**Answer on Question #73904, Physics / Mechanics | Relativity**

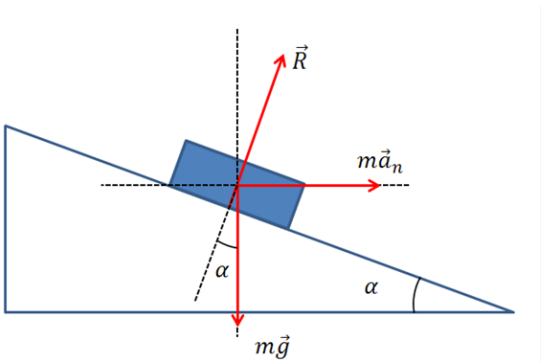
**Question.** A racing car of $1000\ kg$ moves round a banked track at a constant speed of $108\ km/h$. Assuming the total reaction at the wheels is normal to the track, and the horizontal radius of the track is $100\ m$, calculate the angle of inclination of the track to the horizontal and the reaction of the wheels.

**Solution.**

**Given.** $m = 1000\ kg; v = 108\ km/h = 30\ m/s; r = 100\ m.$

**Find.** $\alpha, R-?$

**Solution.**




Applying Newton's second law, we write

$$+\uparrow \sum F_y = 0:\ R\cos\alpha - mg = 0 \ \rightarrow R = \frac{mg}{\cos\alpha}.$$

$$\overset{+}{\rightarrow} \sum F_x = ma_n:\ R\sin\alpha = m\frac{v^2}{r} \ \rightarrow \ \frac{mg}{\cos\alpha}\sin\alpha = m\frac{v^2}{r} \ \rightarrow \ \operatorname{tg}\alpha = \frac{v^2}{gr}.$$

$$\alpha = \operatorname{arctg}\alpha = \operatorname{arctg}\frac{v^2}{gr} = \operatorname{arctg}\frac{30^2}{9.81\cdot 100} = 42.53°.$$

$$R = \frac{mg}{\cos\alpha} = \frac{1000\cdot 9.81}{\cos 42.53°} = 13312\ N.$$

**Answer.** $\alpha = 42.53°;\ R = 13312\ N.$