Circular Motion Problems

Name: _____ Period: _____

1. A ball is swung in a vertical circle as shown to the right. Draw a Free-Body-Diagram for the ball when it is at point A (the peak of its path) and point B (the lowest point of its path.

        A   **B**

        •   •

2. A car travels around an unbanked turn as seen to the right. The road is not banked but <u>there is friction</u>. Draw a Free-Body-Diagram for the car as it travels around the circular path.

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3. A car travels around a corner similar to problem 2 but now there is <u>no friction</u> and the turn is banked (meaning one side of the road is higher) as seen to the right. Draw a Free-Body-Diagram of the car as it travels around the corner.

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4. For each of the three problems above, indicate which component of the forces provides the centripetal force (the net force that results in a centripetal acceleration)
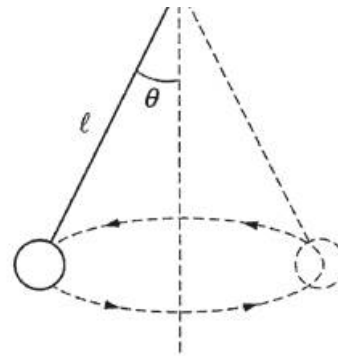
5. A ball attached to a string of length l swings in a horizontal circle, as shown to the right, with a constant speed. The string makes an angle θ with the vertical, and T is the magnitude of the tension in the string. Express your answers to the following in terms of the given quantities and fundamental constants.

(a) On the figure below, draw and label vectors to represent all the forces acting on the ball when it is at the position shown in the diagram. The lengths of the vectors should be consistent with the relative magnitudes of the forces.
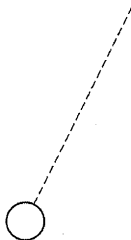
(b) Write out appropriate a=F/m statements for both the X and Y directions.

(c) Determine the mass of the ball in terms of L, theta, g and T.

(d) Determine the speed of the ball.

(e) Determine the period of revolution of the ball.