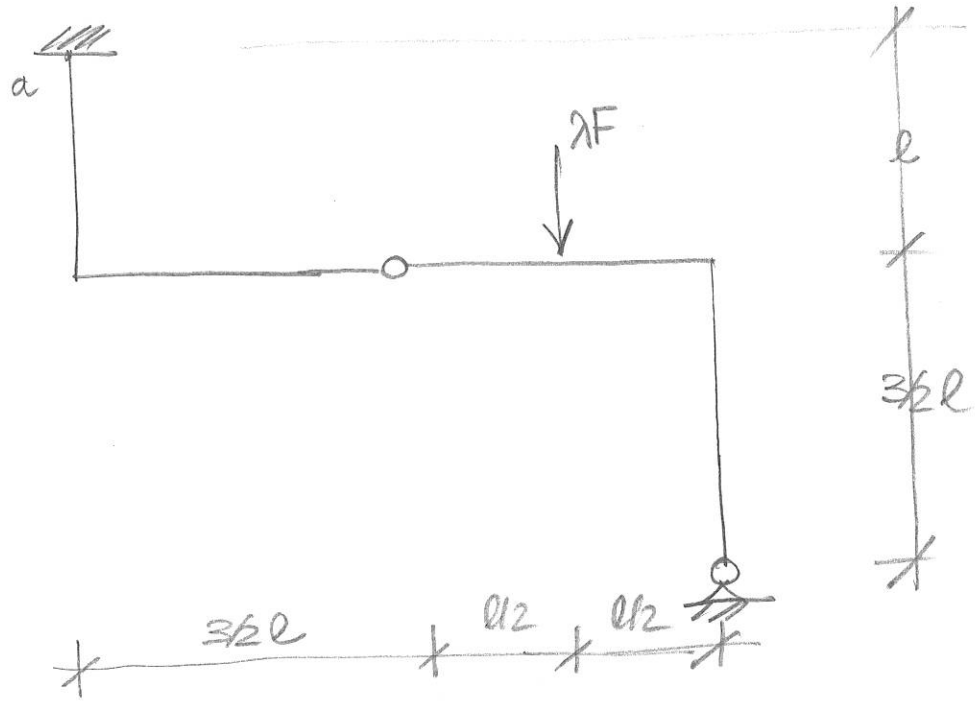
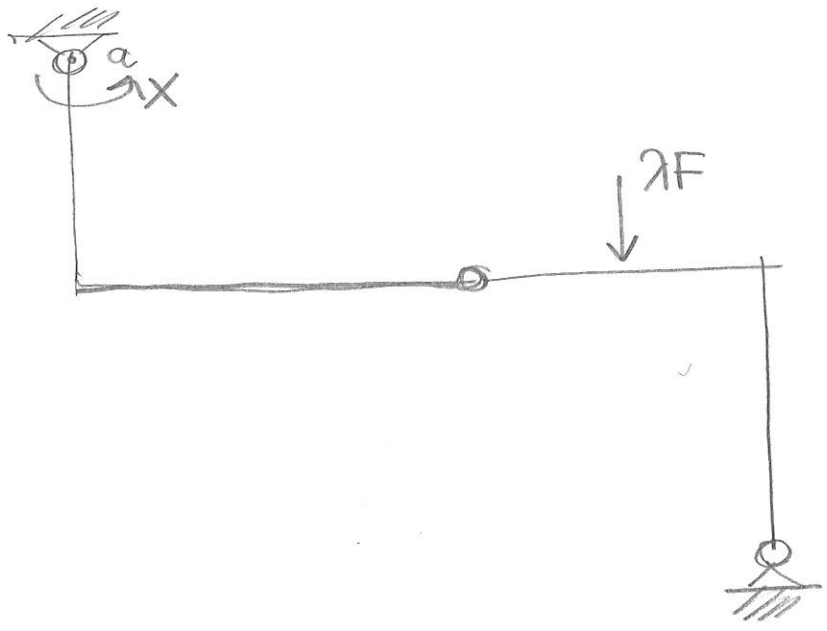
ANALISI
A COLLASSO

