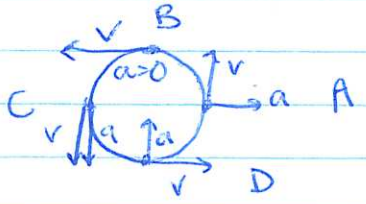
p 145 MC 2, 4, 5, 10
Concept 18
Problem 8, 12, 18, 24 (12)

- Multiple Choice

2) Which location correct



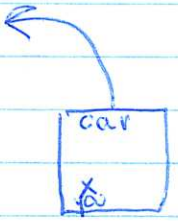
location D
- $\vec{v}$ is tangent
a is in

(4)

4) Difficult high speed car negotiate unbanked turn?

b) Fric not enough to provide accel

5)



outsider explain why you move right when car turn left

a) You go Straight, car slides out from under you

10) Penny center turntable, no slip but on edge it slips why?

c) Radial accel is greater + Ff not enough to keep in place

- Concept

18) Book: describe experiment to estimate μ.

$F_f = F_c$

$\mu F_N = \frac{mv^2}{r}$

$\mu mg = \frac{mv^2}{r}$

$\mu = \frac{v^2}{rg}$

online: find eqn

Place penny on turntable
Turn on, find location where it begins to slip
Measure r, T

(1)

- Problems

8) $v = 470\ m/s$

claim: $a = 150{,}000g$'s

$a = 147150\ m/s^2$

$r = .15\ m$

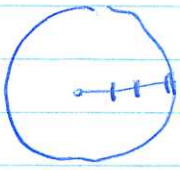
Is claim correct?

$a_c = \frac{v^2}{r} = \frac{(470\ m/s)^2}{.15\ m}$

$= 1.47 \times 10^6\ m/s^2$

Yes, the claim is correct

(1)

12)  3 people on platform

$r_1 = R \quad r_2 = \frac{3}{5}R \quad r_3 = \frac{1}{2}R$

Compare T, V, a_c

a) If $T_1 = T$ what is ~~other~~ $T_2 + T_3$

T is time to go around - SAME for all

(3)

a) $T_2 = T$ b) $T_3 = T$

b) If $V_1 = V$ what is $V_2 + V_3$

c) $V_2 = \frac{2\pi r}{T} = \frac{(1)(1)(\frac{3}{5})}{(1)} = \frac{3}{5}V = .60V$

d) $V_3 = \frac{2\pi r}{T} = \frac{(1)(1)(1/2)}{(1)} = \frac{1}{2}V = .50V$

c) If $a_1 = a$ what is $a_2 + a_3$

e) $a_2 = \frac{V^2}{r} = \frac{(.60)^2}{.60} = .60a$

f) $a_3 = \frac{V^2}{r} = \frac{(.50)^2}{.50} = .50a$

18) $m = 1600\,kg$
$v = 27\,m/s$
$r = 150\,m$
$\mu = .40$

Is it safe to drive your car?

① $F_c = \frac{mv^2}{r}$
$= \frac{(1600\,kg)(27\,m/s)^2}{150\,m}$
$= 7776\,N$

② $F_f = \mu F_N$
$= \mu mg$
$= (.40)(1600\,kg)(9.81\,m/s^2)$
$= 6278\,N$

(2)

Or $v_{max} = \sqrt{\mu g r}$
Safely $= 24\,m/s$
$27\,m/s$ is too fast
so

No, there is not enough F_f to provide necessary F_c

24) $r = .15\,m$
$\mu = .30$
$v_{max} = ?$

$F_f = F_c$
$\mu m g = \frac{mv^2}{r}$
$v = \sqrt{\mu g r}$
$= \sqrt{(.30)(9.81\,m/s^2)(.15\,m)}$
$v = .66\,m/s$

(1)