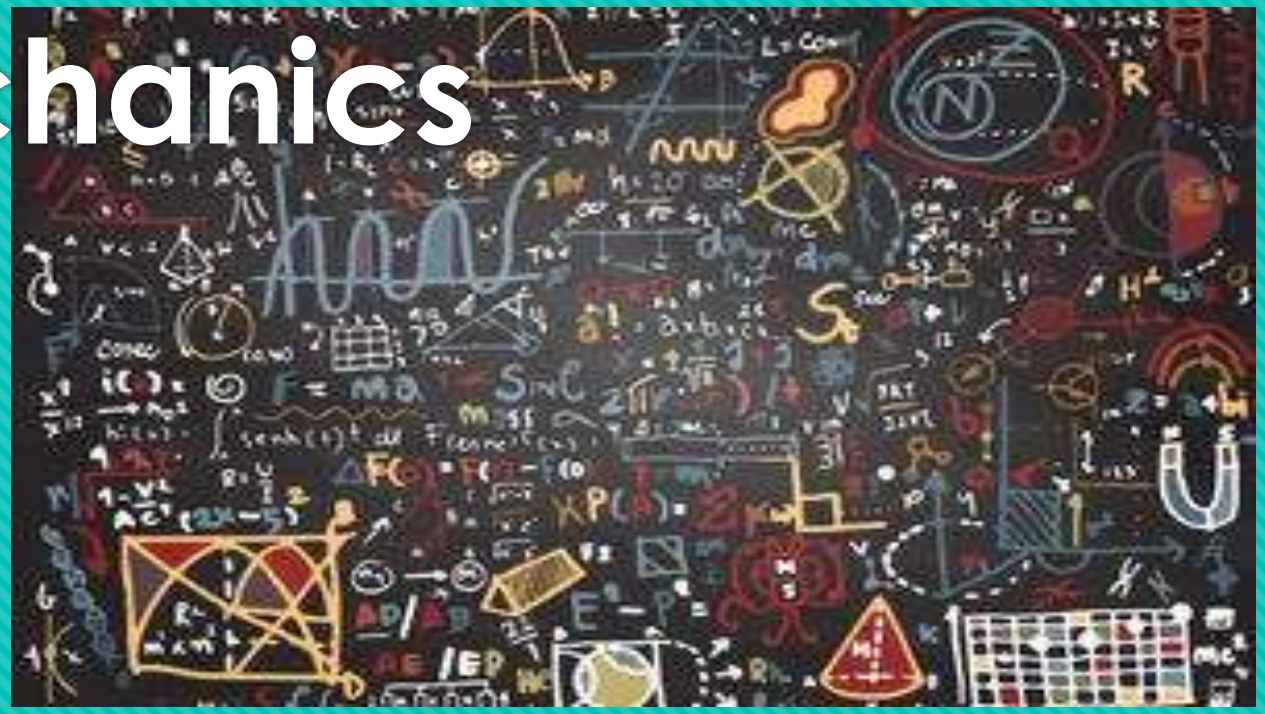
Engineering Mechanics Assignment -I



Slides by

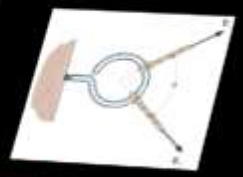
Deepa Anandhan .E
19ME1024
2nd Year ,Mechanical dept.,

Two forces acting on Screw eye. If F_1 = 400N and F_2 = 600N , Determine the angle between them,So that resultant force has magnitude of F_r = 800 N.

Hint:

Law of Cosines

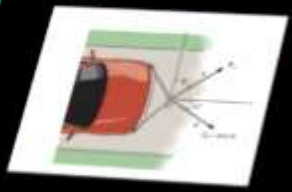
2).Two Forces F_1 and F_2 act on screw eye . If their lines of forces is F_1=F_2=F. Determine magnitude of resulatant force F_r and angle b/w F_r and F_1.