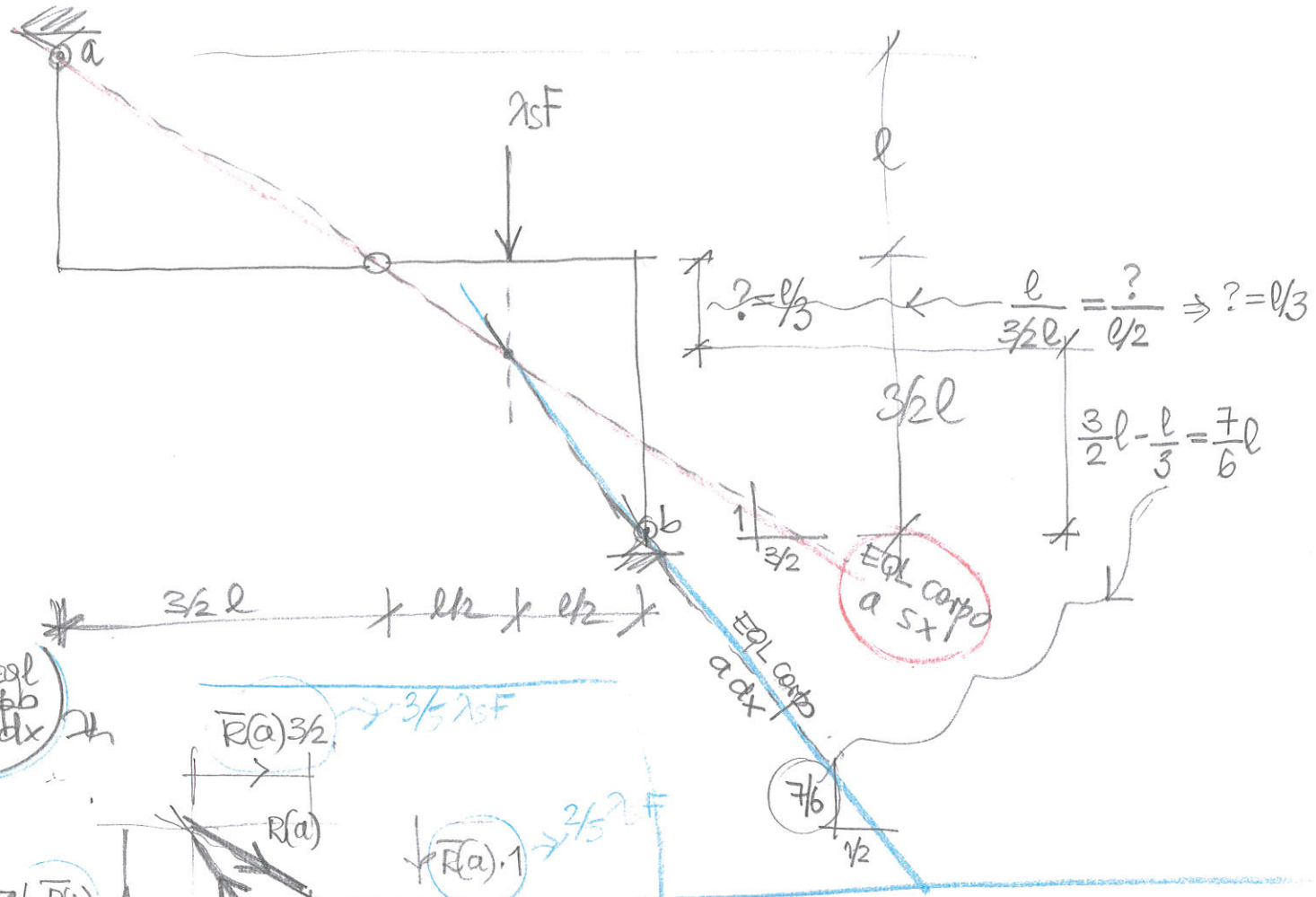
**ESEMPIO 2**




APPROCCIO STATICO

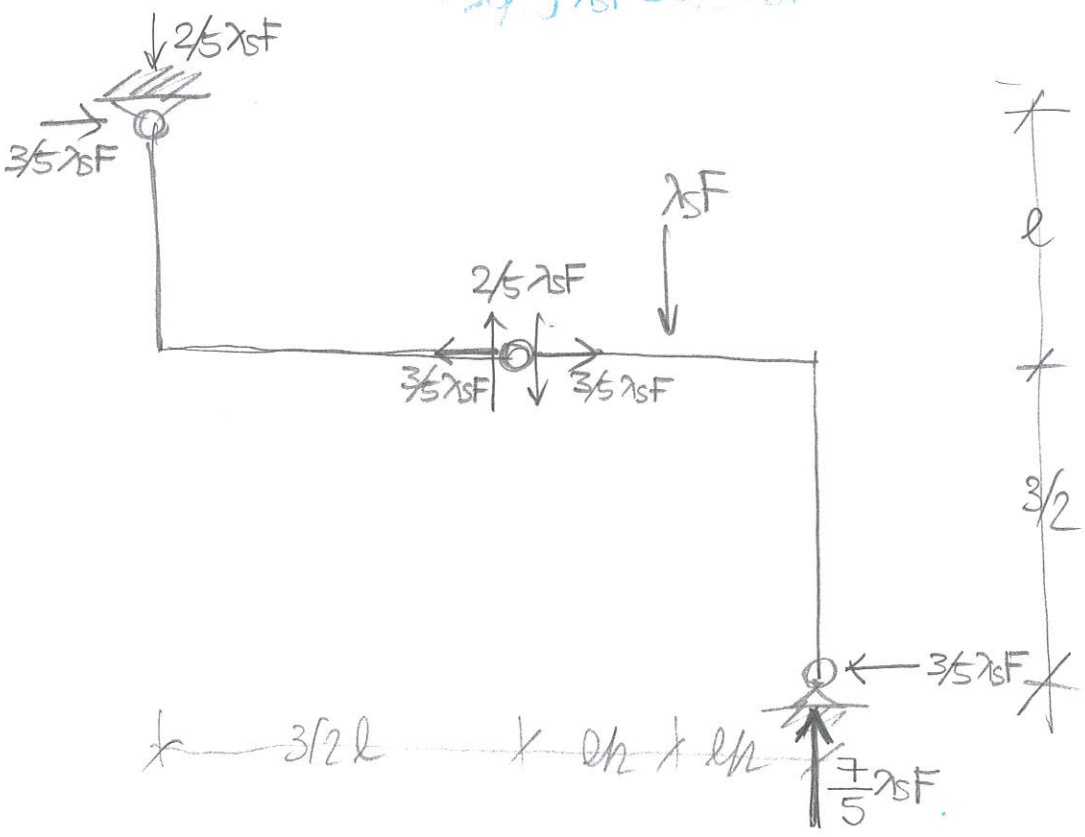


SCHEMA 0

