

**UNIVERSITEIT VAN PRETORIA / UNIVERSITY OF PRETORIA**  
**DEPARTMENT OF CIVIL ENGINEERING / DEPARTEMENT SIVIELE INGENIEURSWESE**

**MEGANIKA SWK122 / MECHANICS SWK122: KLASTOETS 3 / CLASS TEST 3**

Initials and Surname ..... *Memo* ..... Student Nr .....  
 Voorletters en Van ..... Studente No .....

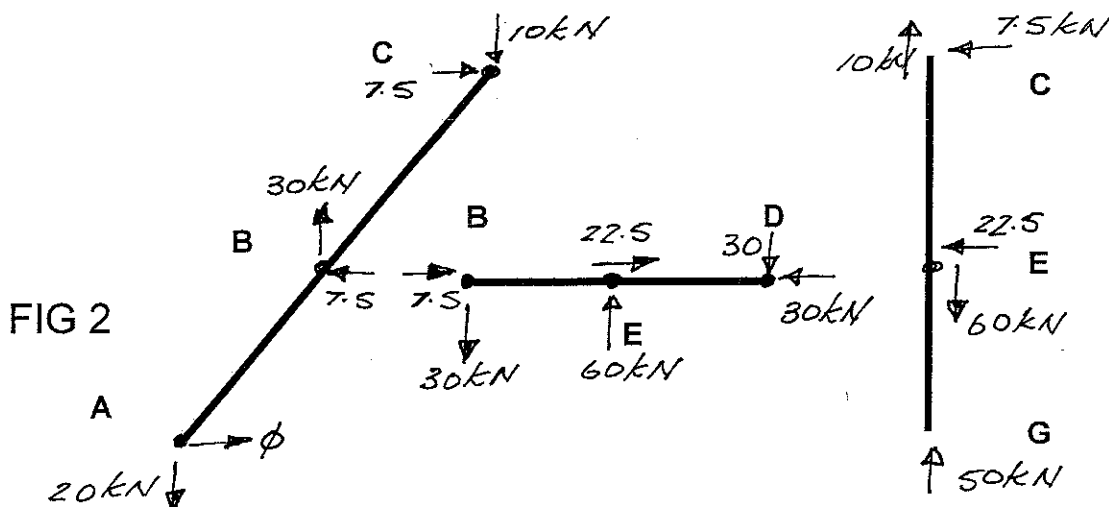
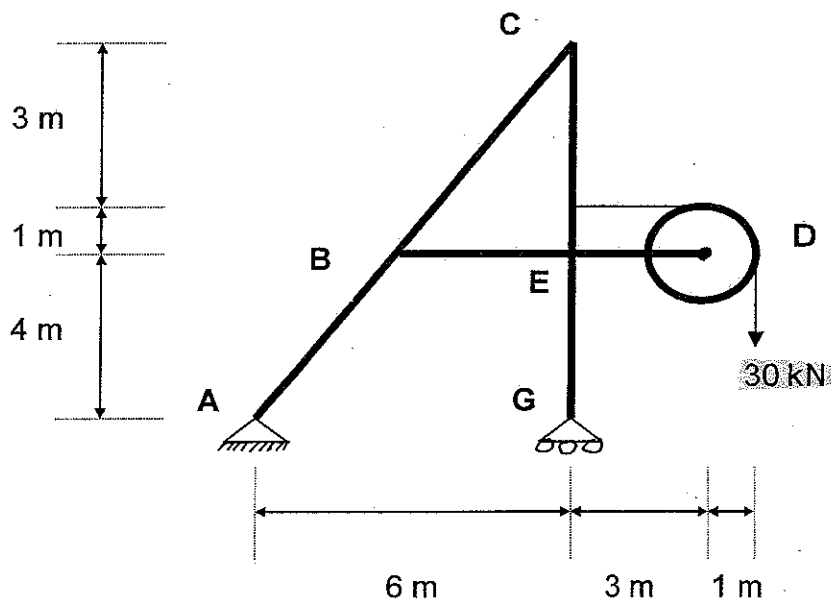
Studierigting ..... Groep No ..... Datum ..... 20 .....  
 Study discipline ..... Group Nr ..... Date .....

