1. The little girl from last week's problem set is still stuck to the wall. As a reminder: The little girl went for a walk. The wind is *very* strong and the little girl was lifted off her feet and blown into a wall. She is pinned to the wall by the wind. The child has a mass of 25 kg and the coefficient of static friction between the child and the wall is 0.35. Last week we drew a free body diagram for the child and determined the minimum force that the wind exerts on her.

   Now: The wind is blowing twice as hard so the force exerted by the wind on the child is twice as large as last week. What is the magnitude of the friction force experienced by the girl?

   Assuming the coefficient of sliding friction between the girl and the wall is 0.30, if the wind subsided so that the force of the wind on the girl drops to half of last week's value, what acceleration will the girl experience as she slides down the wall (assuming that she remains in contact with it)?

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2. A Physics professor twirls a ball with a mass of 100 grams over his head at the end of a string with a length of 1.5 meters in a perfect circle. By observation, it is found that the time it takes for the ball to make one revolution is 2 seconds. What is the speed of the ball?

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3. A Physics professor twirls a ball with a mass of 100 grams over his head at the end of a string with a length of 1.5 meters in a perfect circle. By observation, it is found that the time it takes for the ball to make one revolution is 2 seconds. What angle does the string make relative to the horizontal?

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4. A car of mass M travels at a constant speed v on a stretch of road around a long bend of radius R. The road is banked at an angle θ. The road is coated with greased ice, so there is negligible friction between the car's tires and the road. Ignore air resistance. Draw a free body diagram for the car. What speed does the car need to maintain to avoid sliding? (Tip: Two free body diagrams, from different perspectives, may help.)

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5. A NASCAR of mass M travels at a constant speed v on a stretch of track around a bend of radius R. The road is banked at an angle θ. The coefficient of static friction between the road and the tires is μ_s. Ignore air resistance. Draw a free body diagram for the car. What is the maximum speed that the car can have before skidding into the assembled crowd?

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