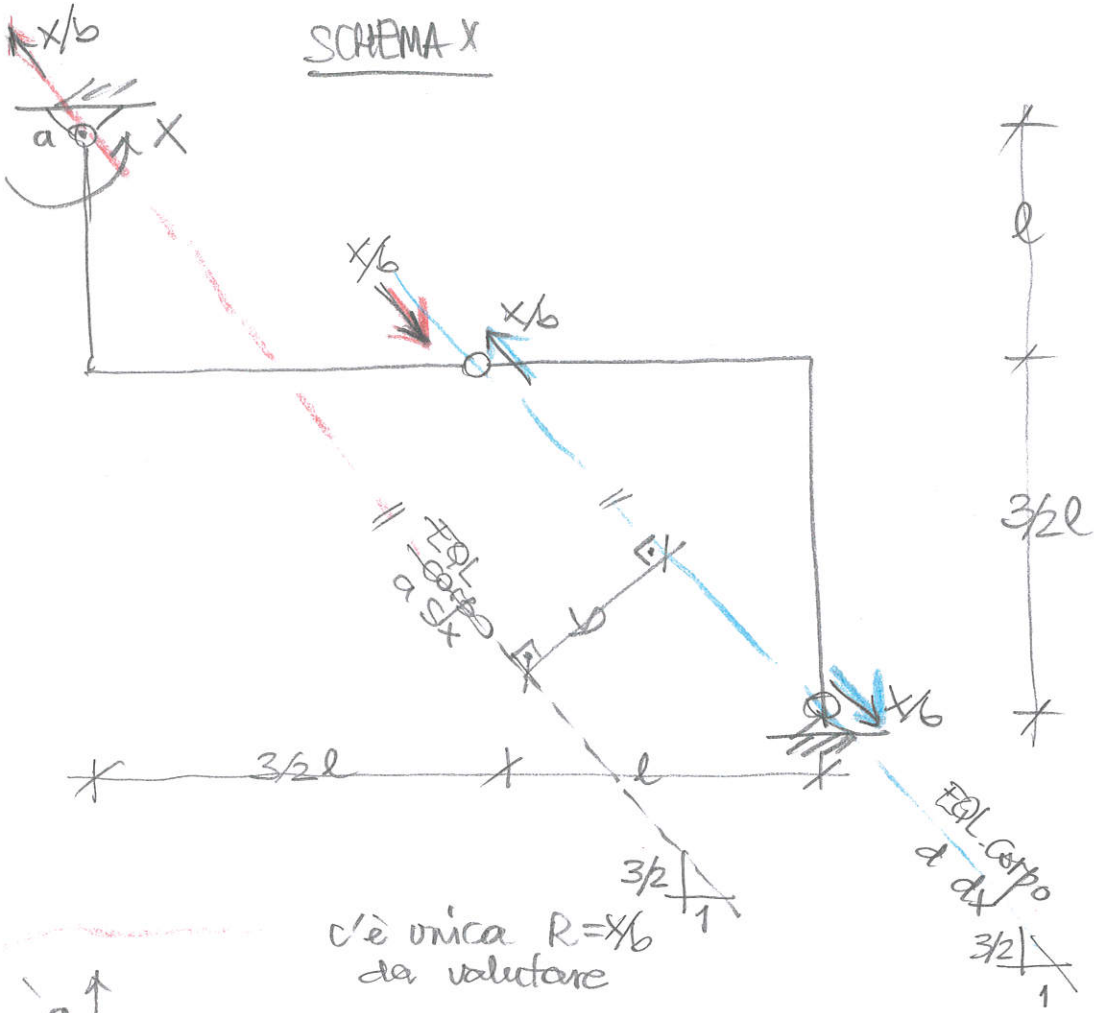



$\bar{R}(a) + \lambda_s F = 7/6\,\bar{R}(b) \rightarrow \bar{R}(a) = \frac{2}{5}\lambda_s F$

