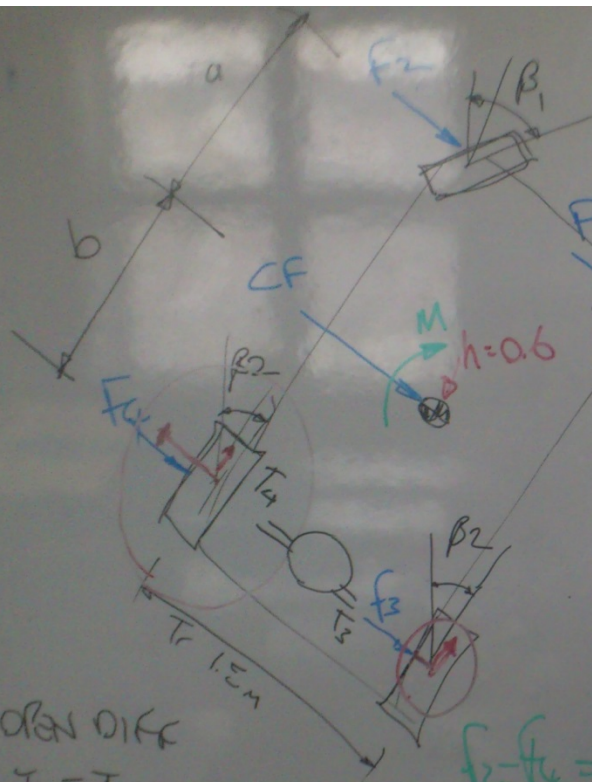


Board Shots

Sandford



Assume 1st grip will be distributed as the vert load ratio - Look AT REAR
 TOTAL REAR VERT FORCE = 7112

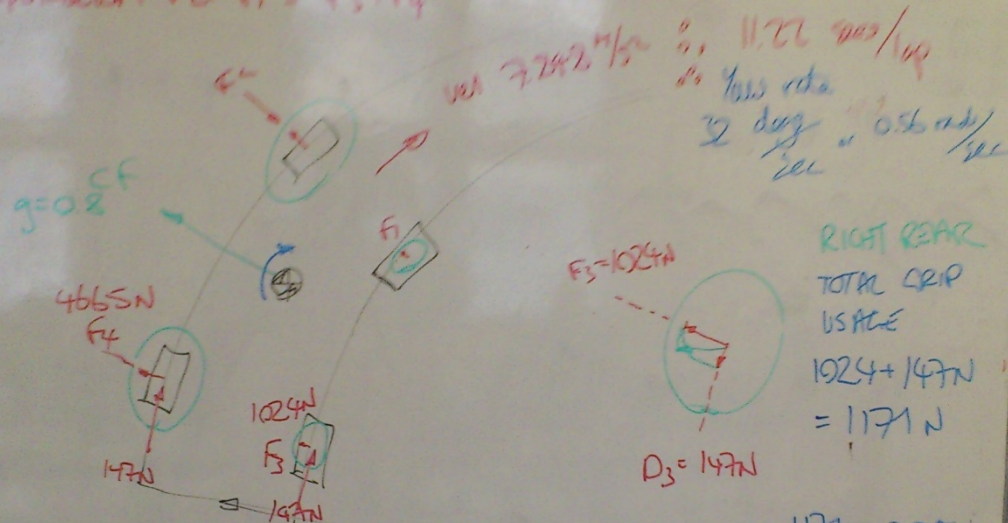
Vert force ratio

$$\text{LEFT } \frac{5832 \text{ N}}{7112 \text{ N}} \times \frac{CF}{2} 11379 = 4665 \text{ N}$$

$$f_2 - f_4 =$$

$$F_1 - f_3 = \text{RIGHT } \frac{1280 \text{ N}}{7112 \text{ N}} \times \frac{CF}{2} 11379 = 1024 \text{ N}$$

