Resultants of Planar Forces

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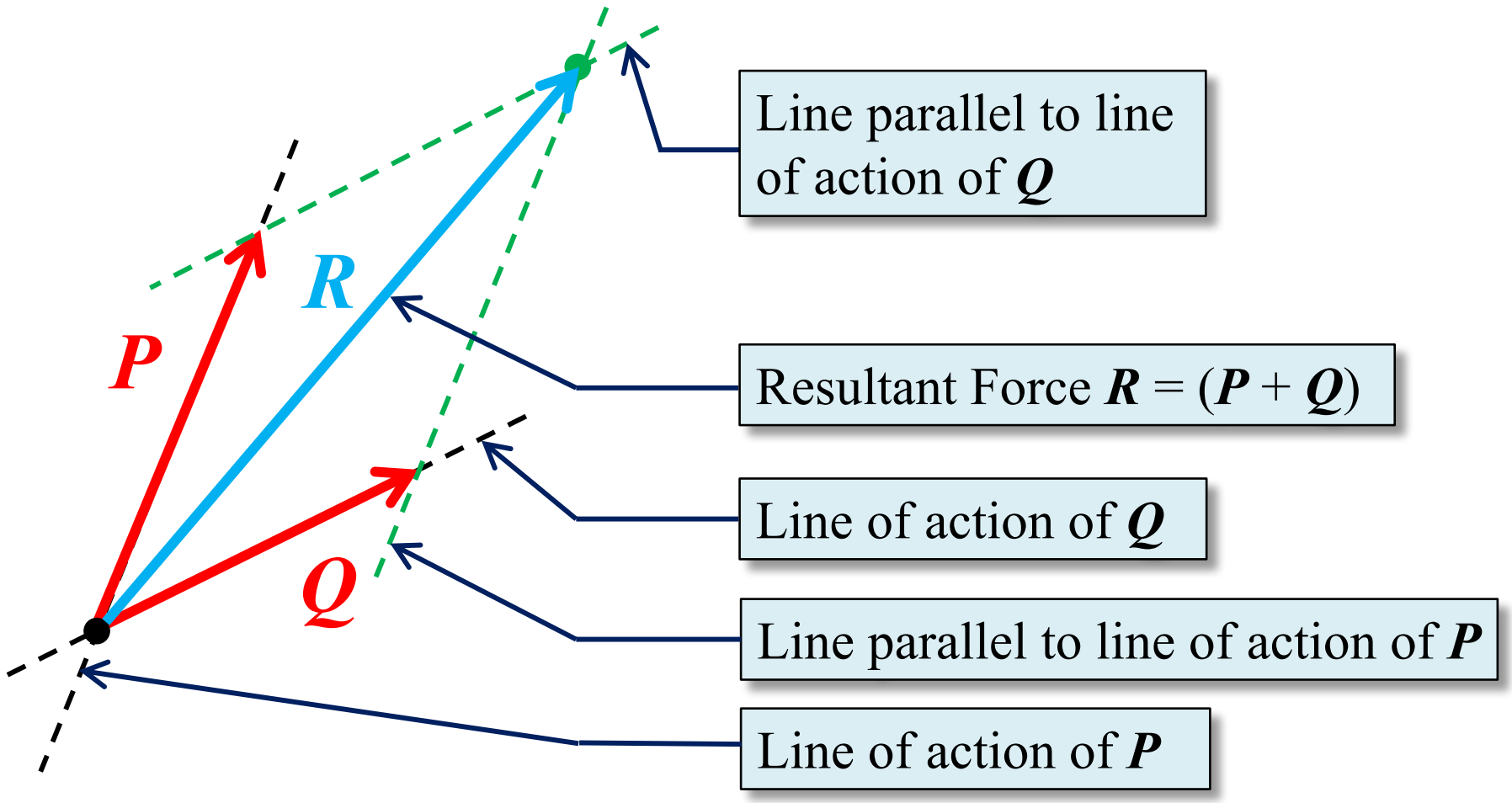
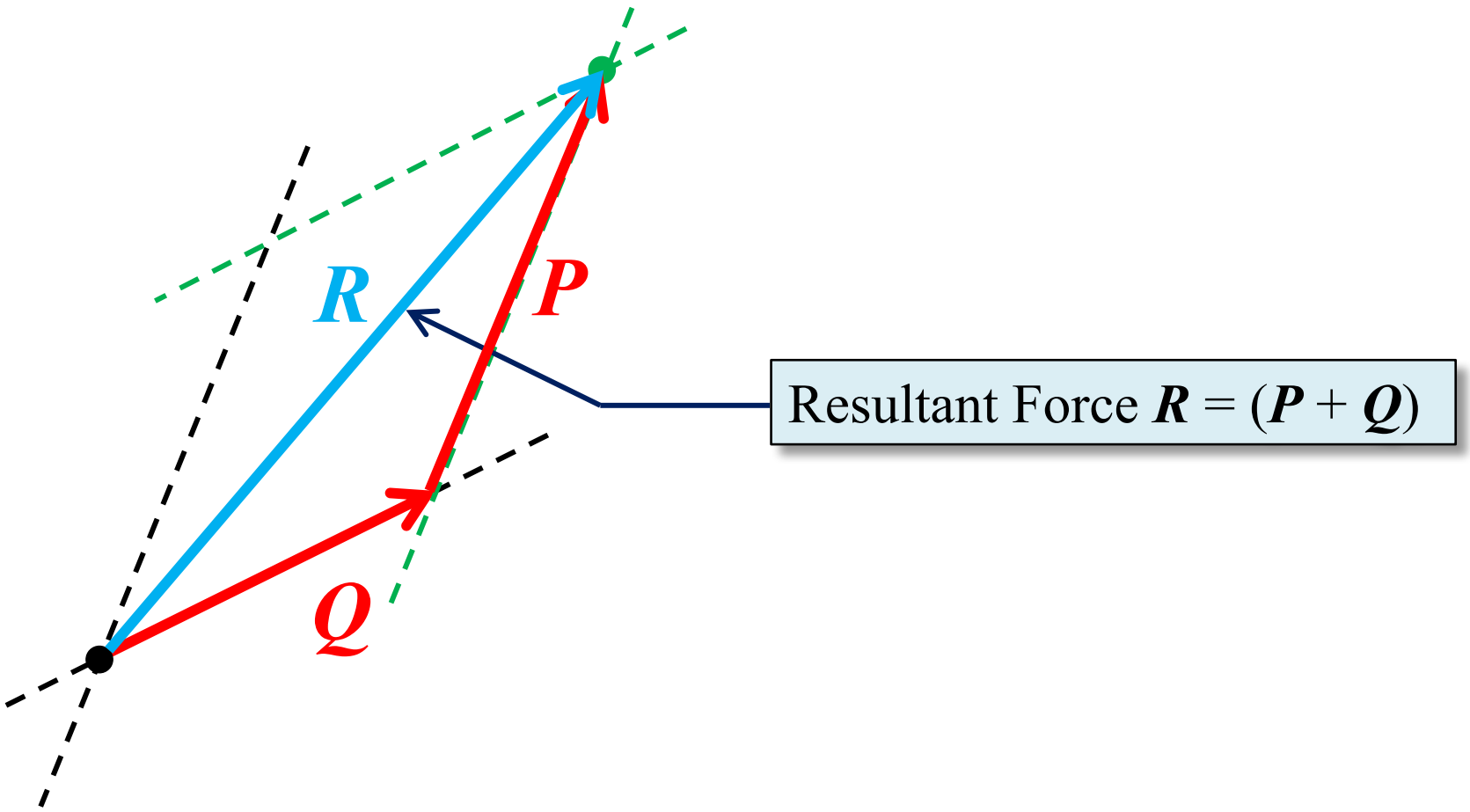
Parallelogram Law

