Fundamentals of Structures Blackboard exercise No3 25.02.2014

Vectors, trigonometric functions

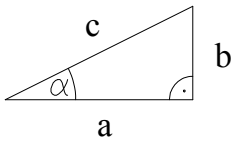
What is a vector? size + direction

$\underline{v}$ = symbol of a vector (underline)

v = length of $\underline{v}$

α = direction of $\underline{v}$

To add up vectors, we need various trigonometric functions:



$b / c = \sin\alpha$

$a / c = \cos\alpha$

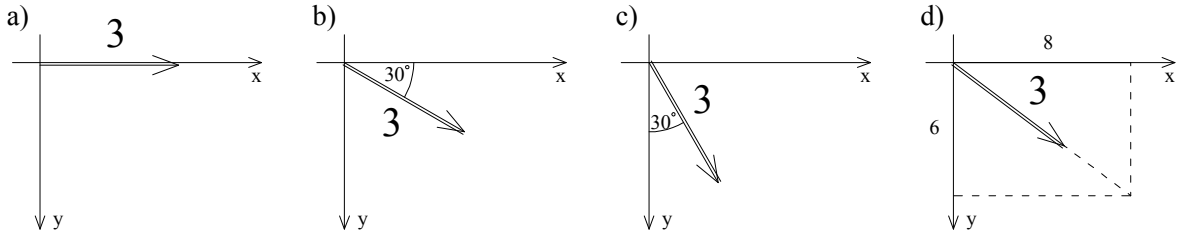
$b / a = \mathrm{tg}\alpha$

$a / b = \mathrm{ctg}\alpha$

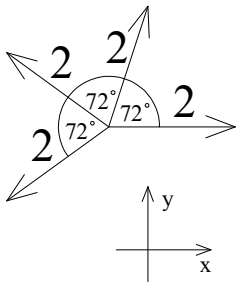
1) Determine the length of the x and y components of the vectors!

Definition: "x component" and "y component" of $\underline{v}$ are vectors $\underline{v}_x$ and $\underline{v}_y$ that are parallel to the x and y axes respectively, and $\underline{v}_x + \underline{v}_y = \underline{v}$.

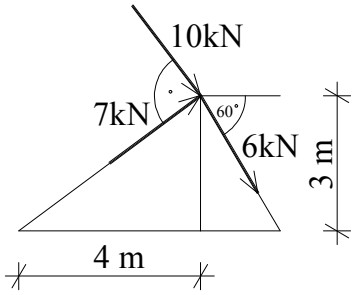
Pythagoras theorem



2) What is the size of the sum of these vectors? What is the direction of the sum?

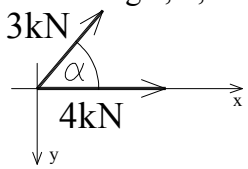


a)



b)

3) What is the angle, α, if the size of the sum is:



a) 7;

b) 5;

c) 3;

d) 1 ?

What is the direction to axis x, β, of the sum in each case?

4) Determine the length of $\underline{v}$ and $\underline{w}$ such that the sum of the vector is 0 !