Practice Quiz Banked Roads WO Sol.

Wednesday, October 7, 2020 10:07 AM

Question 1

A curved road is banked at an angle θ, such that friction is not necessary for a car to stay on the road. A 2500-kg car is traveling at a speed of 25 m/s, and the road has a radius of curvature equal to 40 m. Draw the FBD for this problem, find the banking angle θ, and calculate the magnitude of the force that the road exerts on the car.

Citation:
Barron's AP Physics 1
Ridcout and Wolf

Question 2

Civil engineers generally bank curves on roads in such a manner that a car going around the curve at the recommended speed does not have to rely on friction between it's tires and the road surface in order to round the curve

Suppose that the radius of curvature of a given curve is $r = 60$ m, and that the recommended speed is $v = 40$ km/h. At what angle should the curve be banked?

Citation: Farside.ph, University of Texas.
"A Banked Curve"

Question 3

Suppose you want to negotiate a curve with a radius of 50 meters and a bank angle of 15°. If the coefficient of friction between your tires and the road is 0.50, what is the maximum speed you can safely use?

Citation:
Batesville.k12
"A banked turn with friction"

Question 4

Take the question presented in question 3, but find the minimum velocity instead, utilizing an angle of 30°.

Bonus: Why did I change the angle from $15 \rightarrow 30$?