Hint:

Law of Cosines

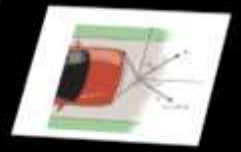
3).Determine the magnitude and direction of F_A so that resultant force is directed along positive x-axis and has a magnitude of 1250N.



Hint:

Law of Cosines

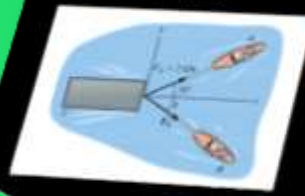
4).Determine the magnitude and direction ,measured counter-clockwise from positive x-axis ,of resultant force acting on ring at O ,if F_A = 750N and θ = 45°.



Hint:

Law of Cosines

If the resultant force of two tugboats is 3kN , directed along positive x-axis, Determine required magnitude of F_B and direction θ .



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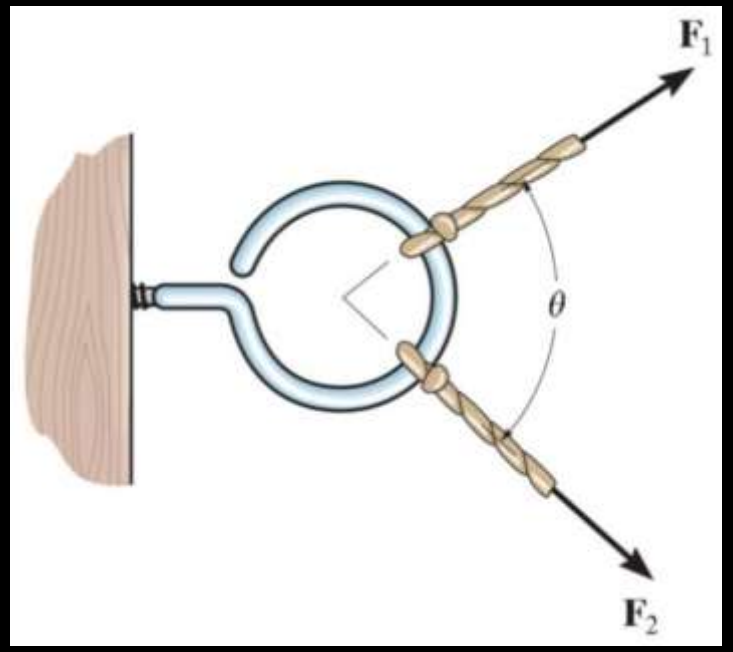

Hint:

Law of Cosines

Soln.

By law of Cosines ,

$F_B = \sqrt{2^2 + 3^2 - 2x2x3cos30^o}$

$= \sqrt{13 - 12(.0866)}$

$= \sqrt{2.6}$

$= 1.6149$ kN

By law of Sines ,

$$\frac{2}{sin\,\theta} = \frac{1.6149}{sin\,30^0}$$

$$sin\,\theta = \frac{2xsin\,30^0}{1.6149} = 0.619$$

$$\theta = 38.26\ or\ 38^o14'35.33'$$

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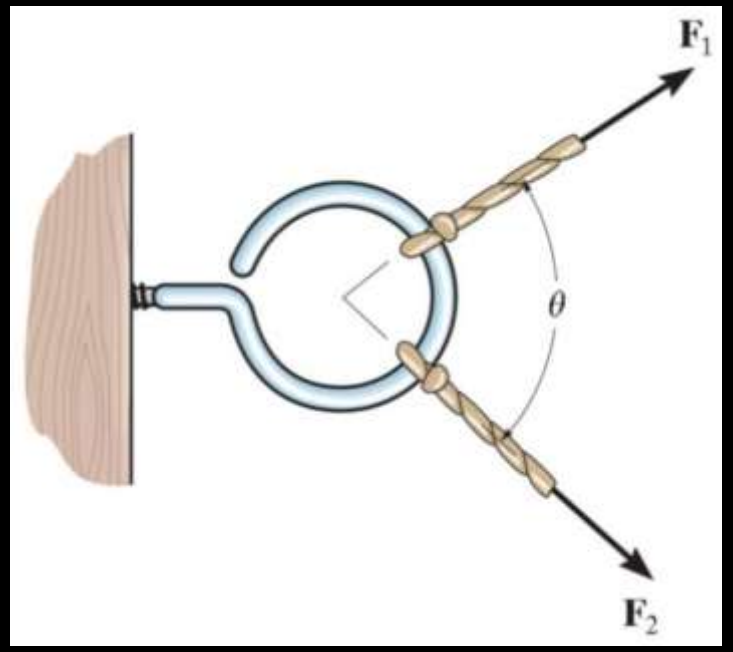

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Soln.

