**Engineering Statics**
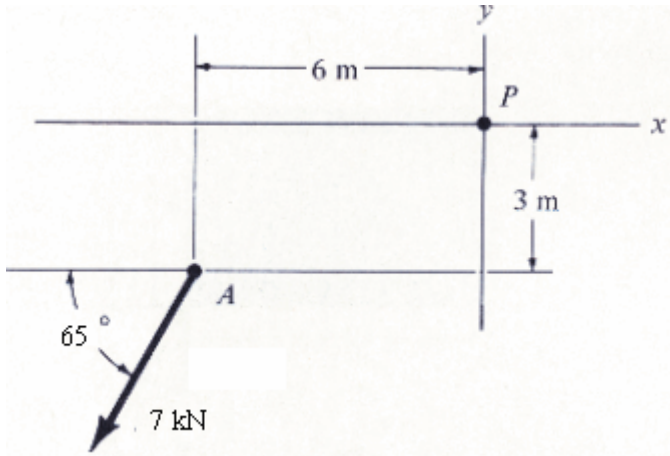**Homework 2**

1.
Determine the magnitude and direction of the moment of the force at $A$ about point $P$.

y

6 m

P

x

3 m

A

65°

7 kN

**(a)** What is the magnitude, in kN-m, of the moment of force about point $P$?
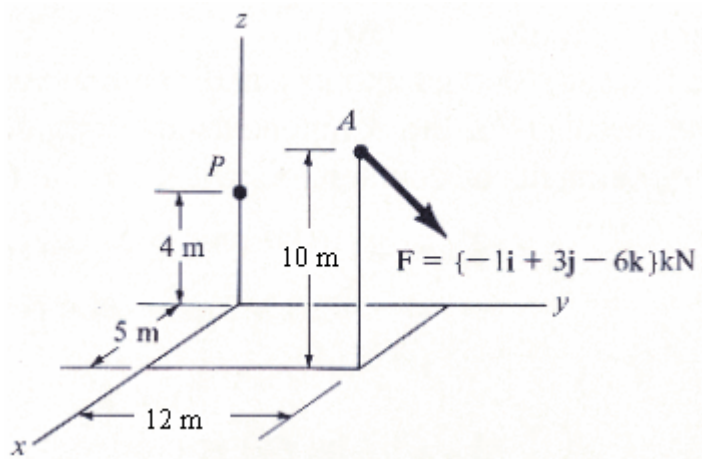
_____ kN-m

**(b)** What is the direction of the moment about point $P$?
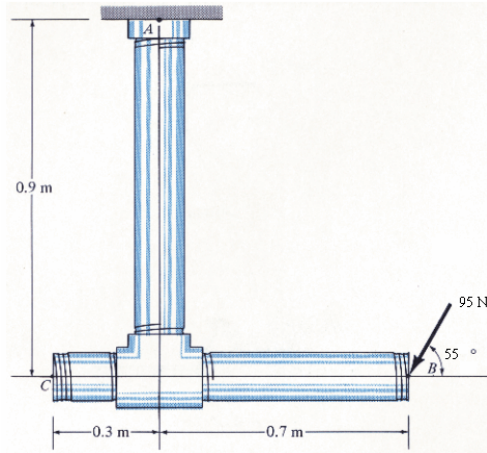
_____ (Clockwise , -z / Counterclockwise +z)

2.
Determine the moment of the force at $A$ about point $P$. Express the result as a Cartesian vector, in kN.



$z$

$A$

$P$

$4\ m$

$10\ m$

$F = \{-1i + 3j - 6k\}kN$

$y$

$5\ m$

$12\ m$

$x$

3.
The 95-N force acts on the end of the pipe at B. Determine the moment of this force about point A, and the magnitude and direction of a horizontal force, applied at C, which produces the same result.



(a) What is the magnitude, in N-m, of the moment of force about point A? _____ N-m

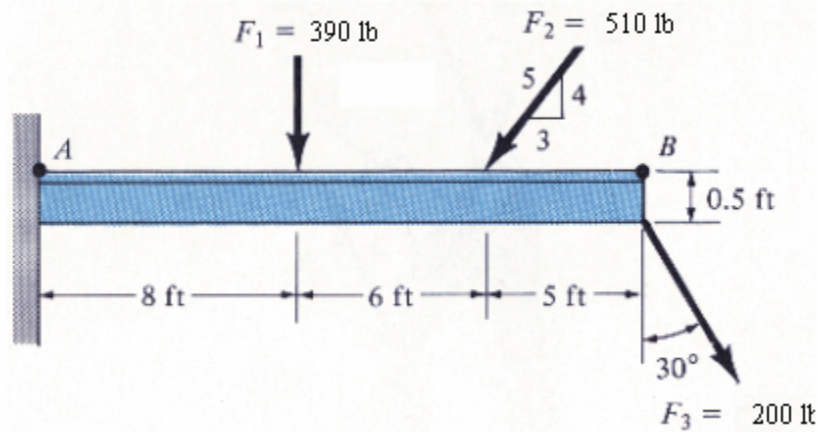(b) What is the direction of the moment of force about A? _____

(c) What is the magnitude of a horizontal force at C that produces the same result?