FOR EQUILIBRIUM $F_T F_1 = F_3 + F_4$



RIGHT REAR

TOTAL GRIP

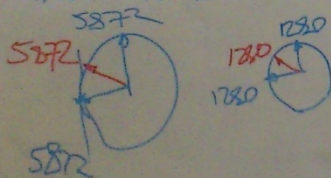
USAGE

$$1024 + 1471$$

$$= 1171 \text{ N}$$

Assume $\mu = 1$

Assume friction circle



R 25m

$$1280 - 1171$$

$$= 109 \text{ N}$$

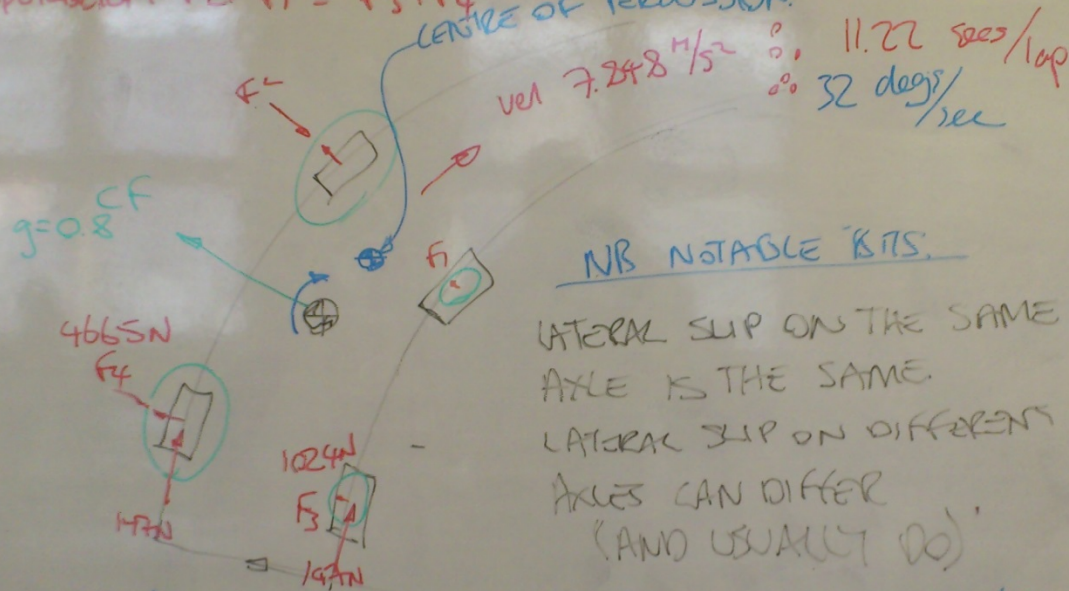
left of GRP. INSIDE. 91%

$$\frac{1171}{1280} = 0.915$$

$109 \times 2 = 218 \text{ N} = \text{TOTAL AVAILABLE ADDITION LONG FORCE}$

$$F = Ma \quad a = \frac{F}{M} = \frac{218}{1450} = 0.155 \text{ m/s}^2$$

FOR EQUILIBRIUM $F_L + F_i = F_3 + F_4$
 CENTRE OF PERCUSSION!



NB NOTABLE BITS

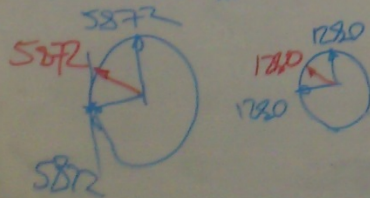
LATERAL SLIP ON THE SAME AXLE IS THE SAME.

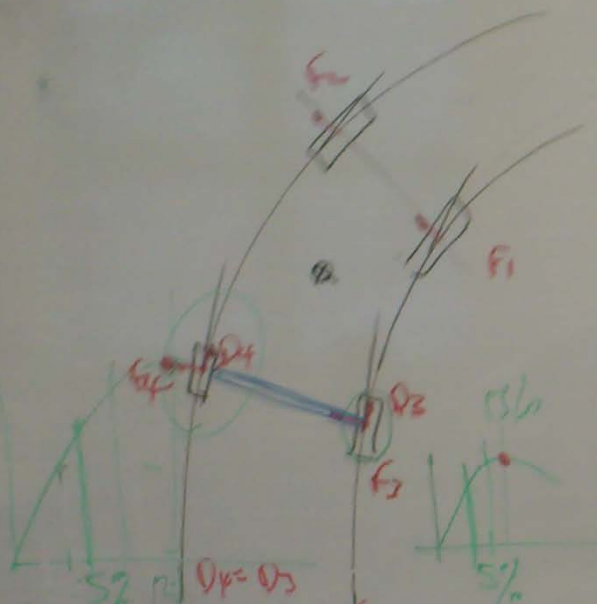
LATERAL SLIP ON DIFFERENT AXLES CAN DIFFER (AND USUALLY DO)

