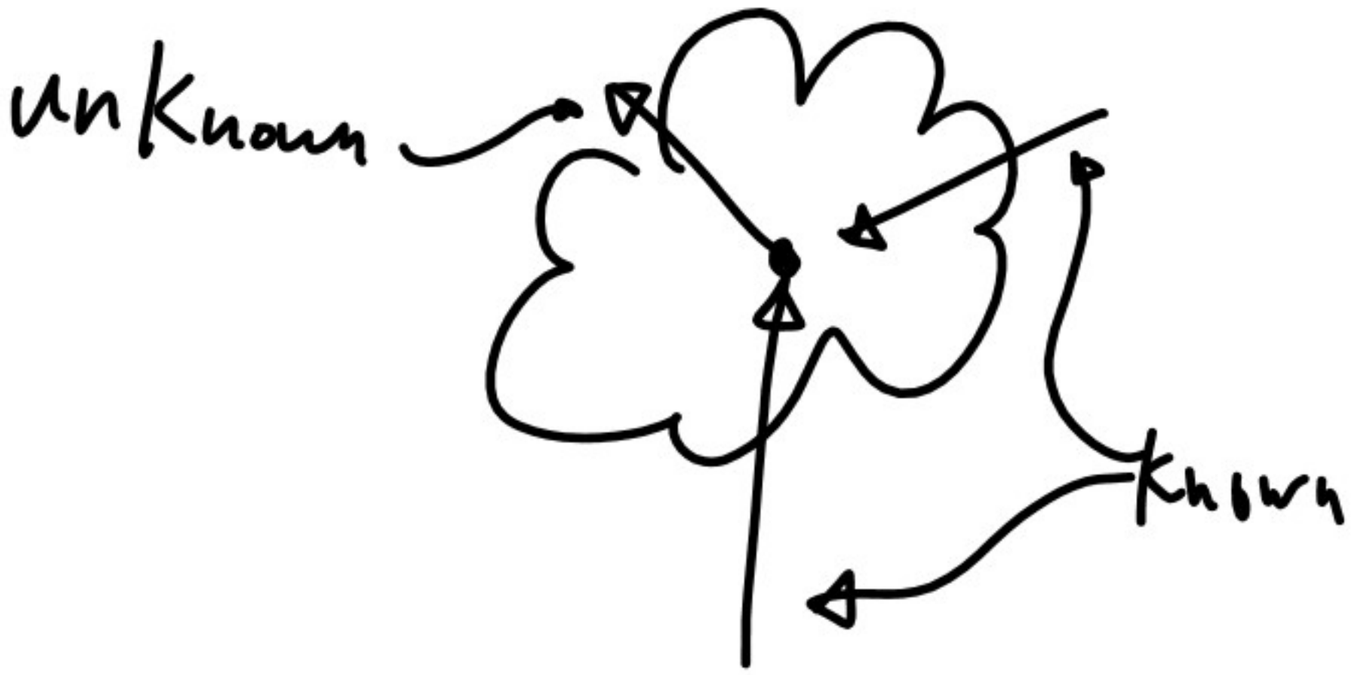
Tutoring

T 4:30 – 6 pm

F 4 – 5 pm

On by appointment

Statics of Particles



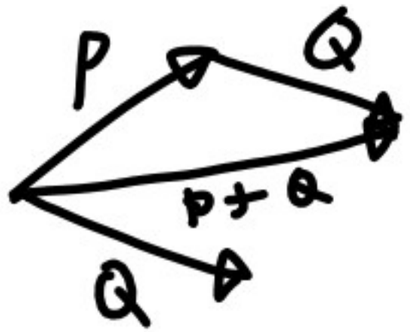
$$\sum \vec{F} = \vec{0}$$

Vectors

Magnitude Direction

Vector Addition

P+Q



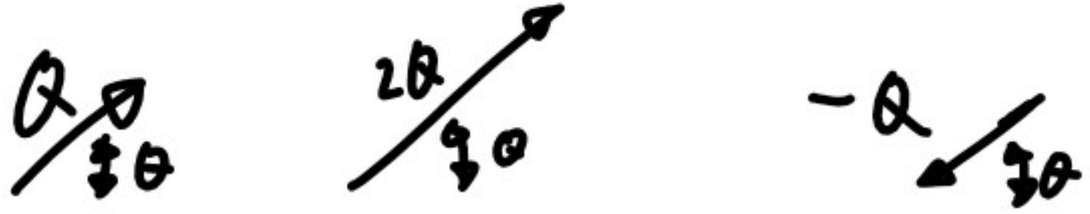
Law of Sines

$$\frac{a}{\sin\alpha} = \frac{b}{\sin\beta}$$

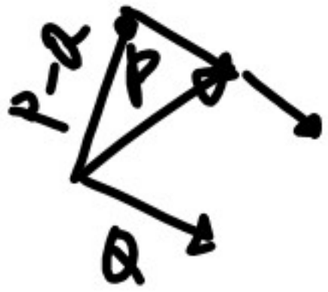
Law of Cosines

$$c^2 = a^2 + b^2 - 2ab\cos\theta$$

Scaler Multiplication



Vector



Subtraction

P − Q

Vector Properties

Commutative

$$P+Q=Q+P$$

Associative

$$(P+Q)+S=P+(Q+S)$$

2.1 Two forces are applied as shown to a hook. Determine graphically the magnitude and direction of their resultant using (*a*) the parallelogram law, (*b*) the triangle rule.