(d) In what direction should the horizontal force at C be applied? _____

4.

Determine the moment about point B of each of the three forces acting on the beam.



$F_1 = 390$ lb    $F_2 = 510$ lb

A    B

0.5 ft

8 ft    6 ft    5 ft

30°

$F_3 = 200$ lt

(a) What is the magnitude, in ft-lb, of the moment of $F_1$ about B?

(b) What is the direction of the moment of $F_1$ about B? _____

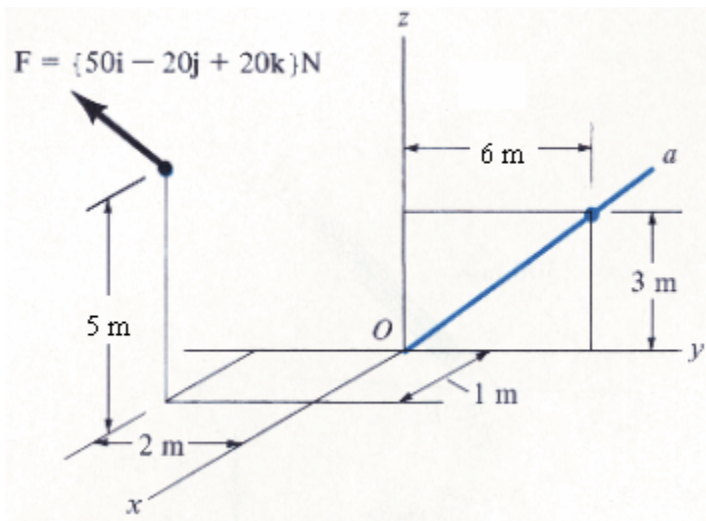(c) What is the magnitude, in ft-lb, of the moment of $F_2$ about B?

(d) What is the direction of the moment of $F_2$ about B? _____

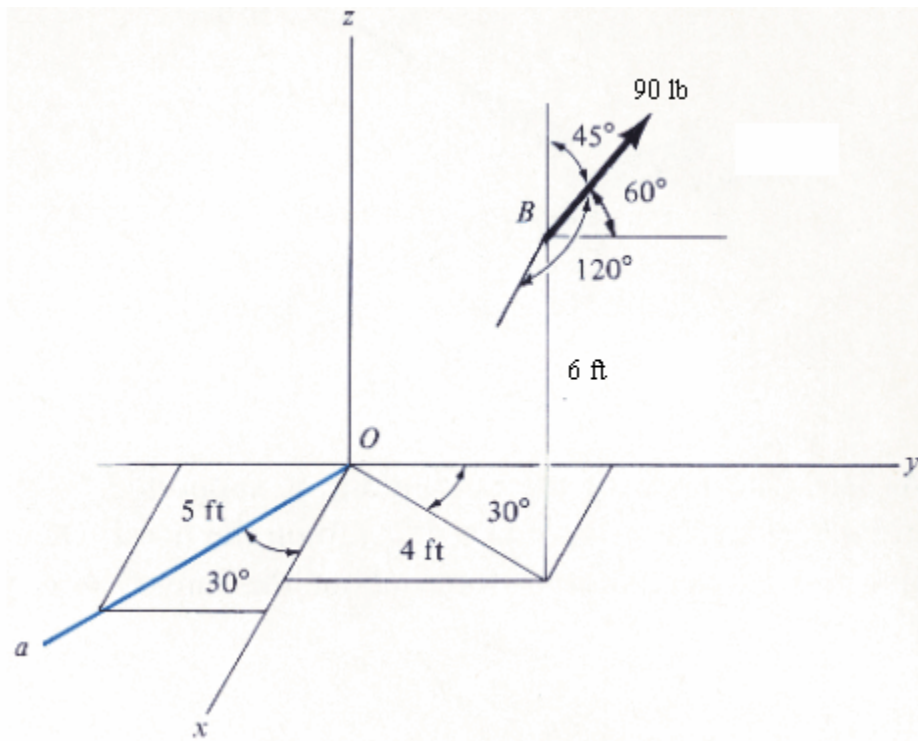(e) What is the magnitude, in ft-lb, of the moment of $F_3$ about B?

