Statics

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Project 1

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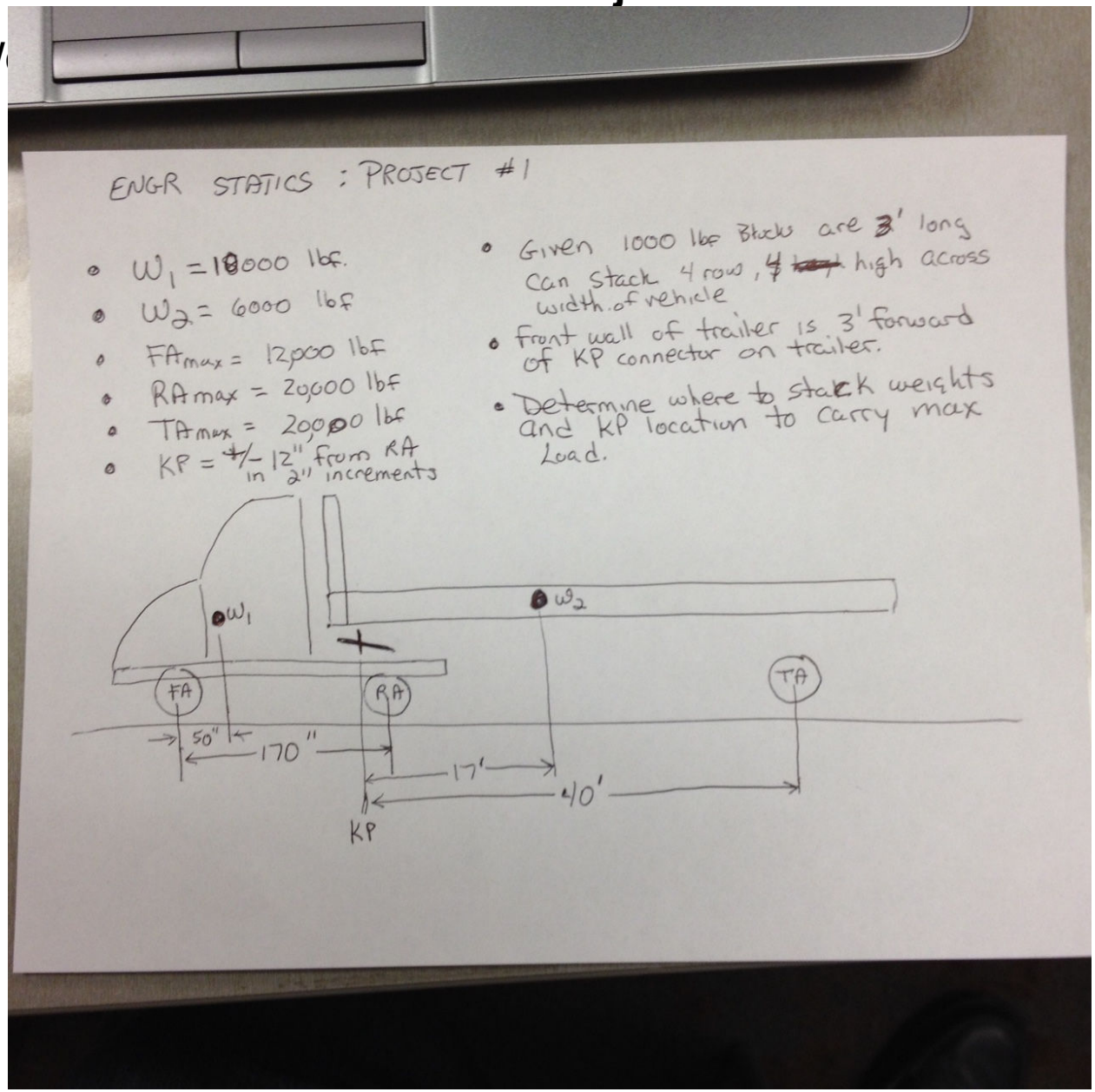
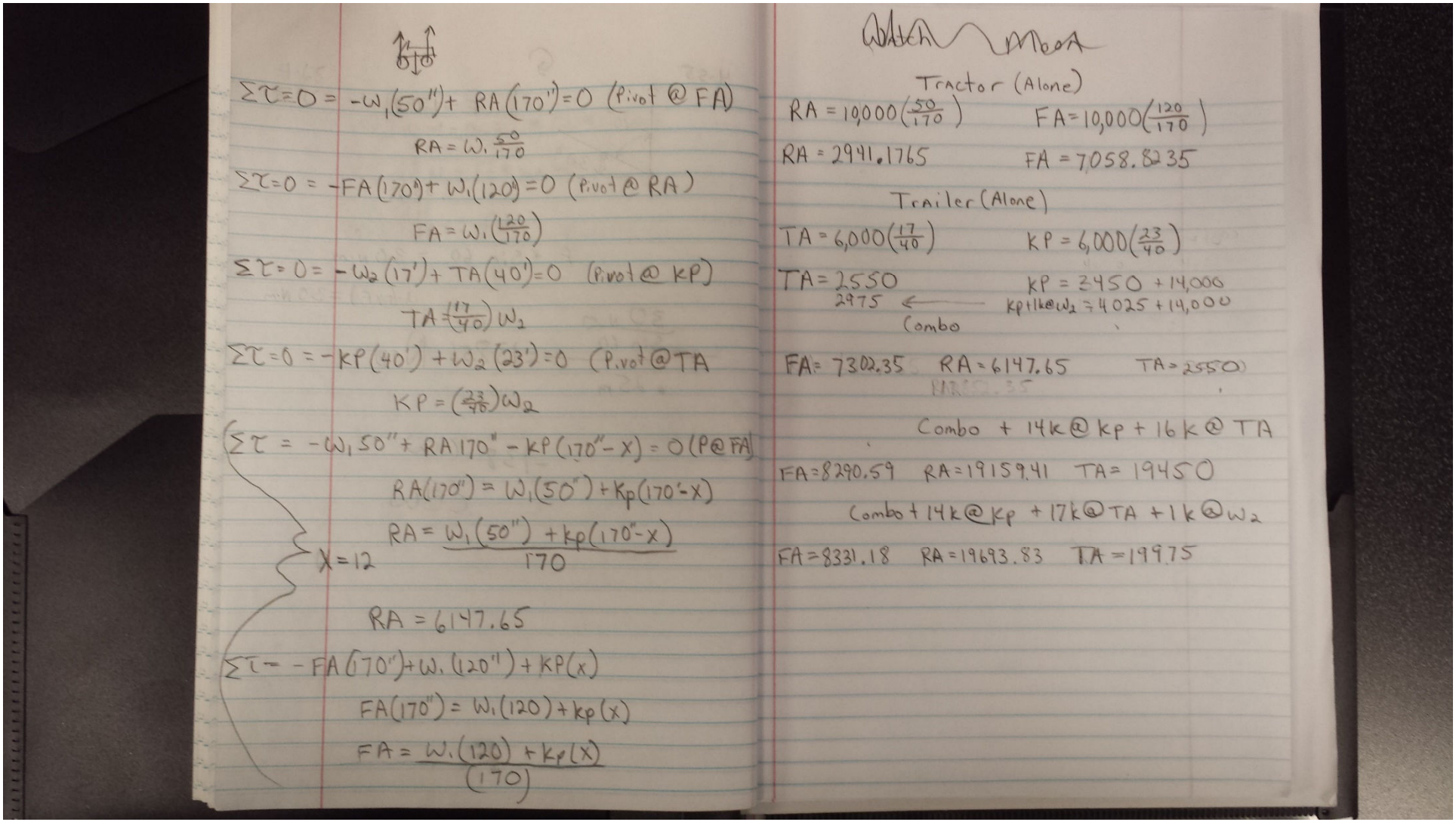
Due W