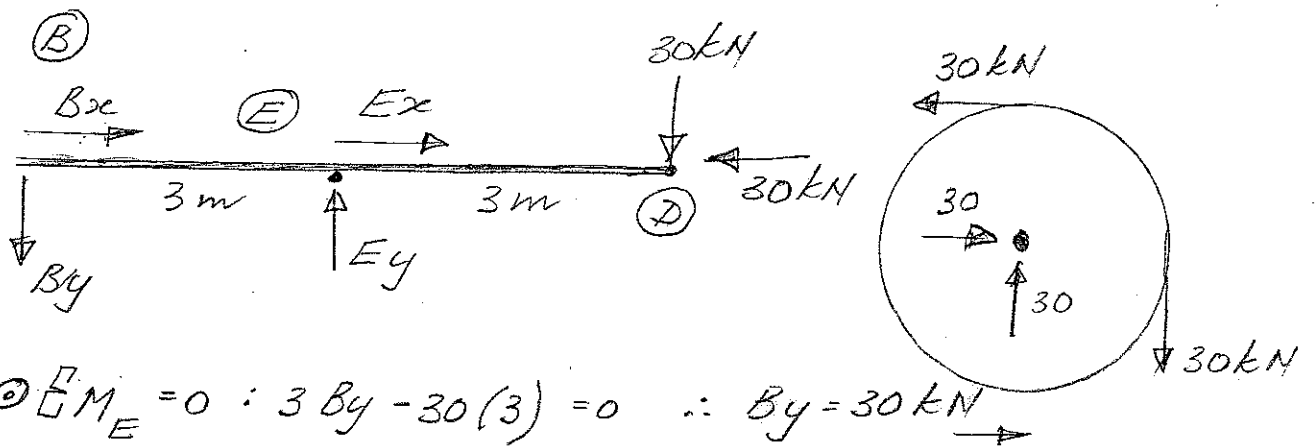
Met my handtekening verklaar ek dat ek alle EKSAMENREËLS sal gehoorsaam. / With my signature I confirm that I will abide by all EXAMINATION RULES.

**SIGNATURE / HANDTEKENING** .....

The structure is supported by a hinge at A and a roller at G. All joints are pin connected. [ 20 ]  
 Determine all the forces that act on all structural members [ ABC; CEG and BED ] and indicate your answers on FIG 2.  
 Show all calculations.

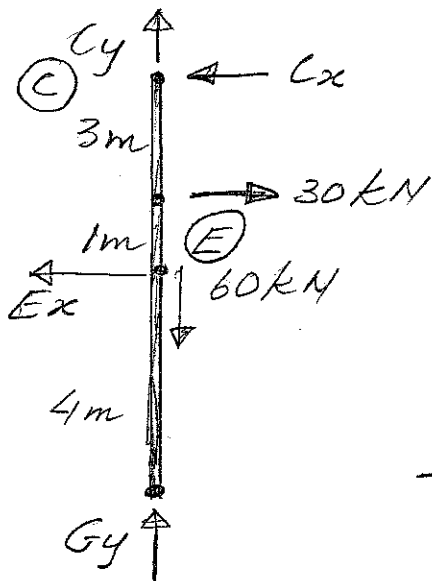
*Die struktuur word ondersteun deur 'n skarnier by A en 'n roller by G. Alle knooppunte is geskamier.  
 Bepaal al die kragte wat op alle struktuurdele [ ABC; CEG en BED ] inwerk en dui u antwoord op FIG 2 aan. Toon alle berekeninge.*





$$\sum F_y = 0 : -B_y + E_y - 30 = 0 \therefore E_y = 60 \text{ kN} \rightarrow$$

$$\sum F_x = 0 : B_x + E_x - 30 = 0 \dots (1)$$



$$\sum M_C = 0 : -4E_x + 30(3) = 0$$

$$E_x = 22.5 \text{ kN} \rightarrow \dots (2)$$

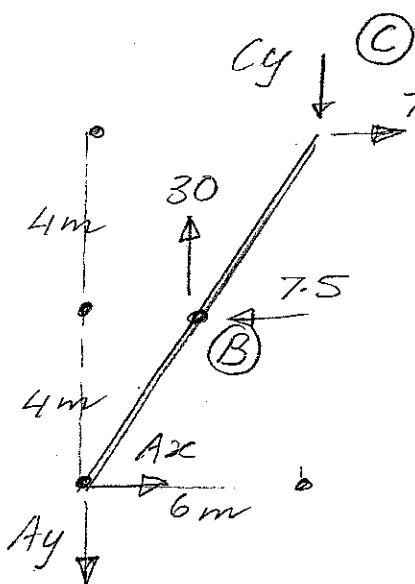
$$(2) \text{ in } (1) : B_x + 22.5 - 30 = 0$$