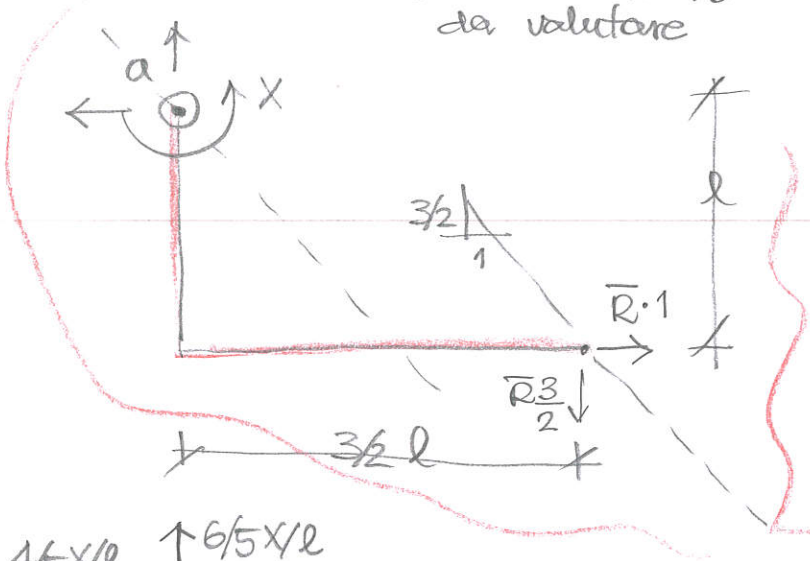
$\bar{R}(b)\frac{1}{2} = \bar{R}(a)\frac{3}{2} \rightarrow \bar{R}(b) = 3\bar{R}(a) = \frac{6}{5}\lambda_s F$