$\Sigma\tau = 0 = -W_1(50'') + RA(170'') = 0$ (Pivot @ FA)

$RA = W_1 \frac{50}{170}$

$\Sigma\tau = 0 = -FA(170'') + W_1(120'') = 0$ (Pivot @ RA)

$FA = W_1\left(\frac{120}{170}\right)$

$\Sigma\tau = 0 = -W_2(17') + TA(40') = 0$ (Pivot @ KP)

$TA = \left(\frac{17}{40}\right) W_2$

$\Sigma\tau = 0 = -KP(40') + W_2(23') = 0$ (Pivot @ TA

$KP = \left(\frac{23}{40}\right) W_2$

$\Sigma\tau = -W_1 50'' + RA\,170'' - KP(170'' - X) = 0$ (P @ FA

$RA(170'') = W_1(50'') + K_p(170'' - X)$

$RA = \frac{W_1(50'') + kp(170'' - x)}{170}$

$X = 12$

$RA = 6147.65$

$\Sigma\tau = -FA(170'') + W_1(120'') + KP(x)$

$FA(170'') = W_1(120) + kp(x)$

$FA = \frac{W_1(120) + K_p(x)}{(170)}$

Tractor (Alone)

$RA = 10{,}000\left(\frac{50}{170}\right)$ $FA = 10{,}000\left(\frac{120}{170}\right)$

$RA = 2941.1765$ $FA = 7058.8235$

Trailer (Alone)

$TA = 6{,}000\left(\frac{17}{40}\right)$ $KP = 6{,}000\left(\frac{23}{40}\right)$

$TA = 2550$ $KP = 2550 + 14{,}000$

$2975 \leftarrow$ $kp + 1k @ W_2 = 4025 + 14{,}000$

Combo

$FA = 7302.35$ $RA = 6147.65$ $TA = 2550$

Combo + 14k @ kp + 16k @ TA

$FA = 8290.59$ $RA = 19159.41$ $TA = 19450$

Combo + 14k @ Kp + 17k @ TA + 1k @ W_2

$FA = 8331.18$ $RA = 19693.83$ $TA = 19975$

Project 1: Completed accurately on time

W_1=	10000	lb	FA_{max}=	12000	lb
W_2=	6000	lb	RA_{max}=	20000	lb
KP position = X			TA_{max}=	20000	lb
-12"<X<12" in incraments of 2"			X=	12	in

Seperate w/No Additional Weight					
$\sum\tau$=RA(170")-W_1(50")=0, Therefore RA=(W_1*50")/170", Pivot @ FA					
$\sum\tau$=W_1(120")-FA(170")=0, Therefore FA=(W_1*120")/170", Pivot @ RA					
$\sum\tau$=TA(40')-W_2(17')=0, Therefore TA=(W_2*17')/40', Pivot @ KP					
$\sum\tau$=W_2(23')-KP(40')=0, Therefore KP=(W_2*23')/40', Pivot @ TA					
FA=	7059	lbf	KP=	3450	lbf
RA=	2941	lbf	TA=	2550	lbf

Combo w/No Additional Weight							
$\sum\tau$=RA(170")-W_1(50")-KP(170"-X)=0, Therefore RA=(W_1(50")+KP(170"-X))/170", Pivot @ FA							
$\sum\tau$=W_1(120")-FA(170")-KP(X)=0, Therefore FA=(W_1(120")+KP(X))/170", Pivot @ RA							
FA=	7302	lbf	Test KP = Distribution	3450	KP=	3450	lbf
RA=	6148	lbf			TA=	2550	lbf

Assumption is that RA will Max out before FA					
KP=(RA(170")-W_1(50"))/(170"-X), Set RA=RAmax					
Max @ KP=	18354	lb	GVW=	16000	lb
New FA_{max}=	8354	lb	Net W_{3max}=	32354	lb
New GVWR=	48354	lb	Possible W_3=	32	Blocks

Combo w/32 Blocks added (14@KP, 17@TA, 1@W_2)					
FA=	8.33E+3	lb	TA=	20.0E+3	lb
RA=	19.7E+3	lb	KP=	18.0E+3	lb

Location	Blocks Added	Weight
Centered @ KP	14	14000
Centered @ TA	17	17000
Centered @W_2	1	1000
Total Used	32	32000
Total Used = Possible W_3		Yes