$$\therefore B_x = 7.5 \text{ kN} \rightarrow$$

$$\sum F_x = 0 :$$

$$-C_x - E_x + 30 = 0 \therefore C_x = 7.5 \text{ kN} \rightarrow$$

$$\sum F_y = 0 : C_y + G_y - 60 = 0 \rightarrow \dots (3)$$



$$\sum M_A = 0 : -6C_y - 7.5(8) + 7.5(4) + 30(3) = 0$$

$$\therefore C_y = 10 \text{ kN} \rightarrow \dots (4)$$

$$(4) \text{ in } (3) : G_y = 50 \text{ kN} \rightarrow$$

$$\sum F_y = 0 : -10 + 30 - A_y = 0$$

$$\therefore A_y = 20 \text{ kN} \rightarrow$$

$$\sum F_x = 0 : +7.5 - 7.5 + A_x = 0 \therefore A_x = 0 \rightarrow$$

**UNIVERSITEIT VAN PRETORIA / UNIVERSITY OF PRETORIA**  
**DEPARTMENT OF CIVIL ENGINEERING / DEPARTEMENT SIVIELE INGENIEURSWESE**

**MEGANIKA SWK122 / MECHANICS SWK122: KLASTOETS 3 / CLASS TEST 3**

Initials and Surname ..... Student Nr .....  
 Voorletters en Van ..... Studente No .....

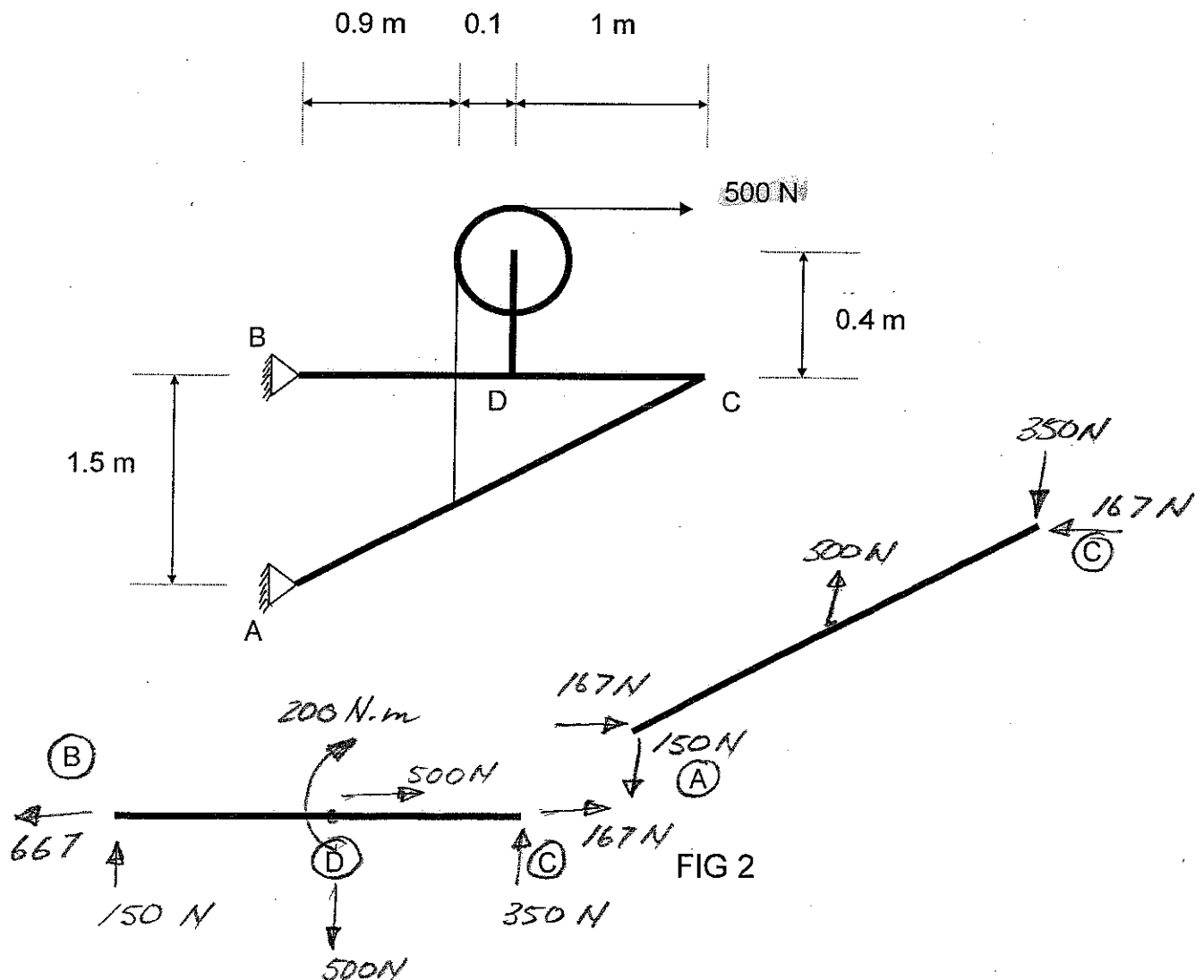
Studierigting ..... Groep No ..... Datum ..... 20 .....  
 Study discipline ..... Group Nr ..... Date .....

