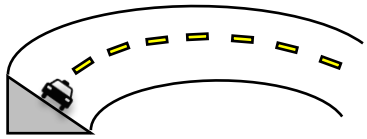
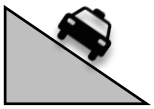
CONCEPT: BANKED CURVE

- Unlike flat curve problems, **Banked Curve** problems involve objects travelling in circular motion on *frictionless inclines*.
  - Because the centripetal direction is *horizontal*, we use an _____ coordinate system (regular X & Y axes).
  - WITHOUT friction, objects accelerate centripetally from the _____ Force (x-component).

EXAMPLE: An 800kg racecar on a racetrack drives around a banked, frictionless curve inclined 37° above the horizontal. The radius of the curve is 200m. Find the exact speed of the car such that it moves *without sliding* up OR down the incline.





CENTRIPETAL FORCES

1) Draw FBD
2) Write $\Sigma F_c = ma_c$
(rewrite $a_C \Rightarrow v^2/R$)
3) Solve

Circ. Motion / Centripetal Forces

$a_C = \frac{v_T^2}{R} = \frac{4\pi^2 R}{T^2} = 4\pi^2 R f^2$

$T = \frac{1}{f} \Leftrightarrow f = \frac{1}{T}$

$v_T = \frac{C}{T} = \frac{2\pi R}{T} = 2\pi R f$

Flat Curve: $v^2 = gR\mu_s$

Banked Curve: $v^2 = gR\tan\theta$

	μ	θ	EQ
Flat Curve			
Banked Curve			

PROBLEM: A bobsled turn banked at 78° is taken at 24 m/s. Assume it is ideally banked and there is no friction between the ice and the bobsled. Calculate the centripetal acceleration of the bobsled.

A) 1100 m/s^2
B) 2.08 m/s^2
C) 46.1 m/s^2
D) 1.92 m/s^2

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