LONGITUDINAL SLIP CAN (SHOULD) DIFFER ACROSS EACH AXLE (UNLESS CONNECTED TOGETHER)

Assume $\mu = 1$

Assume friction circle





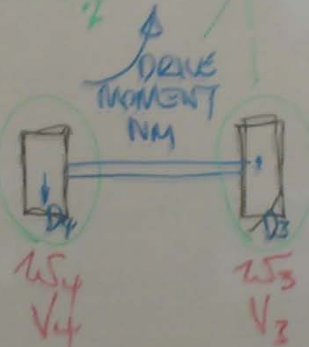
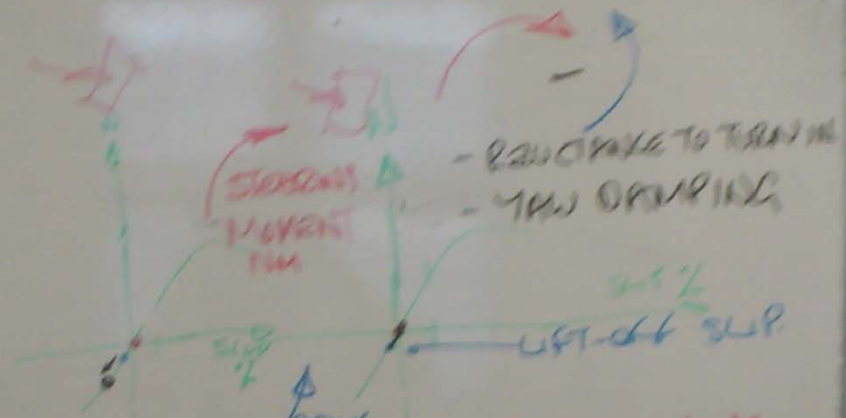
$D_4 = D_3$
locked off
slip cant vary

TORSIONAL RELATIONSHIP
BETWEEN 4 and 3

Now $D_4 > D_3$

in proportion to the applied

vertical load or friction force



STRAIGHT LINE

$$W_3 = W_4$$

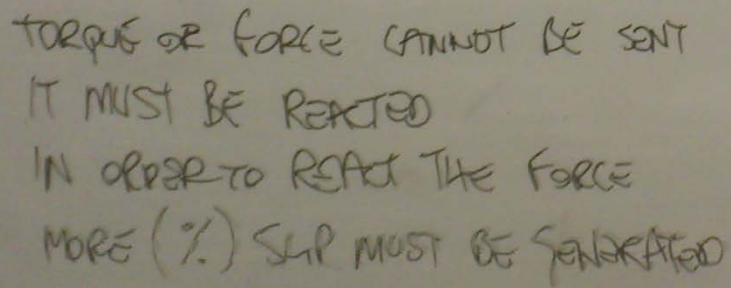
WHEN WE TURN
OPEN DIFF

$$W_4 > W_3$$

VEHICLE VEL IS AN $\frac{V_4 + V_3}{2}$

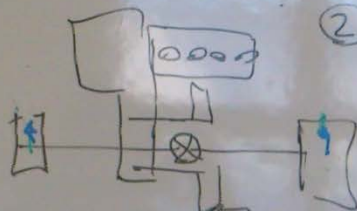
CREATING OVERSTEER

RELATES TO YAW RATE



Centripetal accel = $\frac{v^2}{R}$

① FWD STD CAR
100% FWD.