Vectors are used to represent forces in space. Two force vectors can be added to find their resultant force using the Parallelogram Law.



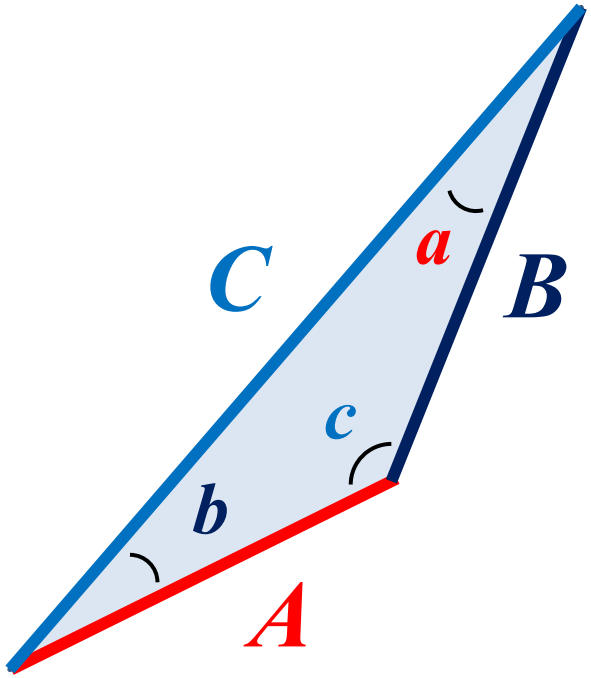
Triangle Rule

Equivalent to the Parallelogram Law, note that when ***P*** and ***Q*** are arranged tip-to-tail, the three force vectors form a triangle.