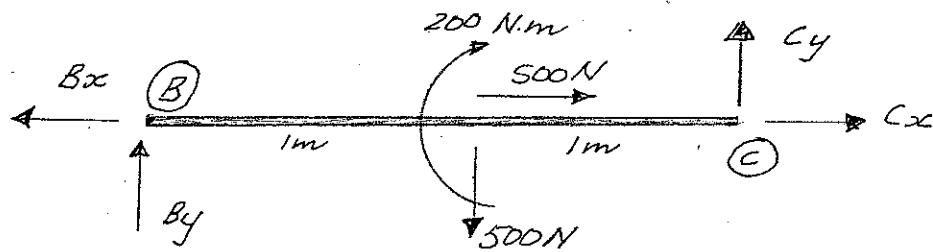
Met my handtekening verklaar ek dat ek alle EKSAMENREËLS sal gehoorsaam. / With my signature I confirm that I will abide by all EXAMINATION RULES.

**SIGNATURE / HANDTEKENING** .....

The structure is supported by hinges at A and at B. Joint C is pin connected. [ 20 ]  
 Determine all the forces that act on structural members BDC and AC and indicate your answers on FIG 2. Show all calculations.

Die struktuur word ondersteun deur skarnier by A en by B. Knooppunt C is geskarnier.  
 Bepaal al die kragte wat op struktuurdele BDC en AC inwerk en dui u antwoord op FIG 2 aan.  
 Toon alle berekeninge.



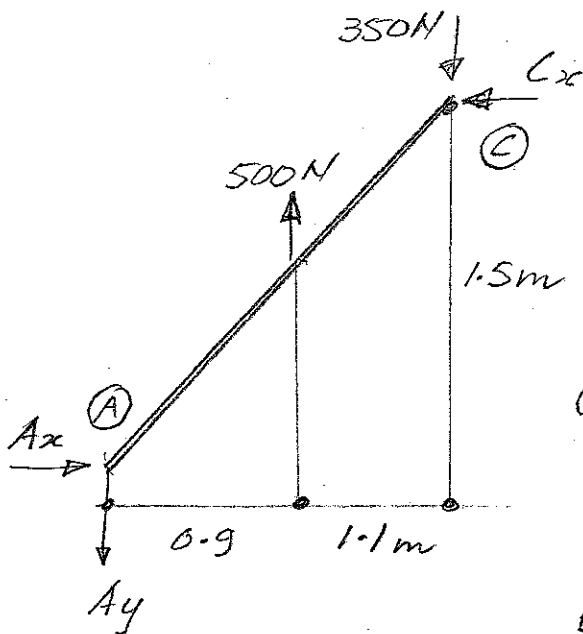


$$\odot \sum M_C = 0: -2B_y - 200 + 500(1) = 0 \quad \therefore B_y = 150 \text{ N} \rightarrow$$

$$\sum M_B = 0: -500(1) - 200 + 2C_y = 0 \quad \therefore C_y = 350 \text{ N} \rightarrow$$

$$\sum F_y = 0: B_y + C_y = 150 + 350 = 500 = \sum F \downarrow \quad \checkmark$$

$$\sum F_x = 0: -B_x + 500 + C_x = 0 \quad \dots (1)$$



$$\odot \sum M_A = 0: -350(2) + 1.5 C_x + 500(0.9) = 0$$

$$C_x = 167 \text{ N} \rightarrow \dots (2)$$

$$(2) \text{ in } (1): -B_x + 500 + 167 = 0$$

$$\therefore B_x = 667 \text{ N} \rightarrow$$

$$\sum F_x = 0:$$

$$\therefore A_x = C_x = 167 \text{ N} \rightarrow$$

$$\sum F_y = 0: -A_y + 500 - 350 = 0$$

$$\therefore A_y = 150 \text{ N} \rightarrow$$