	Project		Job Ref.	
Learning Tool for Reinforced Concrete Design	Section		Sheet no./rev. 1	
	Calc.by	Date	Chk'd by	Date	App'd by	Date

FLEXURAL REINFORCEMENT CALCULATION (BS8110:PART1:1997)

(RECTANGULAR BEAM)

$$K = \frac{M}{bd^2 f_{cu}}$$

$K' = 0.156$

❖ If $K \leq K'$, compression reinforcement is not required;

$$Z = d\left\{0.5 + \sqrt{0.25 - \frac{K}{0.9}}\right\}$$

But not greater than 0.95d

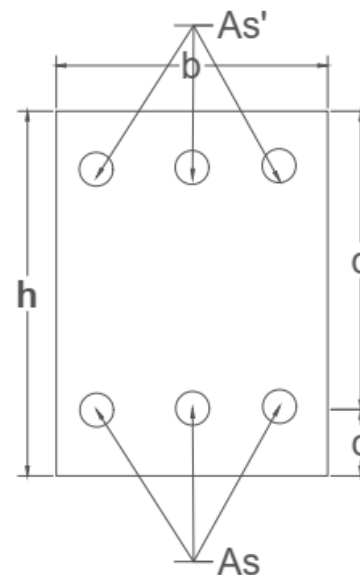$$x = \frac{(d-z)}{0.45}$$

$$A_S = \frac{M}{0.95 f_y Z}$$

❖ If $K > K'$, compression reinforcement is required;

$$Z = d\left\{0.5 + \sqrt{0.25 - \frac{K'}{0.9}}\right\}$$

$$x = \frac{(d-z)}{0.45}$$

$$A'_S = \frac{(K - K')f_{cu}bd^2}{0.95 f_y(d - d')}$$

$$A_S = \left(\frac{K' f_{cu}bd^2}{0.95 f_y Z}\right) + A'_S$$

$K \leq K'$	$K > K'$
$Z = d\left\{0.5 + \sqrt{0.25 - \dfrac{K}{0.9}}\right\} =$ $x = \dfrac{(d-z)}{0.45} =$ $A_S = \dfrac{M}{0.95 f_y Z} =$	$Z = d\left\{0.5 + \sqrt{0.25 - \dfrac{K'}{0.9}}\right\} =$ $x = \dfrac{(d-z)}{0.45} =$ $A'_S = \dfrac{(K - K')f_{cu}bd^2}{0.95 f_y(d - d')} =$ $A_S = \left(\dfrac{K' f_{cu}bd^2}{0.95 f_y Z}\right) + A'_S =$