(f) What is the direction of the moment of $F_3$ about B? _____

5.
Determine the moment of the force **F** about the *Oa* axis. Express the result as a Cartesian vector, in N-m.
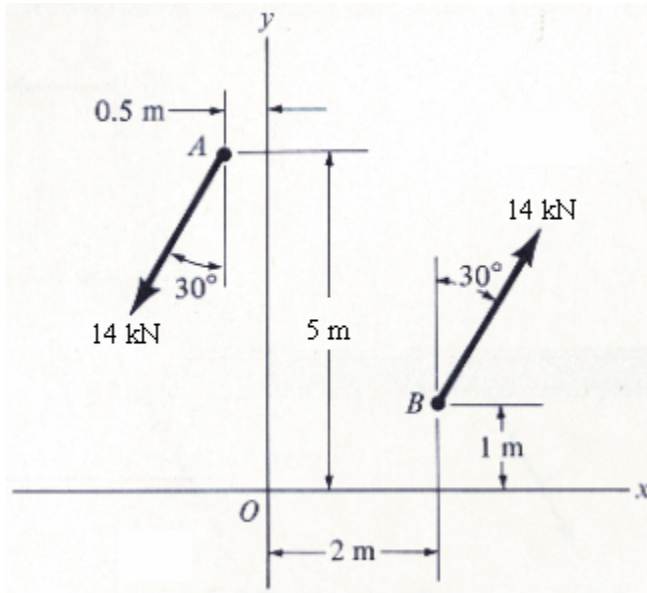
$F = \{50i - 20j + 20k\}N$

6.

Determine the moment of the 90-lb force about the *Oa* axis. Express the result as a Cartesian vector, in ft-lb.

7.
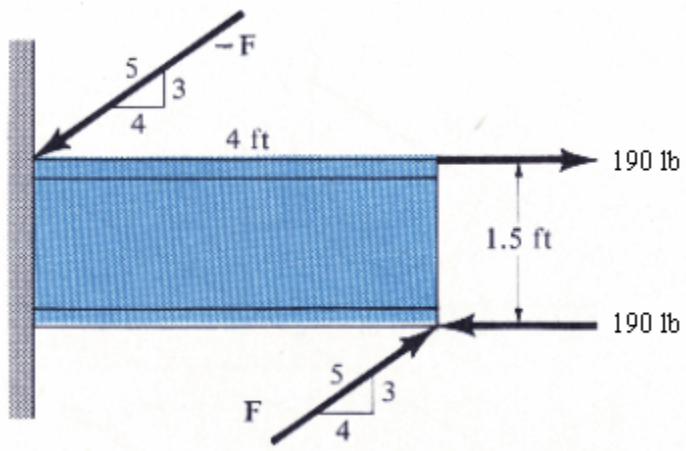Determine the magnitude and sense of the couple moment.



**(a)** What is the magnitude of the moment, in kN-m?

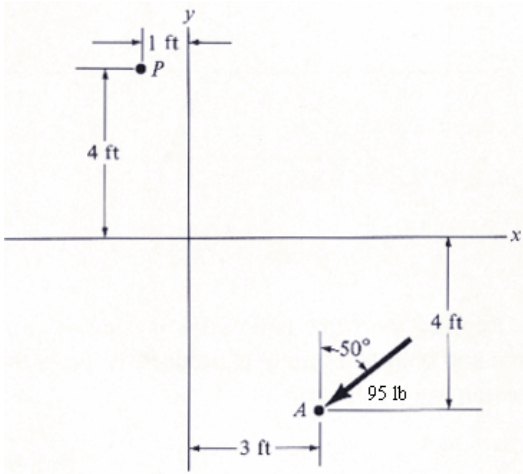**(b)** What is the direction of the moment? _____

8.
Two couples act on the beam as shown. Determine the magnitude of **F** so that the resultant couple moment is 310 lb ft counterclockwise.

9.
Replace the force at $A$ by an equivalent force and couple moment at point $P$.
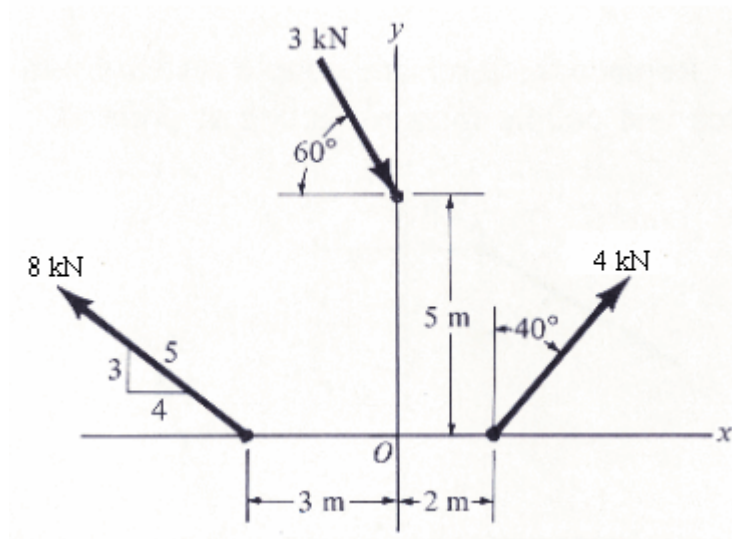


**(a)** What is the equivalent force at $P$ in Cartesian vector form?

**(b)** What is the magnitude of the equivalent coupled moment at $P$ in ft-lb?

**(c)** What is the direction of the moment at $P$? _____

10.
Replace the force system by a single force resultant and specify its coordinate point of application $(x,0)$ on the $x$axis.



**(a)** What is the single force resultant in Cartesian vector form?

**(b)** What is the $x$ position of the single force resultant (on the $x$-axis)?