Name: ANSWER

Date: WINTER 2019.

BANKED CURVES QUIZ **/ 17** 16

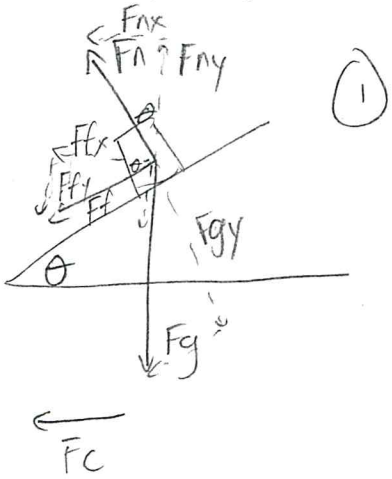
On Ms. Carew's way to work one morning, she entered an icy on ramp, inclined at an angle of 4.9°, with a radius of 25.0 m. The coefficient of friction between the ramp and her tires was 0.051. Determine the speed Ms. Carew was travelling, if she was able to navigate the ramp safely.

$r = 25.0\,m$

$\theta = 4.9°$

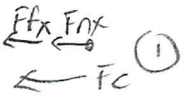
$\mu = 0.051$

$v = ?$



(1)

X



(1)

$F_c = F_{fx} + F_{nx}$ (1)

$\frac{mv^2}{r} = F_f\cos\theta + F_n\sin\theta$ (1) (1) (1)

$\frac{mv^2}{r} = \mu F_n\cos\theta + F_n\sin\theta$

$\frac{mv^2}{r} = F_n(\mu\cos\theta + \sin\theta)$

Sub in Fn (1)

$\frac{mv^2}{r} = \frac{mg(\mu\cos\theta + \sin\theta)}{\cos\theta - \mu\sin\theta}$ cancel m (1)

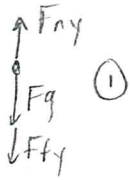
$v = \left[\frac{rg(\mu\cos\theta + \sin\theta)}{\cos\theta - \mu\sin\theta}\right]^{1/2}$

$v = \sqrt{\frac{(25.0\,m)(9.8\,m/s^2)(0.051\cos 4.9 + \sin 4.9)}{\cos 4.9 - (0.051)\sin 4.9}}$

$v = 5.8005\,m/s$

$v = 5.8\,m/s$ (1)

Y



(1)

$F_{net\,y} = ON$ (1)

$F_{net\,y} = F_g + F_{fy} - F_{ny}$ (1)

$F_{ny} = F_g + F_{fy}$

$F_n\cos\theta = mg + F_f\sin\theta$ (1) (1) (1)

$F_n\cos\theta = mg + \mu F_n\sin\theta$ (1)

$F_n\cos\theta - \mu F_n\sin\theta = mg$

$F_n(\cos\theta - \mu\sin\theta) = mg$

$F_n = \frac{mg}{\cos\theta - \mu\sin\theta}$ (1)