Answer on Question #46893-Physics-Mechanics-Kinematics-Dynamics

A car of mass 1000kg negotiates a banked curve of radius 90 m on a fictionless road. If the banking angle is 45degree, the speed of car is

(1) 5m/sec

(2)10m/sec

(3)20m/sec

(4)30m/sec

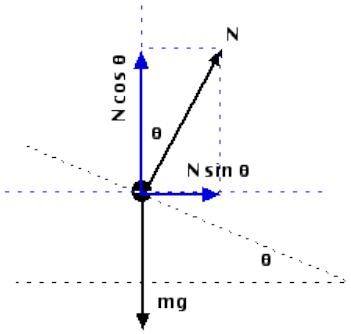
Solution

Radius of curve is $r = 90\ m$.

Banking angle is $\theta = 45°$.

Free-fall acceleration is $g = 10\frac{m}{s^2}$.

No friction speed is .



From the free-body diagram for the car:

$$F_{net} = F_{centripetal}.$$

$$mg\tan\theta = \frac{mv^2}{r}.$$

$$v = \sqrt{rg\tan\theta} = \sqrt{90\cdot 10\tan 45} = 30\frac{m}{s}.$$

Answer: (4) $30\frac{m}{s}$.