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A force of *F Newtons*, angled *D degrees* from the horizontal, is located at the coordinates *(X, Y)*. What is the magnitude and direction of the moment around the origin?

ANSWER:

The easiest way to find the magnitude of the moment is to use the Principle of Moments, also known as Varignon's theorem, which states that for a force $F = F_1 + F_2$

$$\boldsymbol{M_O = r \times F_1 + r \times F_2 = r \times (F_1 + F_2)}$$

Therefore, the moment can be found by splitting the force into x and y components.

$$\boldsymbol{M_O} = (F \sin(D))(X) - (F \cos(D))(Y)$$

The direction of the moment can be found using the right hand rule. If the magnitude is positive, the moment is pointed out of the page, but if the magnitude is negative, the moment is pointed into the page.