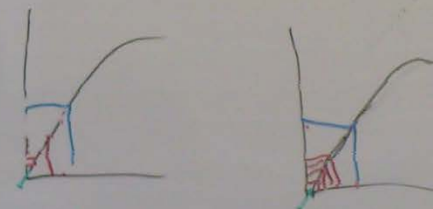
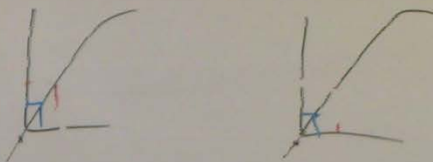
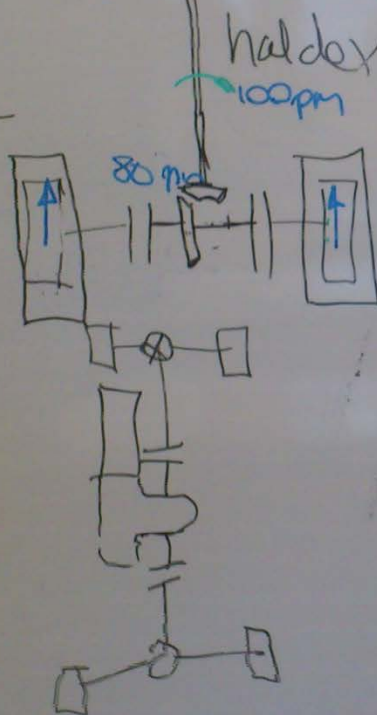
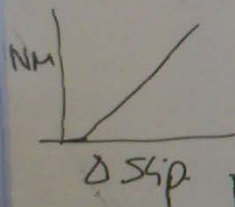
② BEGIN TO CLAMP
CENTRE CLUTCH
PARTIAL 4WD

FRONT SLIP REDUCES

- LAT GRIP INCREASES = Reduced U'STEER

REAR SLIP INCREASES

- LAT GRIP REDUCES.



③ OVERSIZED REAR WHEELS
CREATES Δ rpm across the clutch

- CLAMP CENTRE CLUTCH
+ OVERDRIVE REAR AXLE

① FWD STD CAR
100% FWD.

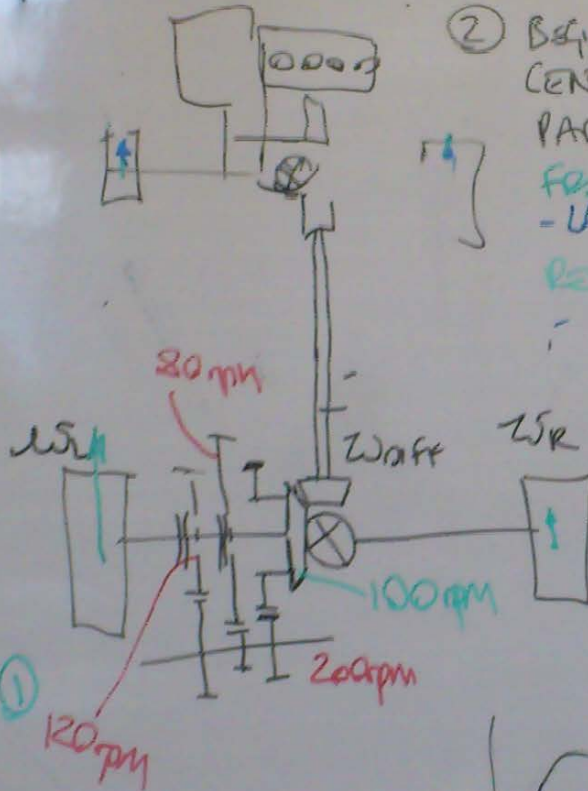
② BEGIN TO CLAMP
CENTRE CLUTCH
PARTIAL 4WD

