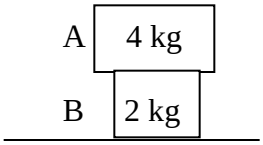
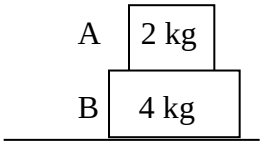
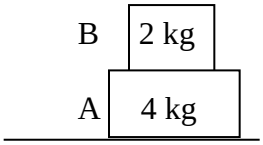
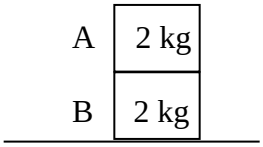
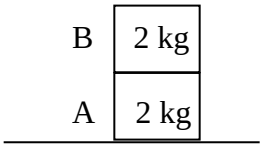
Problem 1

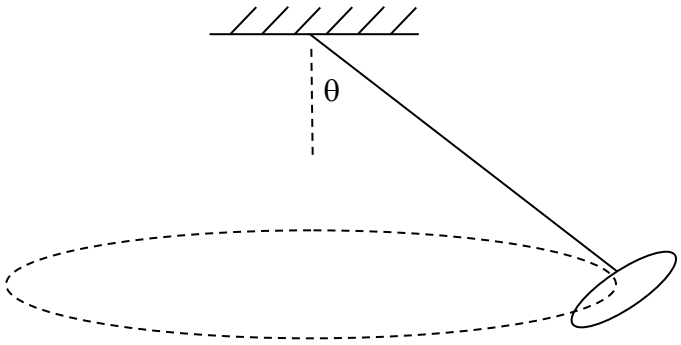
In each case indicate whether the magnitude of the force A exerts on B is greater than, equal to, or less than the force B exerts on A:

	> = <
	> = <
	> = <
	> = <
	> = <

Problem 2

A small toy airplane (weight = 0.9 N) is tied to the ceiling with a string. When its motor is started, it moves with a constant speed of 1.2 m/s in a horizontal circle of radius 0.6 m.

a) Find the tension in the string.

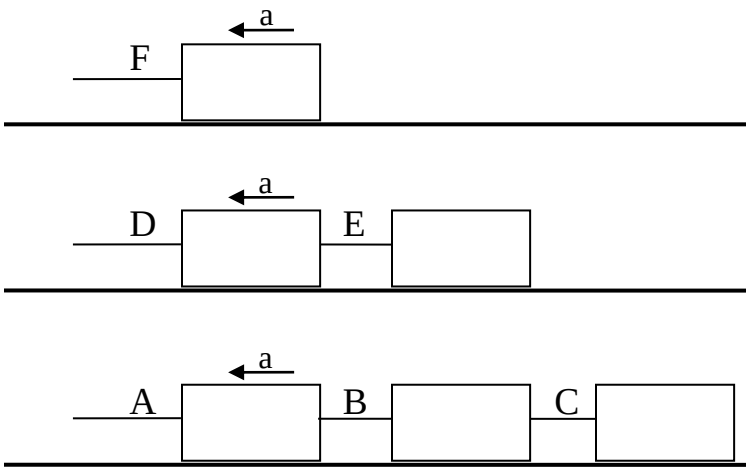


b) Find θ, the angle the string makes with the vertical.

Problem 3

The figures below show boxes that are pulled to the left along frictionless surfaces, accelerating toward the left. All of the boxes are identical (mass = M) and the acceleration is the same in each figure. As you can see, some boxes are pulled by ropes attached to the boxes in front of them.

Rank the ropes from greatest to least tension in the rope.



Greatest tension:
1 _____
2 _____
3 _____
4 _____
5 _____
Least tension:
6 _____

If there is a tie, put them on the same line.
If any are zero, specifically state that.

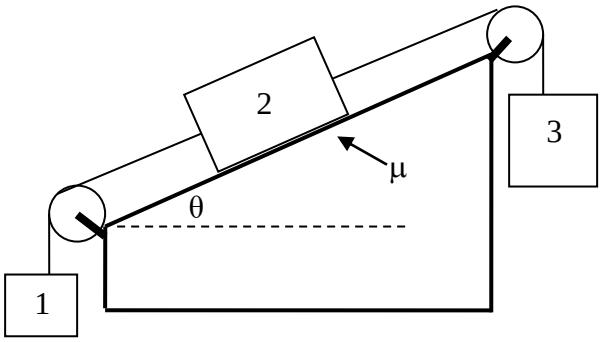
Or,

They are all the same _____

Explain your reasoning:

Problem 4

a) Draw free body diagrams for the three masses. There is friction. Box 2 is moving to the right (block 1 goes up and block 3 goes down). The two pulleys are identical and are massless.



Draw a free body diagram for mass 1	Draw a free body diagram for mass 2	Draw a free body diagram for mass 3

b) Identify any Newton's Third Law pairs using "x" on each arrow for the first pair, "xx" for the second pair, etc. If there are none, state that.

c) Write out the equations needed to solve for the acceleration of the blocks and the tensions in the strings in terms of the following known quantities: m_1, m_2, m_3, g, μ_s, μ_k, θ. There is friction. Box 2 is moving to the right (block 1 goes up and block 3 goes down). The two pulleys are identical and are massless.