By law of Cosines ,

$$F_r^2 = F^2 + F^2 - 2F^2\cos\theta$$

$$= 2F^2(1+\cos\theta)$$

$$= 2F^2\cos^2(\theta/2)x2$$

$$F_r^2 = 4F^2\cos^2(\theta/2)$$

$$\therefore F_r = 2F\cos(\theta/2)$$

By law of Sines ,

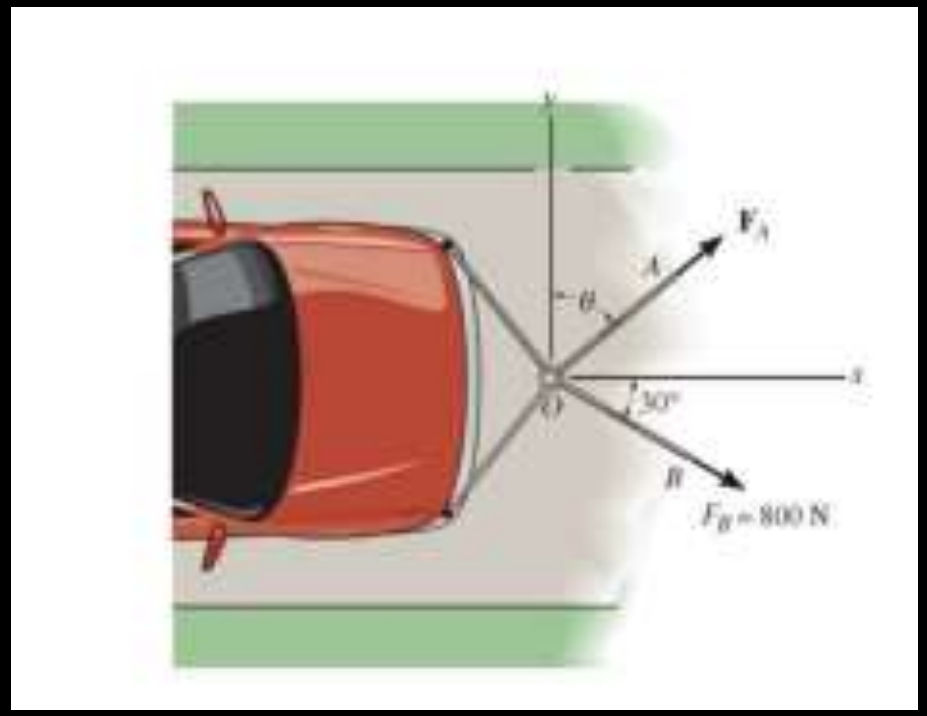
$$\frac{\sin\theta}{2F\cos(\theta/2)} = \frac{\sin\alpha}{F}$$

$$\frac{2\sin(\theta/2)\cos(\theta/2)}{\cos(\theta/2)} = \sin\alpha$$

$$\sin(\theta/2) = \sin\alpha$$

$$\alpha = \theta/2$$

3).Determine the magnitude and direction of F_A so that resultant force is directed along positive x-axis and has a magnitude of 1250N.