FRONT SLIP INCREASES

- LAT GRIP INCREASES = Reduced U'STEER

REAR SLIP INCREASES

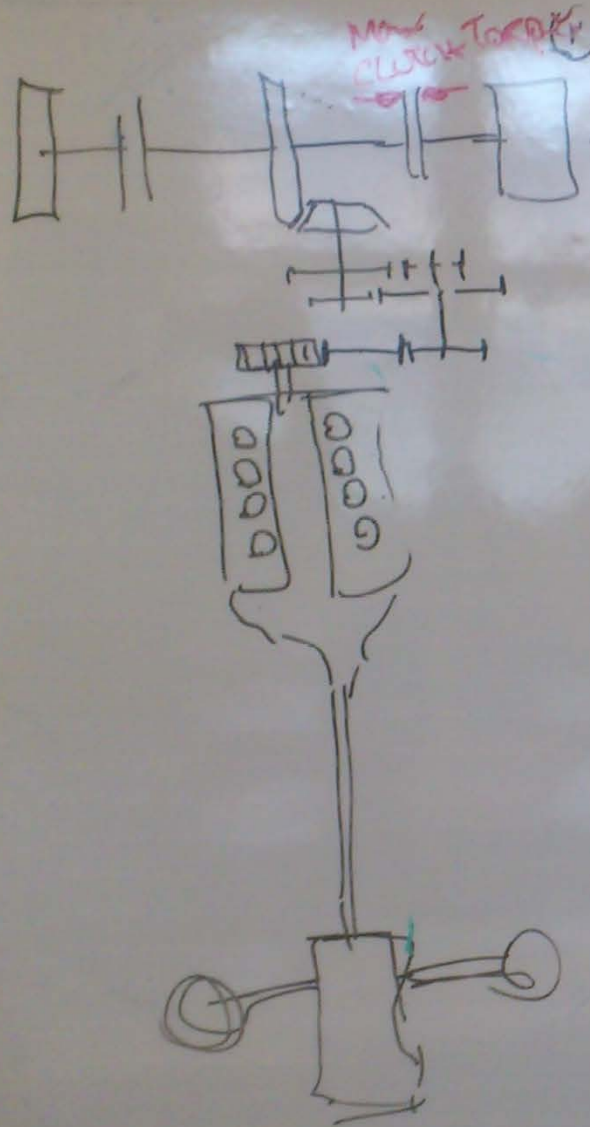
- LAT GRIP REDUCES.



$$\frac{WR \times 3.5}{2} = 25 \text{ OFF}$$

③ OVERSIZED REAR WHEELS
CREATES Δ rpm across the clutch

- CLAMP CENTRE CLUTCH
& OVERDRIVE REAR AXLE



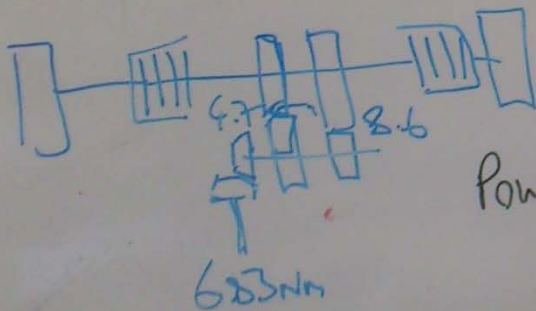
FERRARI 599

MAX OF 20% of total torque to front.
 607 Nm @ 5600 rpm 121 Nm @ CRANK

① Gear	② REAR GEAR RATIO	③ Final DRIVE	④ overall RATIO ②③	⑤ @ 1000 rpm Engine Road Wheel rpm	⑥ Front CRANKshaft OUTPUT + 50% in each (Nm Gear ⑤)	⑦ Δ rpm ④⑤	⑧ %
1	3.15	4.18	13.17	75.9 rpm	116.4	40.5	53
2	2.18	4.18	9.11	109.8	116.4	6.6	6
3	1.57	4.18	6.56	152.4	213.3	60.1	40
4	1.19	4.18	4.97	201.2	213.3	12.1	6
5	0.94	4.18	3.93		-		
6	0.76	4.18	3.18		-		

At engine 1000 rpm At MAX TORQUE

NORMAL GEARS	Ratio WHEEL RPM	FRONT BOX OUTPUT	Δ rpm	
			@ 1000	0 rpm
1	76	116	41	246
2	110	116	7	42
3	152	213	60	360
4	200	213	12	72



$$\text{Power} = T \cdot \omega$$

$$= 587 \text{ Nm} \times \frac{246 \times 2\pi}{60} = 15 \text{ kW}$$

CLUTCH CAPACITY

20% of Max torque
10% to left
10% to right.

