## 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.


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\(\mathrm{mg}=\mathrm{F}_{\mathrm{N}} \cos \theta\)
\(\mathrm{F}_{\mathrm{N}}=\mathrm{mg} / \cos \theta\)
\(m a=F_{N} \sin \theta\)
\(m a=m g x \sin \theta / \cos \theta\)
\(m a=m g x \operatorname{tg} \theta\)
Centripetal acceleration can be found
\(a=v^{2} / R\)
\(m v^{2} / R=m g x \operatorname{tg} \theta\)
\(R=m v^{2} / m g x t g\)
\(R=v^{2} / g x \operatorname{tg} \theta\)
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Answer: $\mathrm{R}=\mathrm{v}^{\mathbf{2}} / \mathrm{gx} \operatorname{tg} \boldsymbol{\theta}$
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