## SCHEMA X




c'è unica R=X/b da valutare

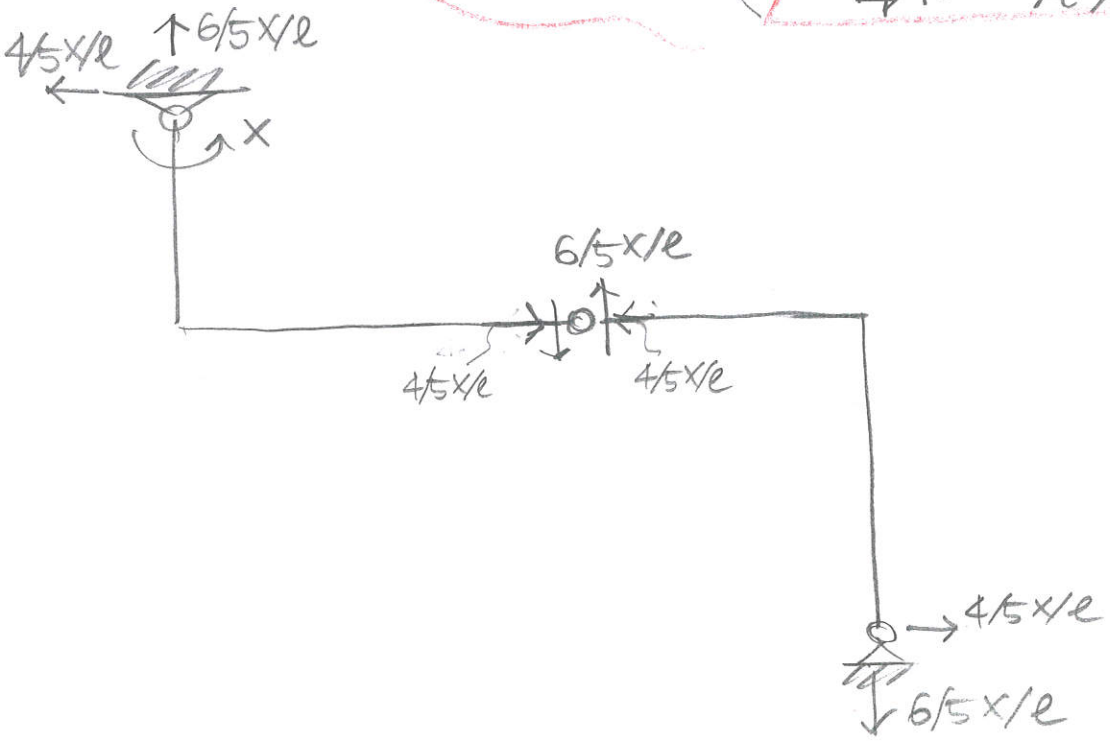


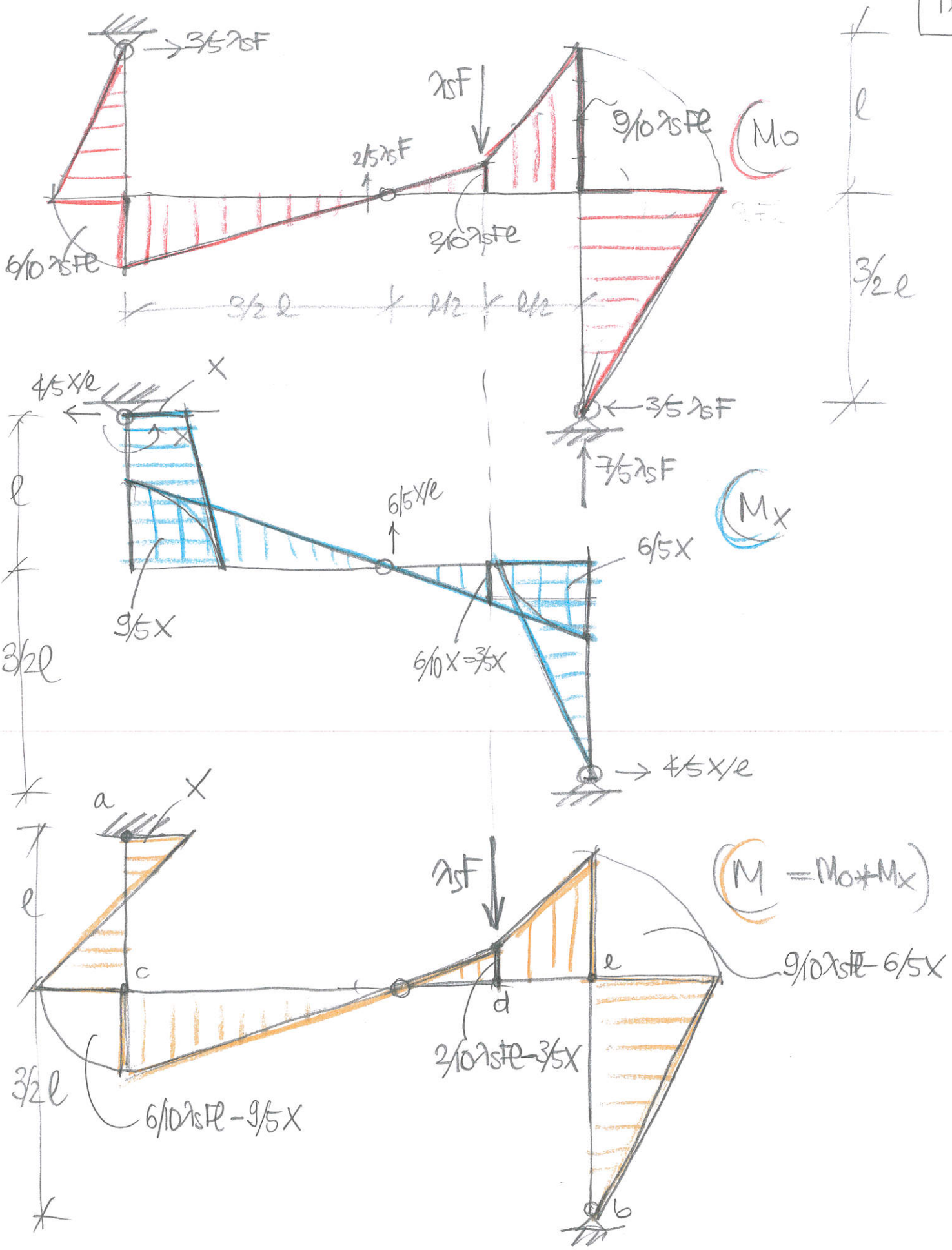

**EQL corpo a sx**

basta sommare momenti intorno ad "a" che equilibriano X

$$-\bar{R}\cdot 1\cdot l + \bar{R}\frac{3}{2}\cdot\frac{3}{2}l = X$$

$$\Rightarrow \bar{R} = X/l \; 1/(9/4-1) = 4/5\, X/l$$




3/5 λsF
λsF
2/5 λsF
9/10 λsFℓ
Mo
6/10 λsFℓ
3/10 λsFℓ
ℓ
3/2 ℓ
3/2 ℓ
ℓ/2
ℓ/2
X
4/5 X/ℓ
3/5 λsF
7/5 λsF
6/5 X/ℓ
Mx
6/5 X
9/5 X
6/10 X = 3/5 X
4/5 X/ℓ
a
X
ℓ
3/2 ℓ
c
d
e
b
λsF
(M = Mo + Mx)
9/10 λsFℓ − 6/5 X
2/10 λsFℓ − 3/5 X
6/10 λsFℓ − 9/5 X

$$\begin{cases} M_Y \geq M(a) = X \\ M_Y \geq M(c) = 6/10\,\lambda_s F_e - 9/5\,X \\ M_Y \geq M(d) = 2/10\,\lambda_s F_e - 3/5\,X \\ M_Y \geq M(e) = 9/10\,\lambda_s F_e - 6/5\,X \end{cases}$$