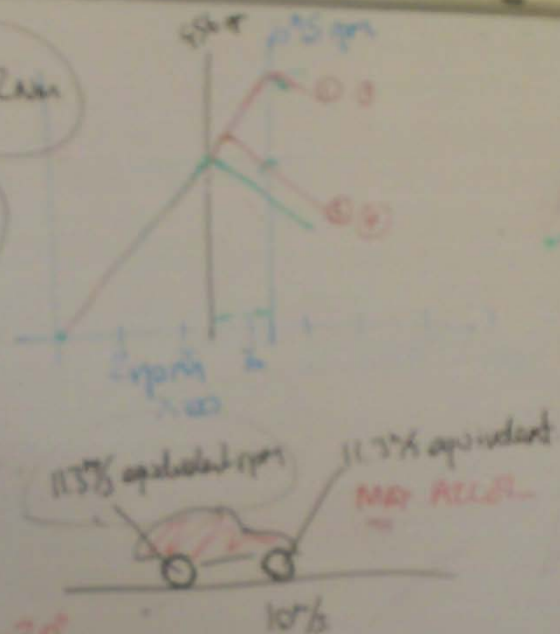
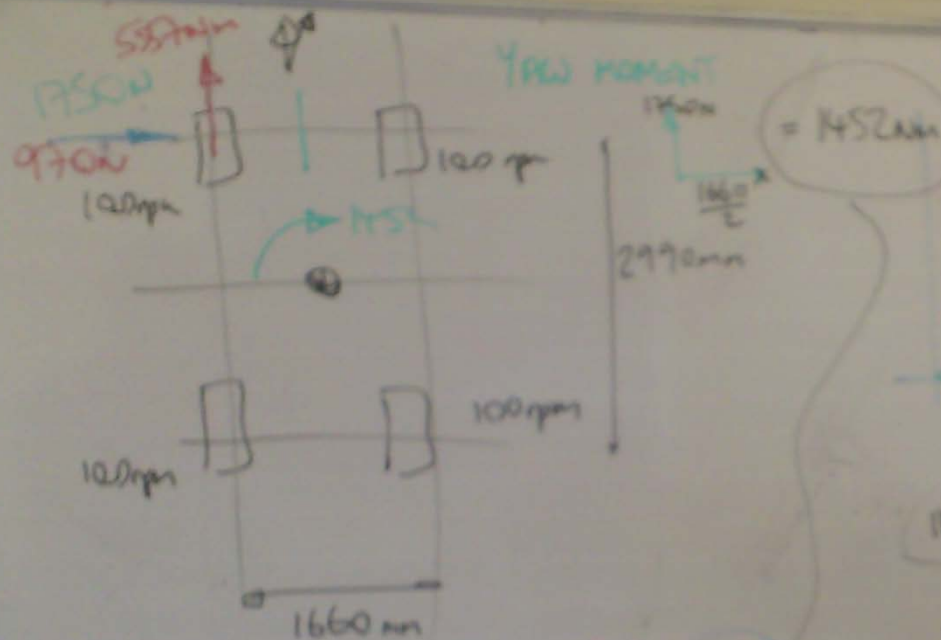
683 Nm @ 6000 rpm

