

$$T = \frac{\quad}{20}$$

(A)

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

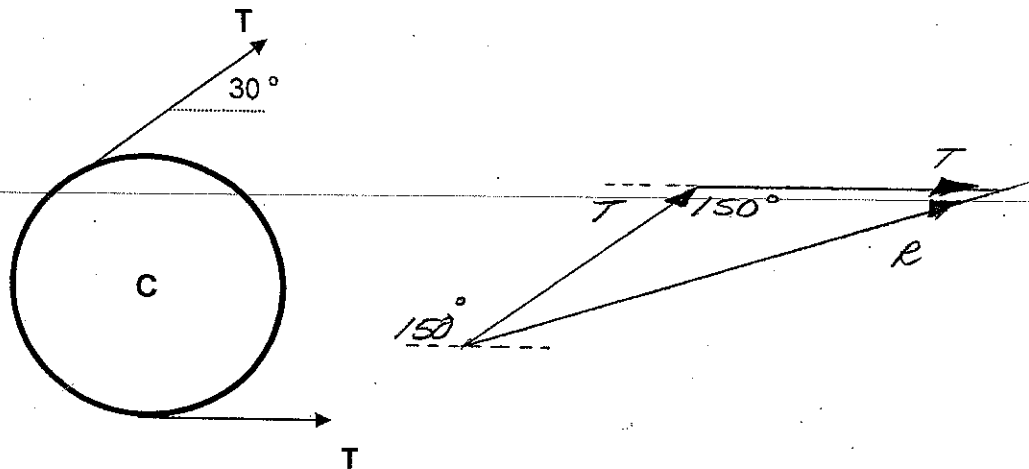
MEGANIKA SWK122 / MECHANICS SWK122: KLASTOETS 1 / CLASS TEST 1

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

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

1. The figure shows a pulley with the tension in the belt =  $T$ . If the net result is a tension =  $6 \text{ kN}$  at the centre of the pulley at C, calculate the tension  $T$  in the belt.

Die figuur toon 'n bandskyf met die trekkras in die dryfband =  $T$ . Indien die netto resultaat 'n trekkras =  $6 \text{ kN}$  by die middel van die bandskyf by C is, bereken die trekkras  $T$  in die dryfband.



$$\begin{aligned} \odot \quad R^2 &= T^2 + T^2 - 2(T)(T)\cos 150^\circ \\ &= 2T^2 - 2T^2\cos 150^\circ \\ &= T^2(2 - 2\cos 150^\circ) \end{aligned}$$

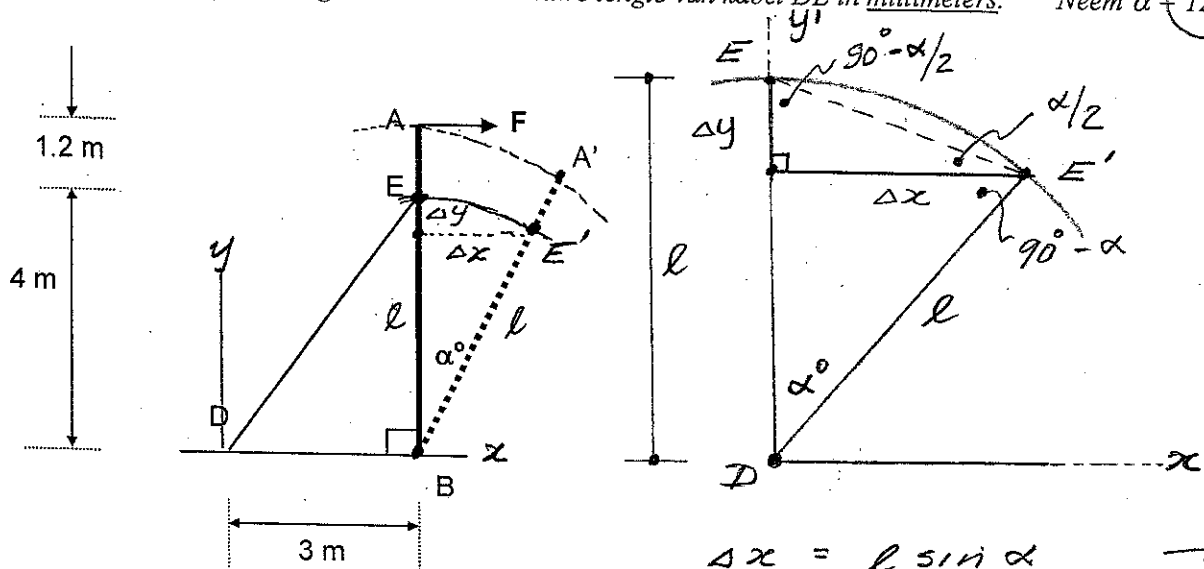
$$\begin{aligned} \odot \quad \therefore T &= \frac{R}{\sqrt{2 - 2\cos 150^\circ}} = \frac{R}{1.931852} = \frac{6}{1.93185} \\ &= 3.106 \text{ kN} \end{aligned}$$

$T = 3106 \text{ N}$

A

2. The rod AB is initially vertical and anchor cable DE is unstretched. Rod AB now rotates  $\alpha^\circ$  clockwise as a result of the application of force F. Calculate the new length of cable DE in millimetres. Take  $\alpha = 12^\circ$ .

Stang AB is aanvanklik vertikaal en ankerkabel DE is onuitgerek. Stang AB roteer nou  $\alpha^\circ$  kloksgewys as gevolg van die aanwending van krag F. Bereken die nuwe lengte van kabel DE in millimeters. Neem  $\alpha = 12^\circ$ .



$$\odot D = (0; 0)$$

$$\Delta x = l \sin \alpha \rightarrow$$

$$\Delta y = \Delta x \tan \alpha/2$$

$$= l \sin \alpha \cdot \tan \alpha/2 \rightarrow$$

$$\odot E = (3000; 4000) \text{ mm} \rightarrow$$

$$\odot E' = (3000 + \Delta x; 4000 - \Delta y)$$

$$= (3000 + 4000 \sin 12^\circ; 4000 - 4000 \sin 12^\circ \tan 6^\circ)$$

$$= (3831.647; 3912.59) \text{ mm} \rightarrow$$

$$\therefore DE' = [3831.647^2 + 3912.59^2]$$

$$= 5476.3 \text{ mm} \rightarrow$$

12

New length of DE / Nuwe lengte van DE = 5476.3 mm