Triangle Rule

Can use the Law of Sines and the Law of Cosines to find unknown magnitudes and directions



Law of Sines

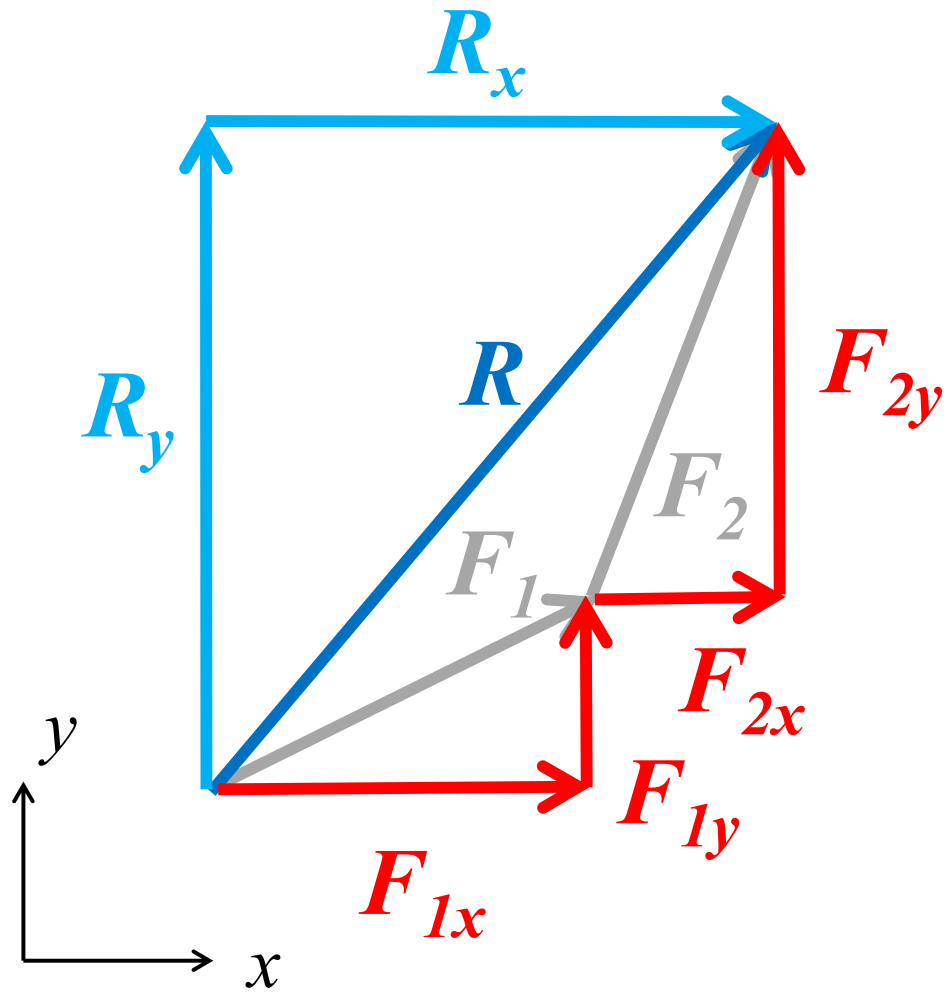
$$\frac{A}{\sin a} = \frac{B}{\sin b} = \frac{C}{\sin c}$$

Law of Cosines

$$C^2 = A^2 + B^2 - 2AB\cos c$$

Resultants using Rectangular Components

For practical engineering problems, it is almost always more efficient to find resultant forces using rectangular components



$$\boldsymbol{R} = \boldsymbol{F_1} + \boldsymbol{F_2}$$

$$\boldsymbol{R} = R_x\hat{\boldsymbol{\imath}} + R_y\hat{\boldsymbol{\jmath}}$$

$$R_x = F_{1x} + F_{2x} = \sum F_x$$

$$R_y = F_{1y} + F_{2y} = \sum F_y$$