GEAR ①
ENGINE 1000 rpm $\frac{1000}{116} = 8.6$
FRONT OUTPUT 116 rpm

$$\therefore 683 \text{ Nm} \times 8.6 = 587 \text{ Nm}$$

GEAR ②
ENGINE 1000 rpm $\frac{1000}{213} = 4.7$
FRONT OUTPUT 213

$$\therefore 68.3 \text{ Nm} \times 4.7 = 321 \text{ Nm}$$

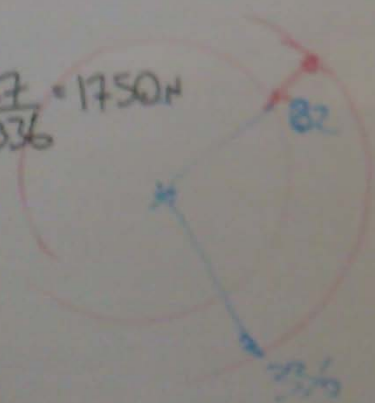


Kerb
+ one

FRONT 245/35 ZR 20 85J 20

$$T = F \cdot R$$

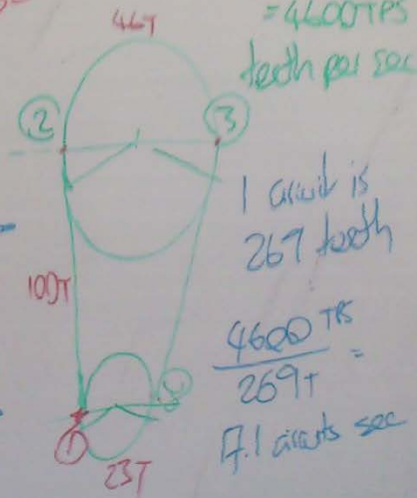
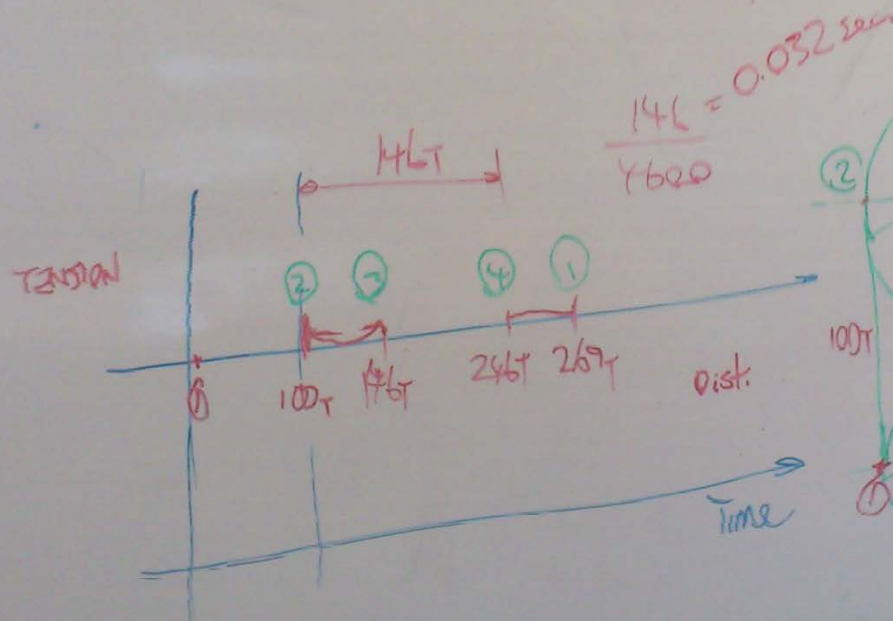
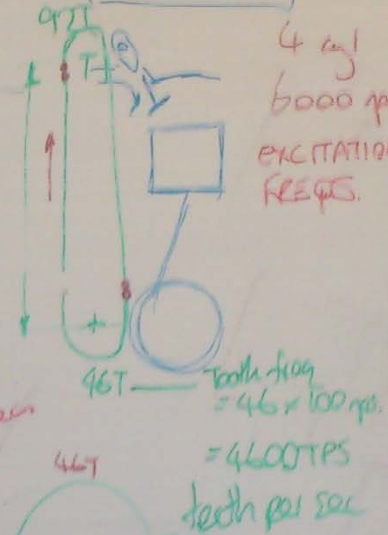
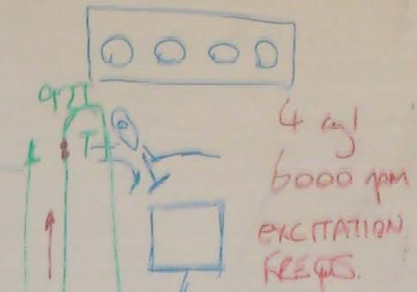
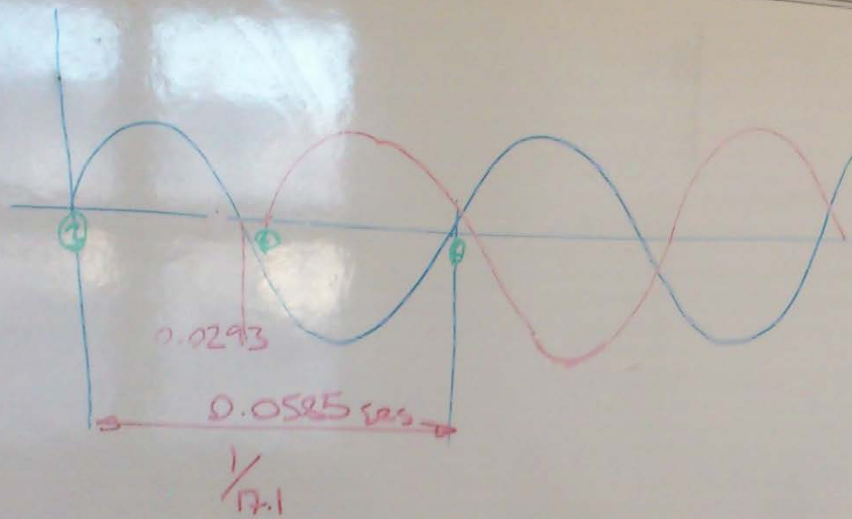
$$F = \frac{T}{R} = \frac{587}{0.336} = 1750 \text{ N}$$

