King Fahd University of Petroleum & Minerals
CIVIL ENGINEERING DEPARTMENT

# CE 201 STATICS (Sections 1 & 2)

Second Semester 1432 / 2011 (**102**)

| Name: Key<br>ID #: _____ | **Quiz # 9** | Score ___/10 |
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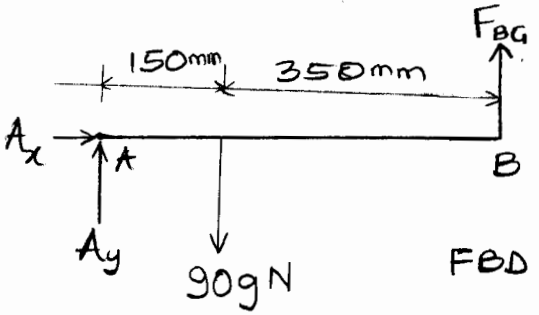
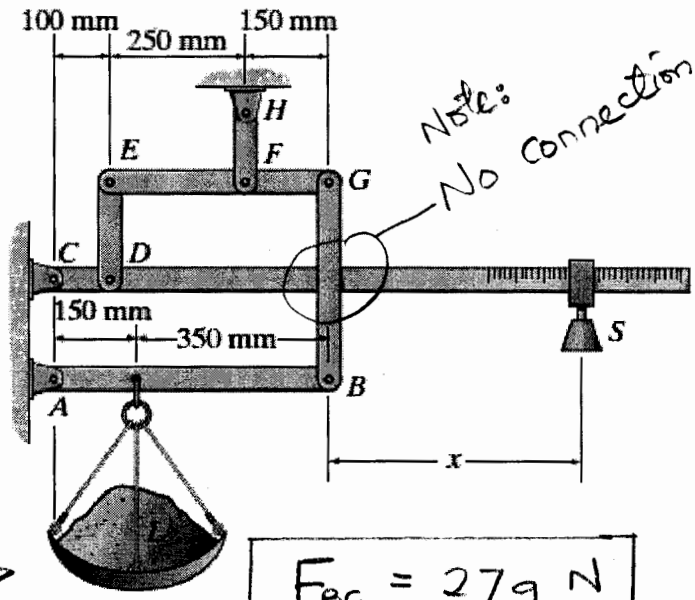
The platform scale consists of a combination of third and first class levers so that the load on one lever becomes the effort that moves the next lever. Through this arrangement, a small weight can balance a massive object. **If $x$ = 450 mm, determine the required mass of the counterweight $S$ required to balance a 90-kg load, $L$.**



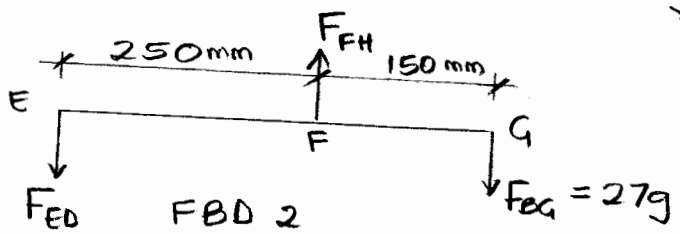

FBD 1




$$\curvearrowleft^{+} \sum M_A = 500F_{BG} - 150(90g) = 0$$

$$F_{BG} = \frac{150 \times 90g}{500} \Rightarrow$$

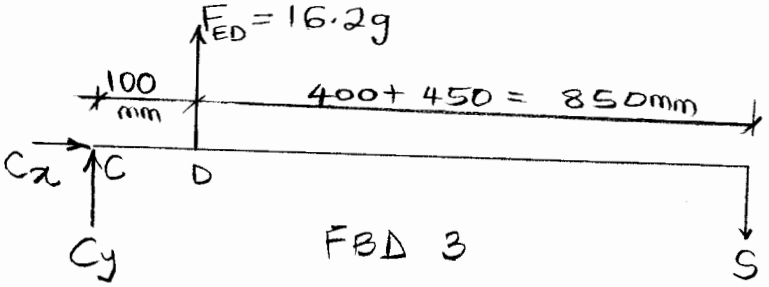
$$\boxed{F_{BG} = 27g \text{ N}}$$




FBD 2

$$\curvearrowleft^{+} \sum M_F = 250F_{ED} - 27g(150) = 0$$

$$\Rightarrow \boxed{F_{ED} = 16.2g \text{ N}}$$




FBD 3

$$\curvearrowleft^{+} \sum M_C = 16.2g(100) - S(850+100) = 0 \Rightarrow S = 1.7053g \text{ N}$$

$$\text{Mass of } S = \frac{1.7053g \text{ N}}{g} \Rightarrow$$

$$\boxed{\text{Mass of } S = 1.7053 \text{ kg}}$$