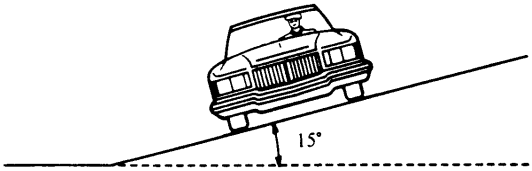
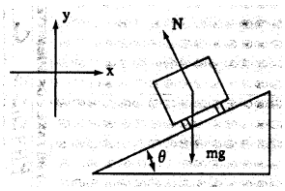
Name _____ Date _____ Period _____



4. A highway curve that has a radius of curvature of 100 meters is banked at an angle of 15° as shown above.

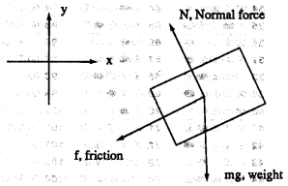
a. Determine the vehicle speed for which this curve is appropriate if there is no friction between the road and the tires of the vehicle.



Toward the center of the turn we have $\Sigma F = N \sin\theta = mv^2/r$ and vertically $N \cos\theta = mg$.
Dividing the two expressions gives us $\tan\theta = v^2/rg$ and $v = 16$ m/s

On a dry day when friction is present, an automobile successfully negotiates the curve at a speed of 25 m/s.

b. On the diagram above, in which the block represents the automobile, draw and label all of the forces on the automobile.



c. Determine the minimum value of the coefficient of friction necessary to keep this automobile from sliding as it goes around the curve.

$\Sigma F_y = N \cos\theta - f \sin\theta - mg = 0$ and $\Sigma F_x = N \sin\theta + f \cos\theta = mv^2/r$

solve for N and f and substitute into $f = \mu N$

gives $\mu_{min} = 0.32$