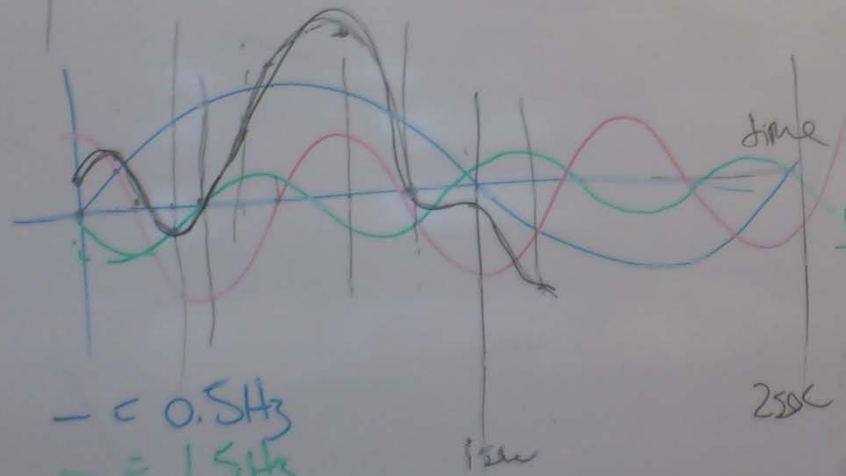


Quick Rack 116 : 1

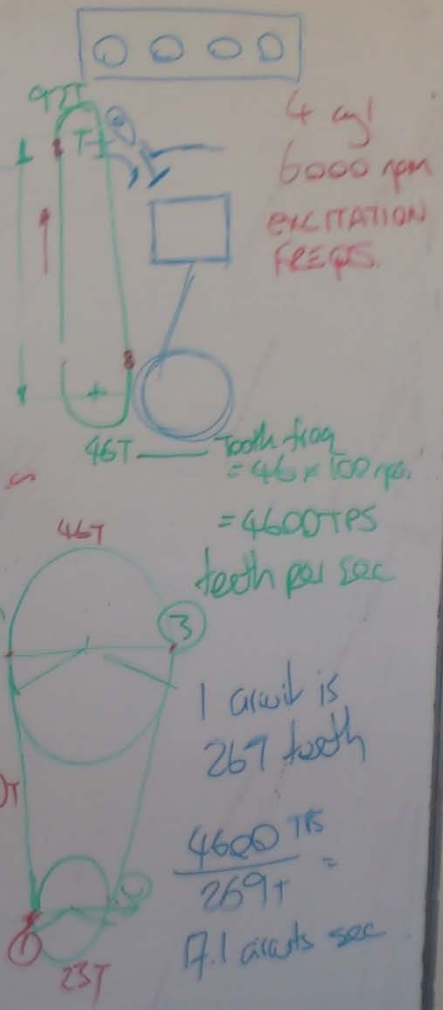
KSS 5050 mm dist
1000 x 7.61 = 9610 mm

EQUIVALENT TO
 $\frac{1432}{2990} \approx 247 \text{ force at front tyre}$
900 N





- = 0.5 Hz
 - = 1.5 Hz
 - = 12.5 Hz





How many balls?

40mm mean $\phi = 125\text{mm}$ length of ball centre line

8 balls.

$$\text{circum} = \pi D$$

$$\pi \times 0.05 = 0.157\text{m}$$

$$\frac{9.4\text{m/s}}{0.157\text{m}} = 60\text{ rps.}$$

Precession

① inner track velocity = $\left(0.03 \times 2 \times \pi\right) \times 100\text{ rps.}$

9.4 m/s

② BALL ROTATION

$$\text{Ball circum} = \pi \times 10 = 31.4\text{mm} = 0.0314\text{m}$$

$$\frac{9.4}{0.0314\text{m}} = 300\text{ rps}$$