Ipotesi 1

$M(a) = M_Y \rightarrow X = M_Y \rightarrow$

$M(c) \Rightarrow \lambda_s F_e\, 6/10 \leq M_Y\ 14/5/6 \sim 14/6$

$M(d) \Rightarrow \lambda_s F_e\, 2/10 \leq M_Y\ 8/5/2 \sim 8/2$

$M(e) \Rightarrow \lambda_s F_e\, 9/10 \leq M_Y\ 11/5/9 \sim 11/9$

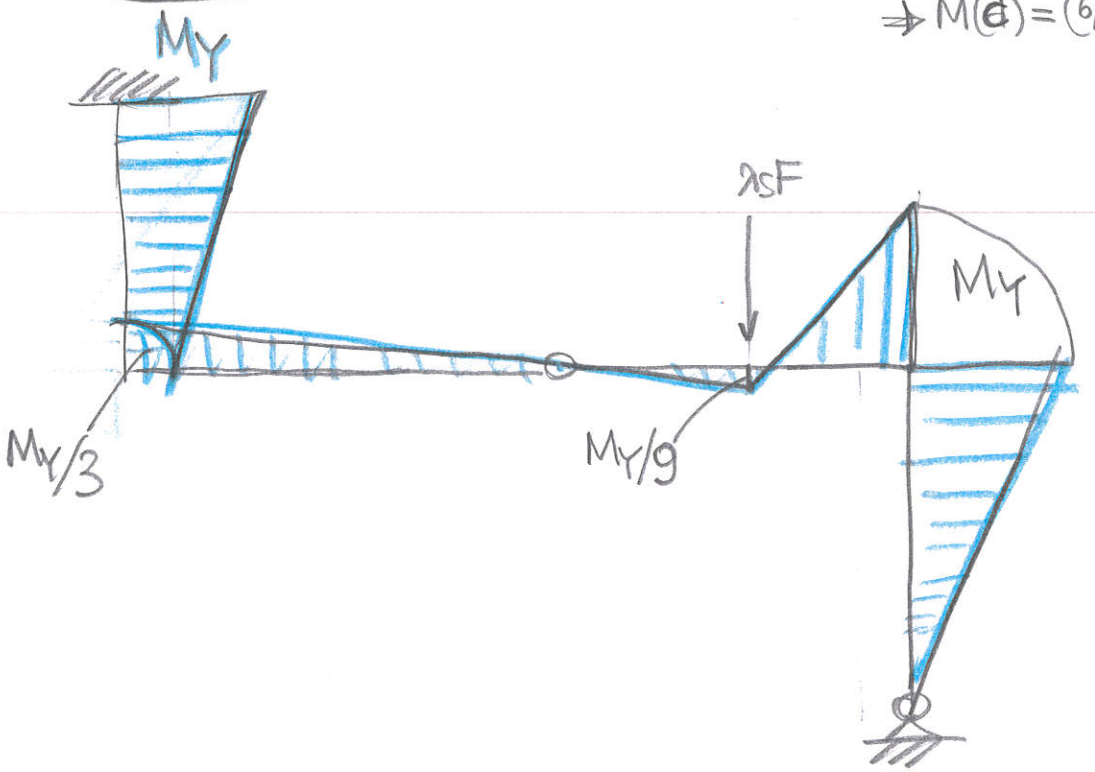
$M(e)$ più restrittiva $\Rightarrow$ Ipotesi 2

$$M(e) = M_Y \Rightarrow \lambda_s = \frac{11}{5}\frac{\cancel{10}^{2}}{9}\frac{M_Y}{F_e}$$

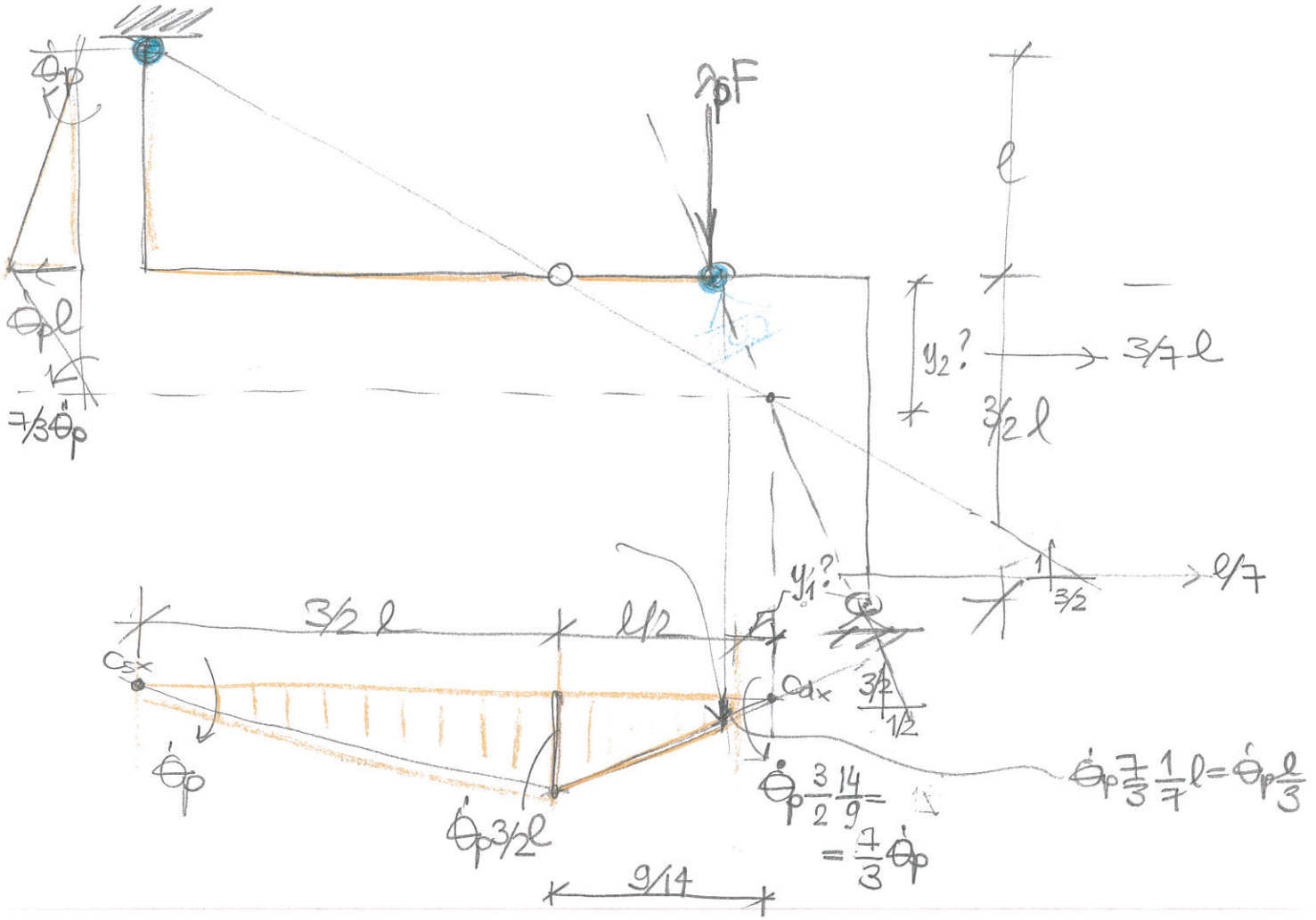
$$\Rightarrow \boxed{\lambda_s = 22/9\ M_Y/F_e}$$

