Answer on Question #65593, Physics / Mechanics | Relativity

What is the radius of the bobsled turn in m, assuming it is ideally banked and there is no friction between the ice and the bobsled?

Solution:

Using a free body diagram with corresponding force equations.



$$\begin{split} mg &= F_N \cos \theta \\ F_N &= mg / \cos \theta \\ ma &= F_N \sin \theta \\ ma &= mg x \sin \theta / \cos \theta \\ ma &= mg x tg \theta \\ Centripetal acceleration can be found \\ a &= v^2 / R \\ mv^2 / R &= mg x tg \theta \\ R &= mv^2 / mg x tg \\ R &= v^2 / g x tg \theta \end{split}$$

Answer: $R = v^2 / g x tg \theta$

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