N. At what upward acceleration will the string break?

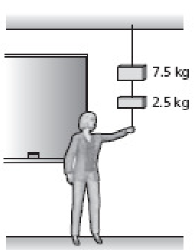
First draw a free-body diagram for the object (consider all forces applied)	**Write the expression for Newton's 2^{nd} Law ($\Sigma F = ma$)**	**Solve the equation**

2. A large sculpture is lowered into place by a crane. The sculpture has a mass of 2225 kg. When the sculpture makes contact with the ground, the crane slowly releases the tension in the cable as the workers make the final adjustments to its position on the ground. What is the normal force on the sculpture when the tension in the cable is 19,250 N?

3. A 50.0 kg bucket is being lifted by a rope. The rope will not break if the tension is 525 N or less. The bucket started at rest, and after being lifted 3.0 m, it is moving at 3.0 m/s. If the acceleration is constant, is the rope in danger of breaking?

4. A 12.0 kg lantern is suspended from the ceiling by two vertical wires. What is the tension in each wire?

5. A physics teacher attaches a 7.5 kg object to the ceiling by a string. This object supports a 2.5 kg object below it by another piece of string. Finally, another piece of string hangs off the bottom of the lower object to be pulled with ever increasing force until the string breaks somewhere. The string will break when the tension reaches 156 N.



   a) Which length of string will break first?

   b) What is the maximum downward force the physics teacher can apply before the string breaks?

6. During a space launch, an astronaut typically undergoes an acceleration of 3 g's, which means he experiences an acceleration that is three times that of gravity. What would be the apparent weight of a 205 kg astronaut that experiences a 3 g liftoff?

7. Erika, who's mass is 65 kg, is on an elevator (mass = 1185 kg) and presses the button to go down. When the elevator first starts moving it has an acceleration of 2.5 m/s^2 downward. What is the tension in the cable that provides the upward force on the elevator car?