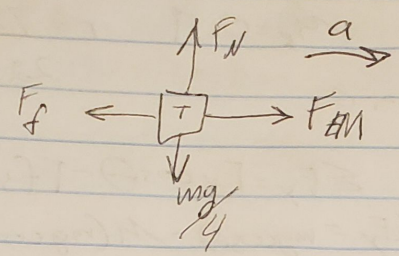
1.



$v_i = 0 mph \quad v_f = 60 mph$
$26.82 m/s$

$t = 2.28$ $\quad m = 4900 lbs$
$2222.6 kg$

$\Sigma F_y = F_N - \frac{mg}{4} \Rightarrow$

$a = 11.76 m/s =$

$\Sigma F_x = F_{EM} - F_f = ma$

$\Sigma F_x = F_{EM} - \mu mg/4 = ma$

$+\frac{\mu mg/4}{mg/4} = \frac{ma + F_{EM}}{mg/4}$

$\mu = \frac{4ma + F_{EM}}{mg}$

$\Sigma F_x = 4\mu_s\left(\frac{mg}{4}\right) = ma$

$\frac{(2222.6)(11.76) + F_{EM}}{(2222.6)(9.8)(0.25)}$

$\frac{26137.78 + F_{EM}}{5445.37} \Rightarrow \frac{F_{EM}}{5445.37} + 4.78$

$\mu_s = \frac{a}{g} \Rightarrow \frac{11.76}{9.8} = 1.2$

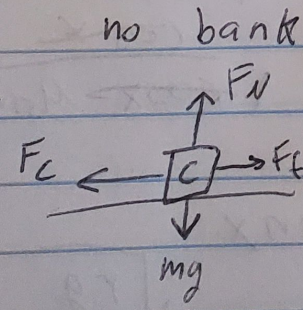
yes, the power from the power unit is evenly distributed to 4 tires which lowers the sum of forces in the x direction.

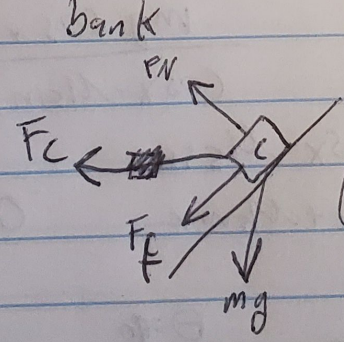
It is static friction because the tire is not actively slipping on the tarmac

2. $\mu = 1.2$

$\frac{4}{4}\mu = \frac{4a}{0.25g}$

3.





they allow cars to drive at higher speeds

$\Sigma F_x = F_C - F_f = m\frac{v^2}{r}$

$\Sigma F_x = F_N \sin\theta + \mu F_N \cos\theta$

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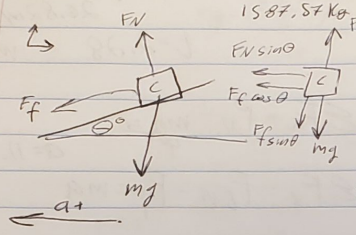
4. $\theta = 24°$ $m = 3500\,lbs$ $1587.57\,kg$ $\mu_s = 0.9$ $r = 750\,ft$ $228.6\,m$



$\Sigma F_y = F_N\cos\theta - F_f\sin\theta - mg = 0$

$\Sigma F_y = mg\cos\theta - \mu(mg\cos\theta)\sin\theta - mg = 0$

$\Sigma F_x = F_N\sin\theta + F_f\cos\theta = ma$

$\Sigma F_x = mg\sin\theta + \mu(mg\cos\theta)\sin\theta = m\frac{v^2}{r}$

$$v = \sqrt{\frac{r}{m}(F_N\sin\theta - F_f\cos\theta)}$$

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

$F_N(\cos\theta - \mu\sin\theta) = mg$ $\quad F_N = \frac{mg}{\cos\theta - \mu\sin\theta}$

$\Sigma F_x = \left(\frac{mg}{\cos\theta - \sin\theta\mu}\right)(\sin\theta) + \left(\mu\left(\frac{mg}{\cos\theta - \mu\sin\theta}\right)\cos\theta\right) = m\frac{v^2}{r}$

$$v = \sqrt{\frac{r\,g(\sin\theta + \mu\cos\theta)}{(\cos\theta - \mu\sin\theta)}}$$

$$158.6\,mph = 70.91\,m/s = \sqrt{\frac{(228.6\,m)(9.8)(\sin 24 + 0.1\cos 24)}{(\cos 24 - 0.9\sin 24)}}$$

5. $\frac{\frac{v^2}{gr} - \mu}{1 + \left(\frac{\mu v^2}{gr}\right)} = \tan\theta$ $\quad$ 48° or like 76° idrk

$F_N\cos(x)$

C

mg

$F_N\cos x = mg$

$\cos x = \frac{mg}{F_N}$

$\cos x = 0.9\sin x$

$\cot x = 0.9$

$\frac{mg\cos x}{\cos x - \mu\sin x} = mg$ $\quad \frac{\cos x}{1 - \mu\sin x} = 1$

$\frac{\left(\frac{10000}{2240.28}\right) - 0.9}{1 + \left(\frac{0.9(10000)}{2240.28}\right)}$

$1 + \frac{1 - \mu\sin x}{} = 0$

$\cos x = \cos x - \mu\sin x$

$\cos x = \cos x + \mu\sin x$

$-\cos x \quad -\cos x$

$0 = \mu\sin x$

$\theta = 90$ $\quad \sin\theta = 1, \cos\theta = 0$

$\frac{2240.28(0.48)}{-0.88} = \pm 2449.86\,m/s$

$\sqrt{\frac{rg}{-0.9}} = 49.89\,m/s$

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6. It will always have a greater centripetal acceleration inwards

7. $a = \frac{v^2}{r}$ $\quad \frac{70.91^2}{228.6} = 22\,m/s^2 / 9.8 = \boxed{2.24\,g's}$

8. Yes, it will increse the normal force acting on the car, thus increasing it Force of friction

9.