

SERIES 01
RATIONAL MECHANICS

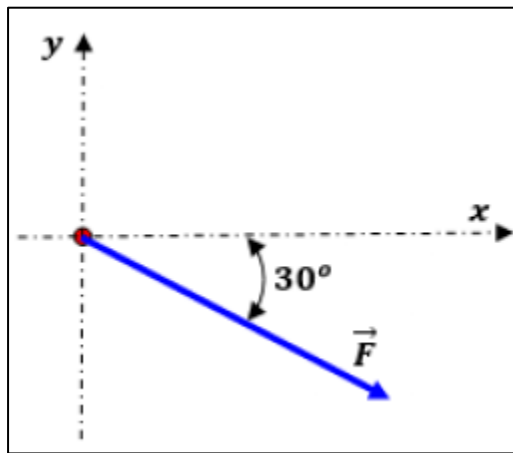
Exercise N° 1:

A certain force specified by the vector $\vec{F} = 60\vec{i} - 60\vec{j} + 30\vec{k}$ (N). Calculate angles between $\vec{F}$ and the positive directions of axes x , y and z .

Exercise N° 2:

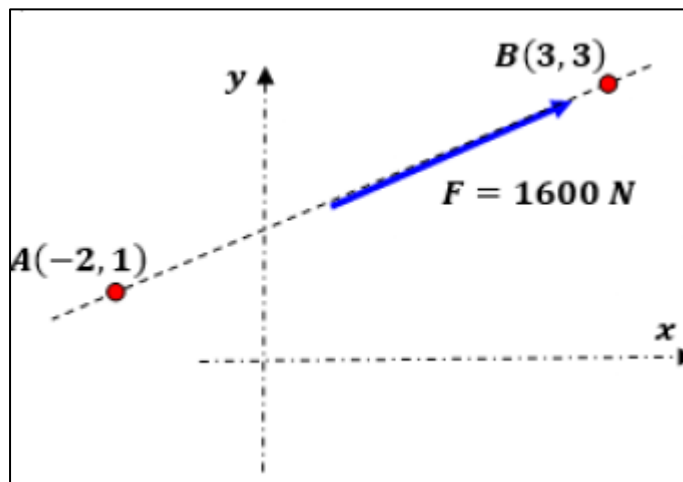
The force $\vec{F}$ has a magnitude of **300 (N)**. Express this force vectorially in terms of the unit vectors $\vec{i}$ and $\vec{j}$.

Determine the scalar components of $\vec{F}$ according to x and y axes.



Exercise N° 3:

The action line of the force of **1600 (N)** passes through the point **A** and **B**. Determine the scalar components according to x and y of the force $\vec{F}$.

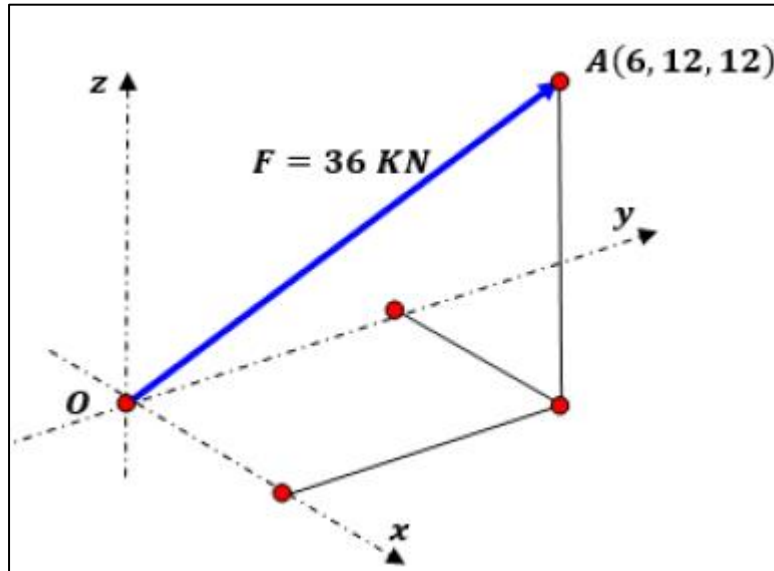


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Exercise N° 4:

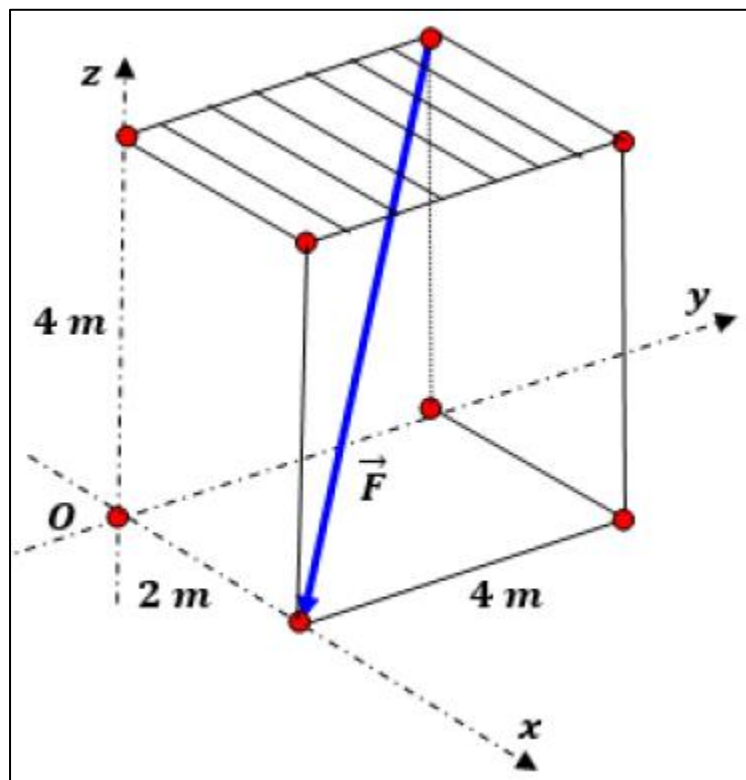
Express the force $|\vec{F}| = 36 \text{ KN}$ in vector form as a function of the unit vectors $\vec{i}, \vec{j}$ and $\vec{k}$.

Determine the components of $\vec{F}$ on the x axis.



Exercise N° 5:

The magnitude of $\vec{F}$ is 900 (N) ; this force acts along the diagonal of the rectangular parallelepiped as shown in the figure. Express $\vec{F}$ in vector form and determine its components.



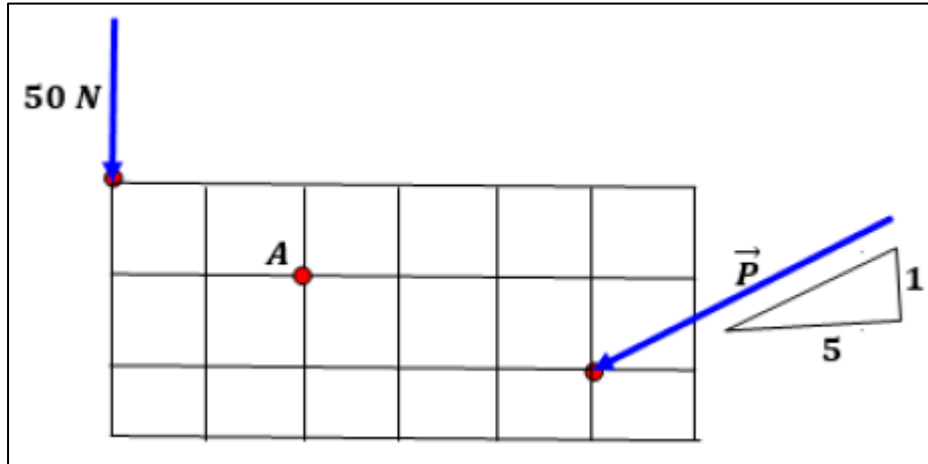
Exercise

N° 6:

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If the resulting moment about point A of the force 50 (N) and the force $\vec{P}$ is zero, determine the magnitude of $|\vec{P}|$.

The plate receiving the solicitation from these forces is divided into squares.

