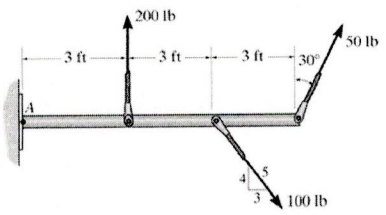
EXAMPLE I



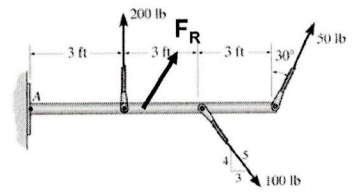
Given: A 2-D force system with geometry as shown.

Find: The equivalent resultant force and couple moment acting at A and then the equivalent single force location measured from A.

Plan:

1) Sum all the x and y components of the forces to find F_{RA}.
2) Find and sum all the moments resulting from moving each force component to A.
3) Shift F_{RA} to a distance d such that $d = M_{RA}/F_{Ry}$

EXAMPLE I (continued)



$+\rightarrow \Sigma F_{Rx} = 50(\sin 30) + 100(3/5)$
$= 85$ lb

$+\uparrow \Sigma F_{Ry} = 200 + 50(\cos 30) - 100(4/5)$
$= 163.3$ lb

$+ \circlearrowleft M_{RA} = 200\,(3) + 50\,(\cos 30)\,(9)$
$- 100\,(4/5)\,6 = 509.7$ lb·ft $\circlearrowleft$

$F_R = (85^2 + 163.3^2)^{1/2} = 184$ lb

$\theta = \tan^{-1}(163.3/85) = 62.5°$

The equivalent single force F_R can be located at a distance d measured from A.

$d = M_{RA}/F_{Ry} = 509.7 / 163.3 = 3.12$ ft

F1 mag =	200 lb
F2 mag =	100 lb
F3 mag =	50 lb
F1 ang =	90 °
F2x rat =	0.6
F2y rat =	0.8
F3 ang =	60 °
F1 d =	3 ft
F2 d =	6 ft
F3 d =	9 ft
F1x =	0 lb
F2x =	60 lb
F3x =	25 lb
ΣFx =	85 lb
F1y =	200 lb
F2y =	-80 lb
F3y =	43 lb
ΣFy =	163 lb
FR =	184 lb
θ =	63 °
MRA =	510 lbft
d =	3.12 ft