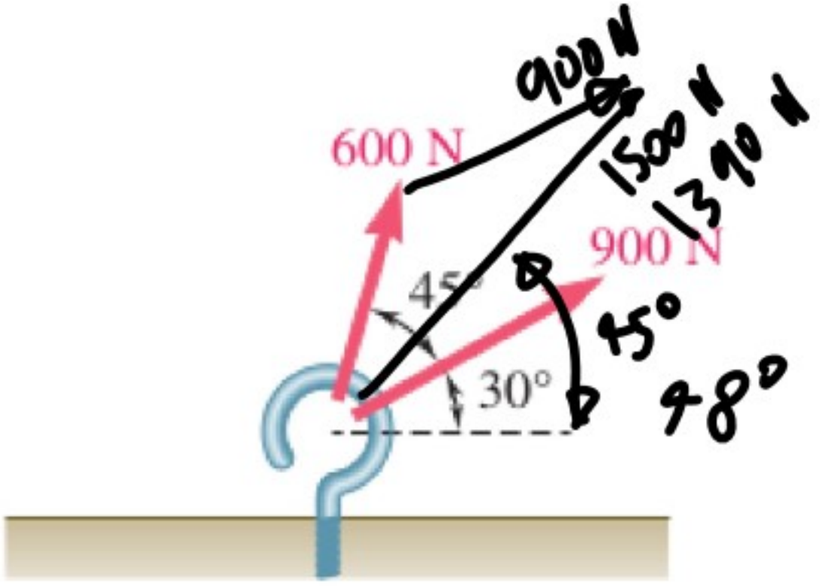


Fig. P2.1

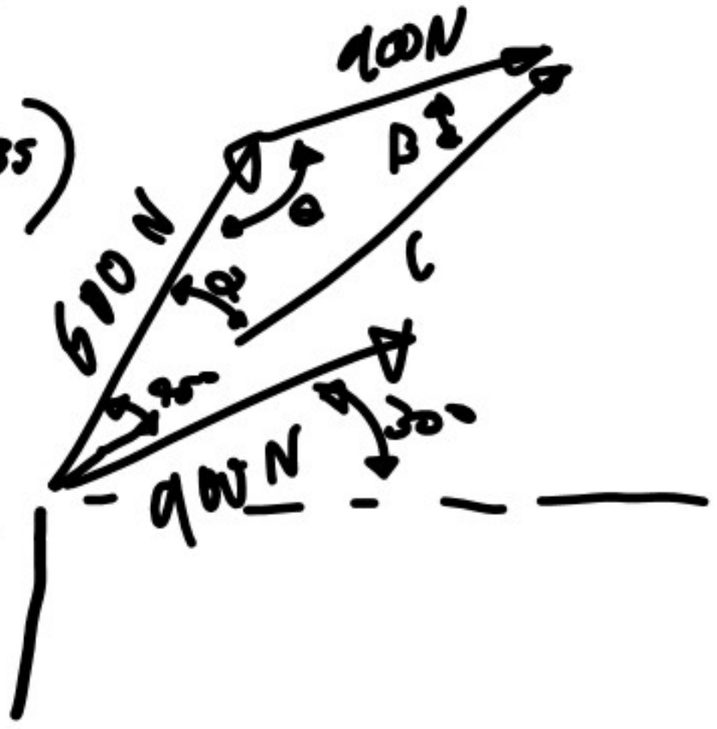
$$\frac{a}{\sin\alpha} = \frac{b}{\sin\beta}$$

$$c^2 = a^2 + b^2 - 2ab\cos\theta$$

$$\frac{900}{\sin\alpha} = \frac{1390}{\sin 135}$$

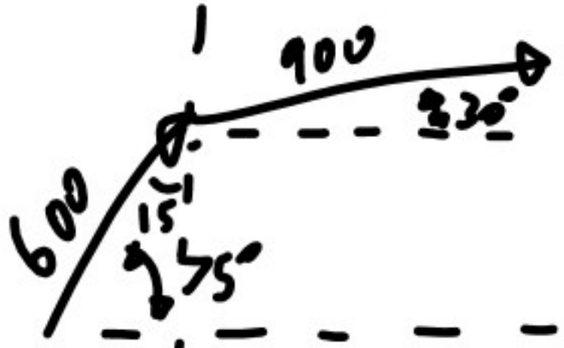
$$\alpha = \sin^{-1}\left(\frac{900}{1390}\sin 135\right)$$

$$= 27°$$



$$= 30 + 45 - 27$$

$$= 48°$$



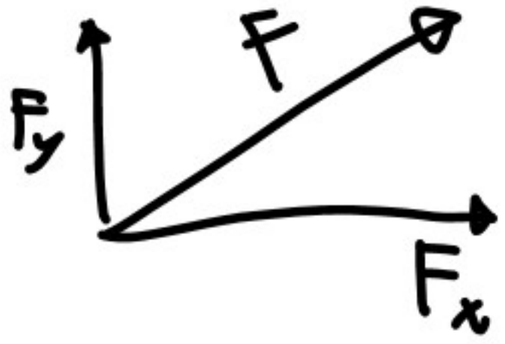
$90 - 75 = 15$

$$\theta = 30 + 90 + 15 = 135$$

$$C^2 = 600^2 + 900^2 - 2(600)(900)\cos 135$$

$$\boxed{C = 1390\ N}$$

Vector Components



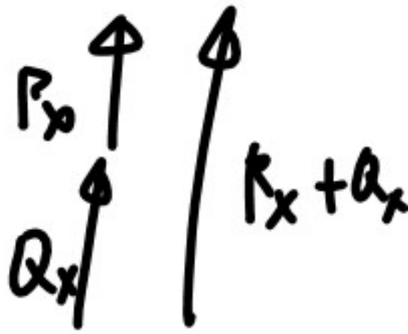
$$F_x i + F_y j = \vec{F}$$

$i = \langle 1, 0 \rangle$

$j = \langle 0, 1 \rangle$

Component Addition

$$\vec{P} + \vec{Q} = \vec{R}$$



$$(P_x i + P_y j) + (Q_x i + Q_y j) = R_x i + R_y j$$

$$P_x i + Q_x i + P_y j + Q_y j = R_x i + R_y j$$

$$(P_x + Q_x) i + (P_y + Q_y) j = R_x i + R_y j$$

$$P_x + Q_x = R_x \qquad P_y + Q_y = R_y$$