$\Rightarrow M(d) = (2/10 \cdot 22/9 - 3/5) M_Y = -1/9\, M_Y$

$\Rightarrow M(c) = (6/10 \cdot 22/9 - 9/5) M_Y = -1/3\, M_Y$



# APPROCCIO CINEMATICO

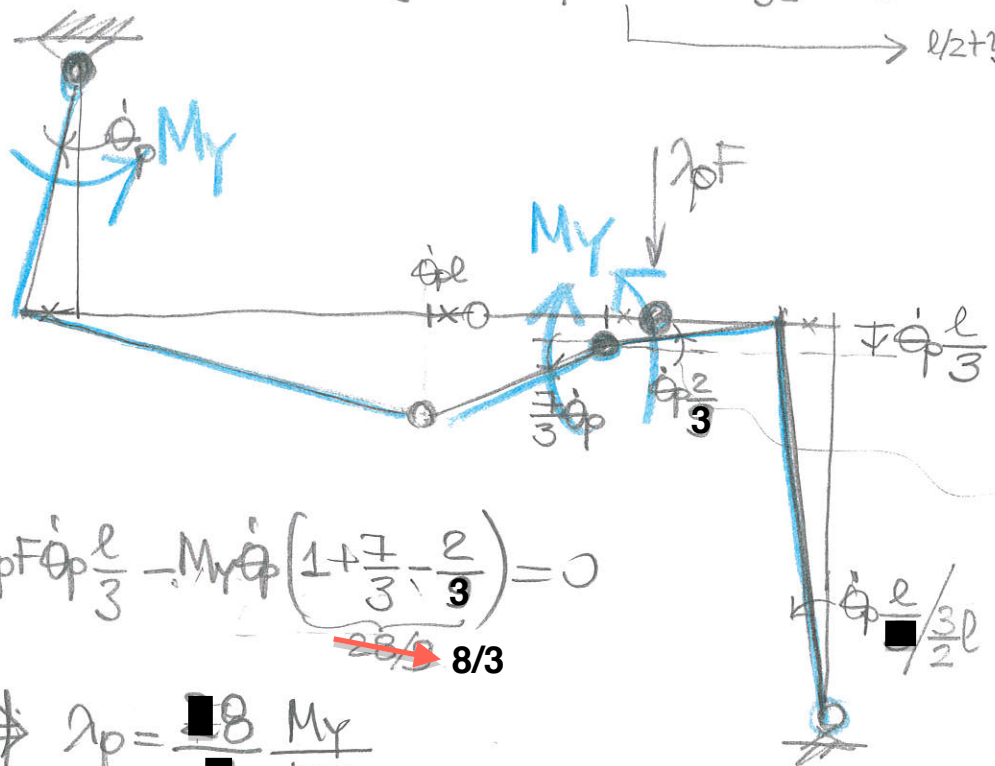



$$\frac{\ell/2 + y_1}{y_2} = \frac{3/2}{1} \quad ; \quad \frac{y_1}{y_2} = \frac{1}{3} \rightarrow y_2/3 = y_1$$

