

## Problem 2:

Consider a person standing in an elevator that is accelerating upward. The upward normal force  $N$  exerted by the elevator floor on the person is

1. larger than
2. identical to
3. smaller than

the downward force of gravity on the person.

## Problem 6:

In the 17th century, Otto von Güricke, a physicist in Magdeburg, fitted two hollow bronze hemispheres together and removed the air from the resulting sphere with a pump. Two eight-horse teams could not pull the halves apart even though the hemispheres fell apart when air was readmitted. Suppose von Güricke had tied both teams of horses to one side and bolted the other side to a heavy tree trunk. In this case, the tension on the hemispheres would be

1. twice
  2. exactly the same as
  3. half
- what it was before.

## Problem 8

You're playing with a yo-yo (a vertically oriented top surrounded by a coiled string, in case you've never used one). The action of the yo-yo is produced by several forces, most notably tension in the string and gravity acting on the top. Which statement is true for the top just after it is released?

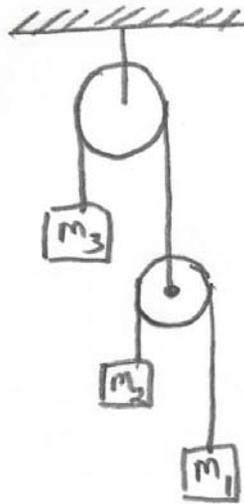
- 1) The tension in the string is greater than the force of gravity.
- 2) The tension is equal to the force of gravity.
- 3) The tension is less than the force of gravity.

## Problem 9

You're still playing with the yo-yo; now, you wait until the top has hit the bottom of its run and returns upward to your hand. Which statement is true for the top when it hits bottom and returns upward?

- 1) The tension in the string is greater than the force of gravity.
- 2) The tension is equal to the force of gravity.
- 3) The tension is less than the force of gravity.

## Problem 10



A set of objects are connected via strings to pulleys and released from rest. Assume

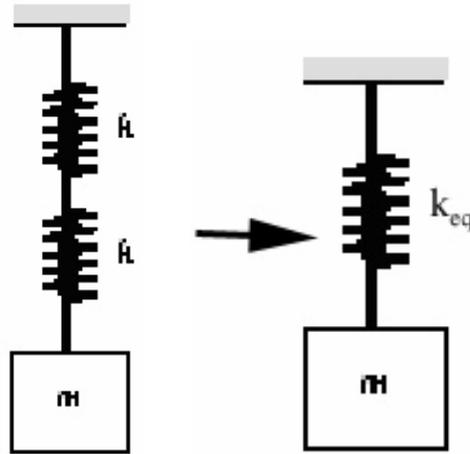
$$m_3 > m_2 + m_1 + m_p \text{ and } m_2 > m_1 > m_p > 0.$$

Choose positive acceleration pointing down. Which describes the nature of the acceleration of object 3?

- 1) Equal in magnitude, but points in the opposite direction, to the acceleration of object 1
- 2) Less in magnitude, but points in the opposite direction, to the acceleration of object 1
- 3) Greater in magnitude but points in the opposite direction to the acceleration of object 1
- 4) Not enough information to determine the relation, but it points in opposite direction

### Problem 11:

Two identical springs with spring constant  $k$  are attached to each other and a mass is suspended from the lower spring. If you suspended the same mass by a single spring with a new spring constant  $k_{eq}$



the new spring constant is related to the old spring constant by

1)  $k_{eq} = k$

2)  $k_{eq} = 2k$

3)  $k_{eq} = \frac{1}{2}k$

4) an unknown relation; there is not enough information.