Exercise 3-3-5	10/30/22	Isaac Abella

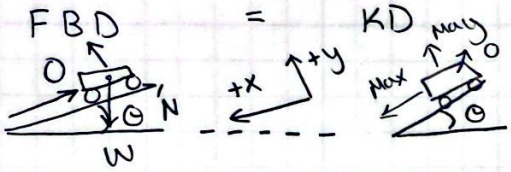
Problem:

A) A Hill has a 6.3% grade, determine the angle of the hill from the horizontal

B) A 1009 Kg car is coasting down a 6.3% grade. Determine the magnitude of the normal force on the car.

C) A 1009 Kg car is coasting down a 6.3% grade. Determine the magnitude of the acceleration of the car.

Represent:



Organize

Hill grade = 6.3% = $\frac{6.3}{100}$

$\tan\theta = \tan^{-1}\frac{O}{A}$

$m_{car} = 1009\ Kg$

$g = 9.81\ m/s^2$

Solution:

$X: M \cdot a_x \rightarrow +W - \sin\theta - Friction\ (0)$

$Y: M \cdot a_y \rightarrow +N - W \cdot \cos\theta$

A) Find θ given $\tan^{-1}\left(\frac{rise}{run}\right) = \theta$

$\theta = \tan^{-1}\left(\frac{6.3}{100}\right) = \boxed{3.604^\circ}$

B) Calculate Normal Force using y equation

$N - W\cos\theta = ma_y$

$1009 \cdot 9.81\cos(3.604) = 9878.7\ Newtons = \boxed{9879N}$

C) using x equations, $W \cdot \sin\theta - F\ m - a_x$, $W\sin\theta = m \cdot a_x$

$(9.81\ m/s^2) \cdot (\sin(3.604)) = \boxed{.6167\ m/s^2}$