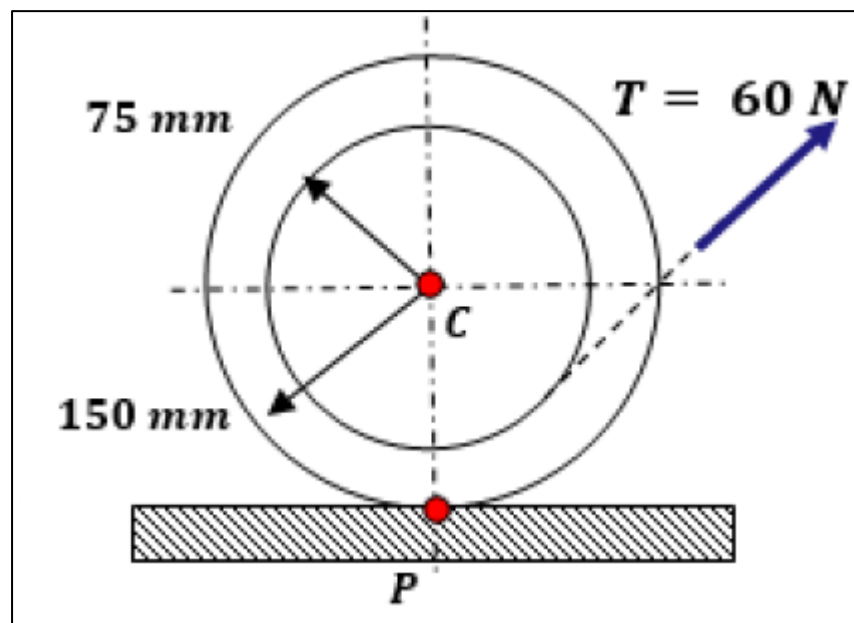


Exercise N° 7:

A tension $T = 60\text{ (N)}$ is applied to a rope wound tightly around the inner hub of a drum.

Determine the moment of $\vec{T}$ about the center of the drum C .

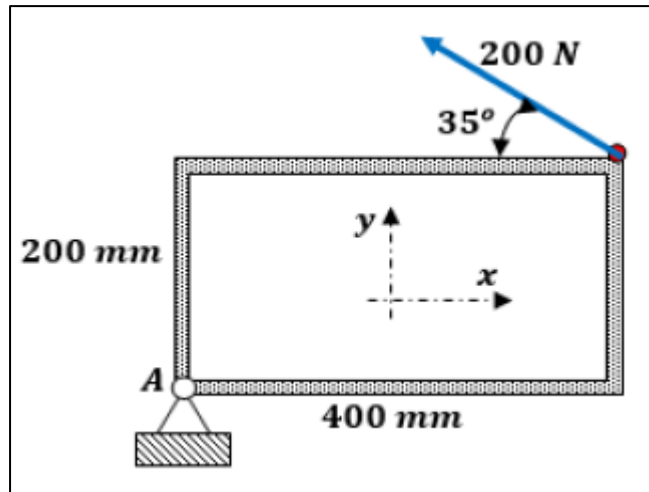
Determine the moment of $\vec{T}$ about the center C , knowing that the moment of $\vec{T}$ about P is zero.



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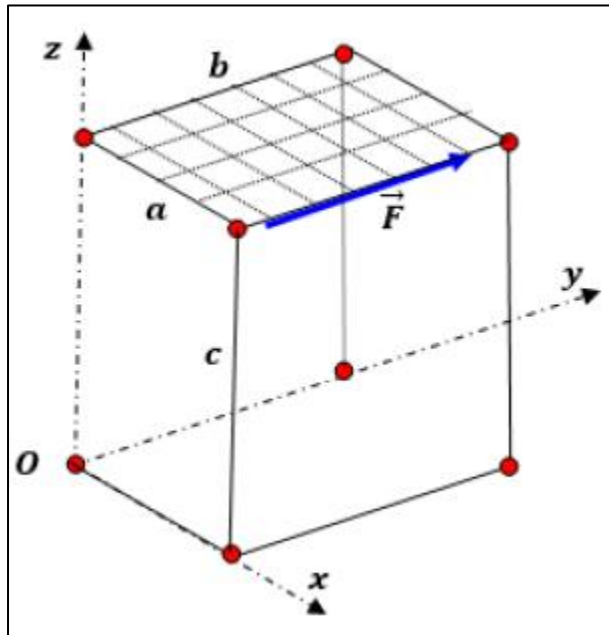
Exercise N° 8:

Calculate the moment $\mathcal{M}_A$ of the force **200 (N)** about point **A** using three scalar methods and one vector method.



Exercise N° 9:

Determine the moment of force $\vec{F}$ about the center O .



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Exercise N° 10:

The force $\vec{F}$ is equal to **10 (KN)** and the coordinates of the points **A** and **B** are given in meters. Express vectorially the moment of $\vec{F}$ with respect to **O**.