$$\rightarrow \ell/2 + y_1 = 3/2\, y_2 = y_1 9/2$$

$$\rightarrow y_1 = 2/7\, \ell/2 = \ell/7$$

$$\rightarrow y_2 = 3\ell/7$$

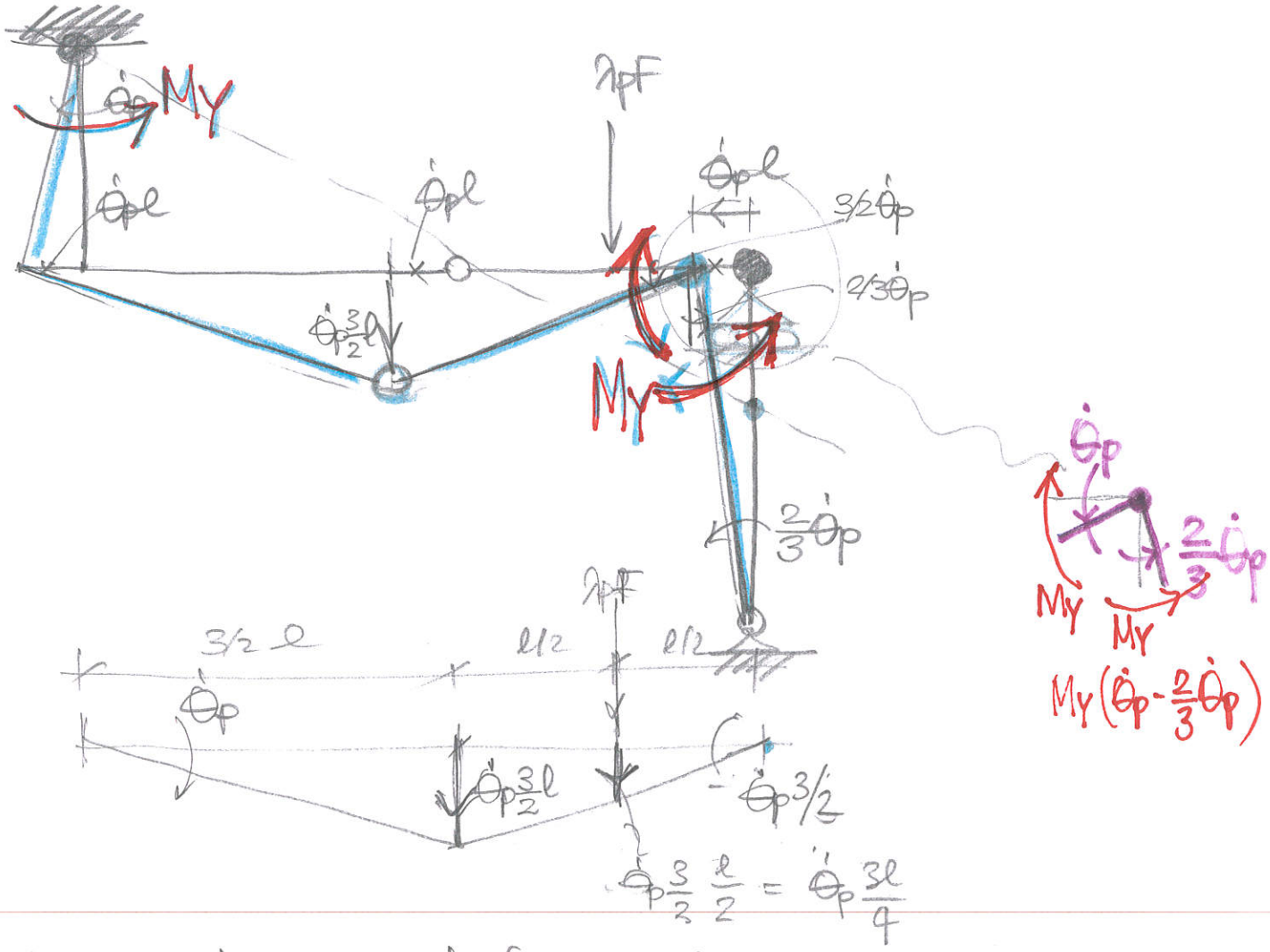



$$P = \lambda_p F \dot\theta_p \frac{\ell}{3} - M_Y \dot\theta_p \left(1 + \frac{7}{3} - \frac{2}{3}\right) = 0$$

~~8/3~~ 8/3

$$\Rightarrow \lambda_p = \frac{[8]}{[\ ]} \frac{M_Y}{F\ell}$$

$\rightarrow$ si può far meglio : $\frac{22}{9}\frac{M_Y}{F\ell} < \lambda_c < \frac{[8]}{[\ ]}\frac{M_Y}{F\ell} = \frac{[72]}{9}\frac{M_Y}{F\ell}$




$$P = \lambda_p F \dot\theta_p \frac{3l}{4} - M_Y \dot\theta_p \underbrace{\left(1 + \frac{3}{2} - \frac{2}{3}\right)}_{11/6} = 0$$

$$\Rightarrow \lambda_p = \frac{22}{9}\frac{M_Y}{Fl}$$

il moltiplicatore di collasso è $\lambda_c = \frac{22}{9}\frac{M_Y}{Fl}$

poichè $\lambda_s \equiv \lambda_p = \lambda_c$