Centripetal Acceleration and Centripetal Force Problems

The following problems are situations that you may come across when dealing with circular motion. The first few problems will guide you through the information that you need to be looking for and what you need to find. After that it is up to you!

1. A rope is attached to cardboard platform that has a glass of water (total mass of 1.2 kg) resting on it. The glass is swung around in a vertical circle with a constant rate of 1.5 revolutions per second. The radius of the circle is 1 meter. What is the maximum and minimum tension on the rope?

a) Is the speed given tangential or angular?

b) Knowing this, what centripetal force equation do we need to use?

c) The weight of the glass and platform is _____.

d) At the top of the circle will the weight increase the tension or decrease it?

e) At the bottom of circle the weight will _____. (increase or decrease tension)

f) The total tension on the rope is the combination of F_c and weight. What is the maximum tension? Where on the circle will the glass be with maximum tension?

g) What will the minimum tension be? Where will the glass be with minimum tension?

2. A coin is placed .15 m from the axis of a rotating record on a record player. The speed of the record is slowly increased until the record reaches 66 rotations per minute. At this point the coin starts to slip off the record. What is the coefficient of friction between the coin and the record?

a) What is the radius of rotation?

b) Is the speed angular or tangential?

c) Do you need to convert from rot/s to anything?

d) What F_c equation will you use?

d) What is the force that keeps the coin from slipping?

e) The centripetal force is equal to this force. So you can set up an equation with these two force equations equal. (Hint: the force equation that keeps it from slipping is "fun")

e) Solve this equation and you should have your answer.