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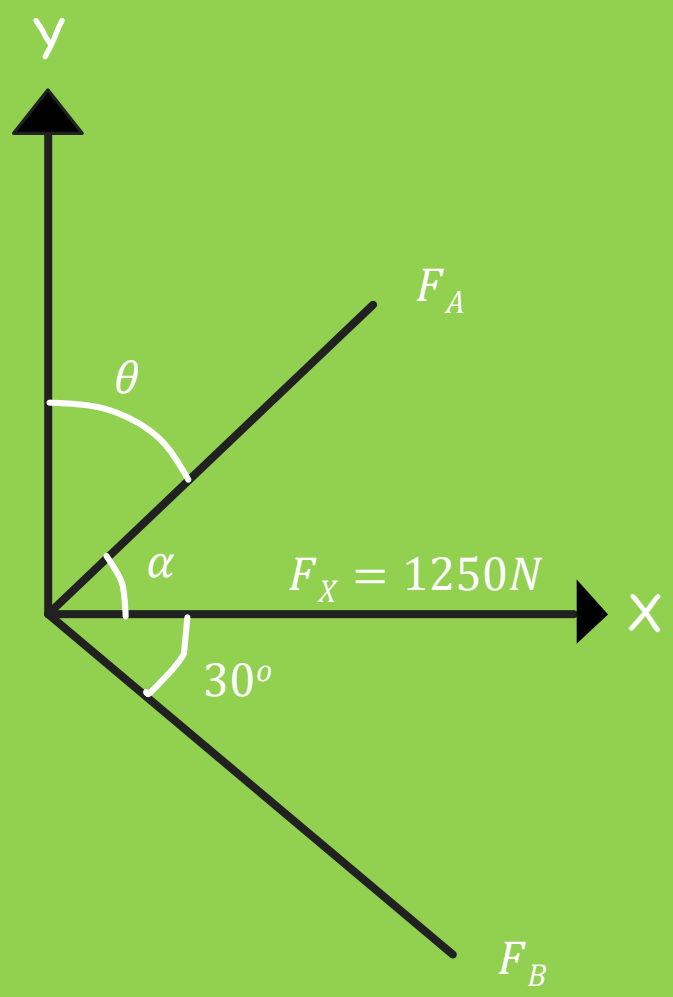
y
F_A
θ
α
$F_X = 1250N$
x
30^o
F_B

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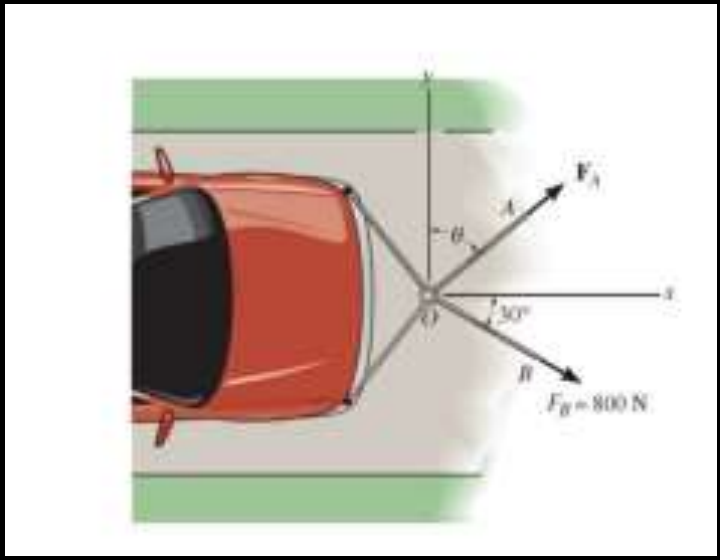

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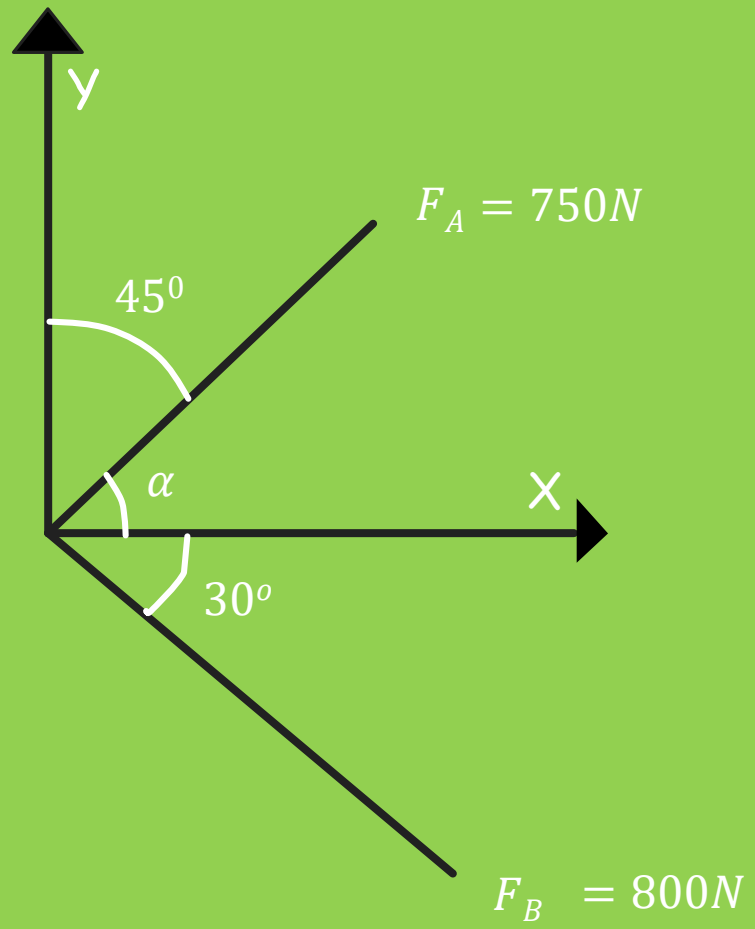
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α
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30^o
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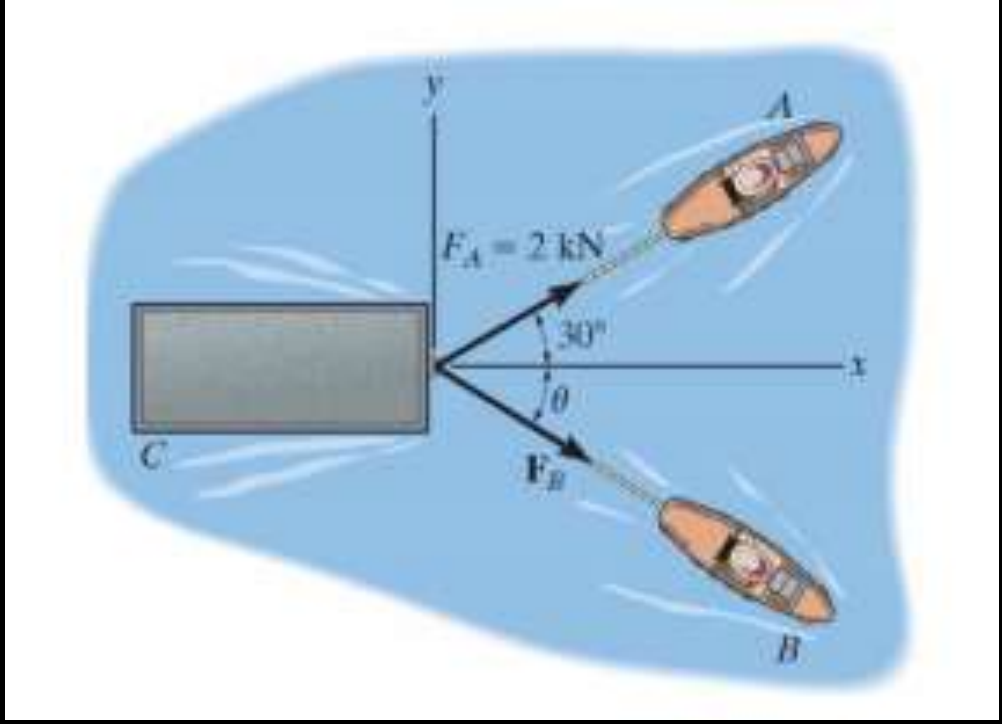

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Thanks for viewing my slide 🙏🙏🙏