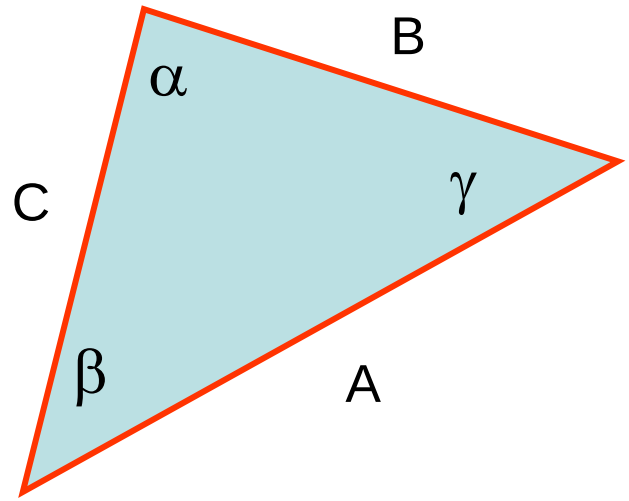
Addition and Subtraction

- Using simple trig
- Usually avoided in other physics courses
- Good only for two 2D vectors and their resultant or for resolving a 2D vector into components.
- Slow and unwieldy for 3 or more 2D vectors.
- Very difficult with 3D vectors.

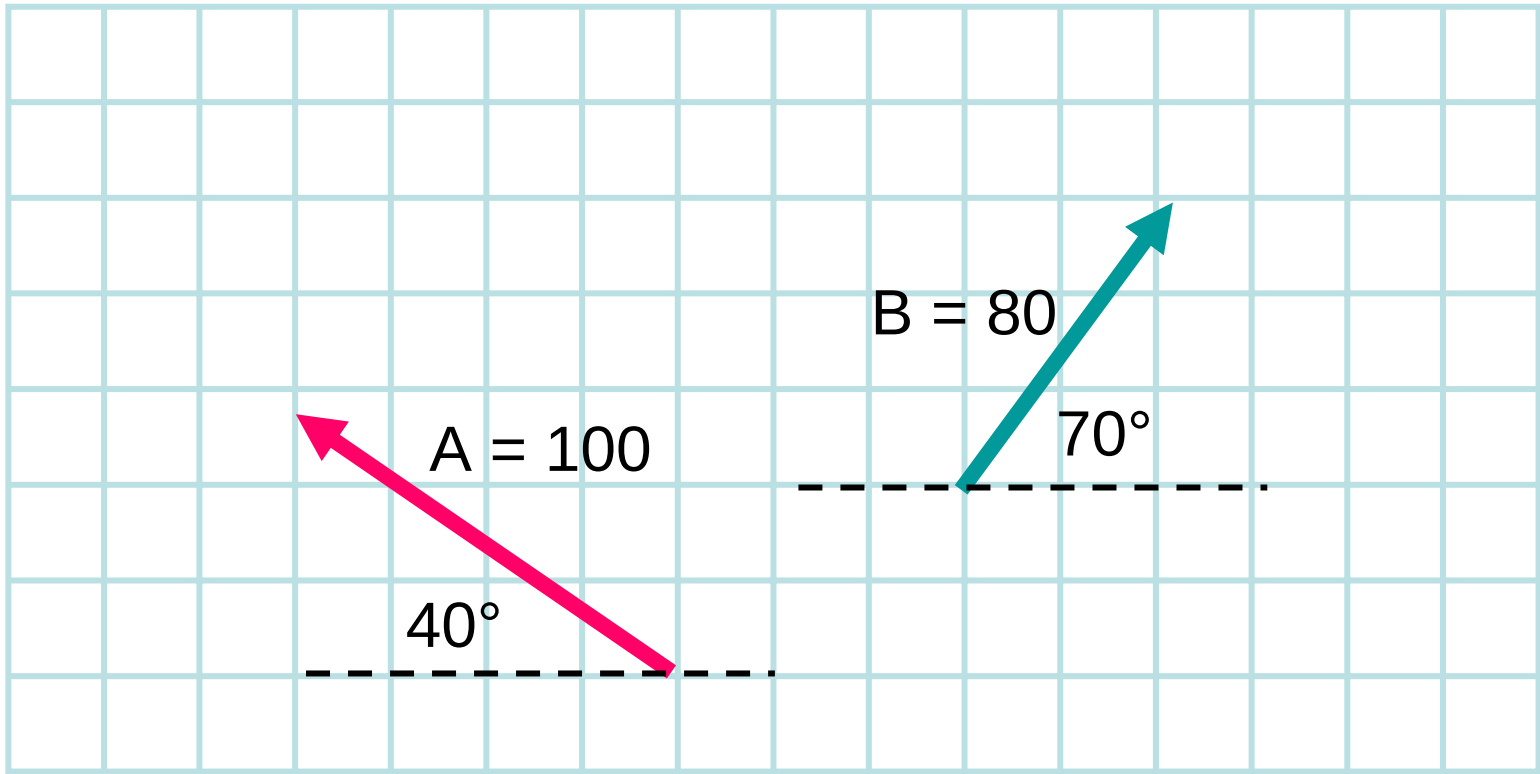
Basic Rules

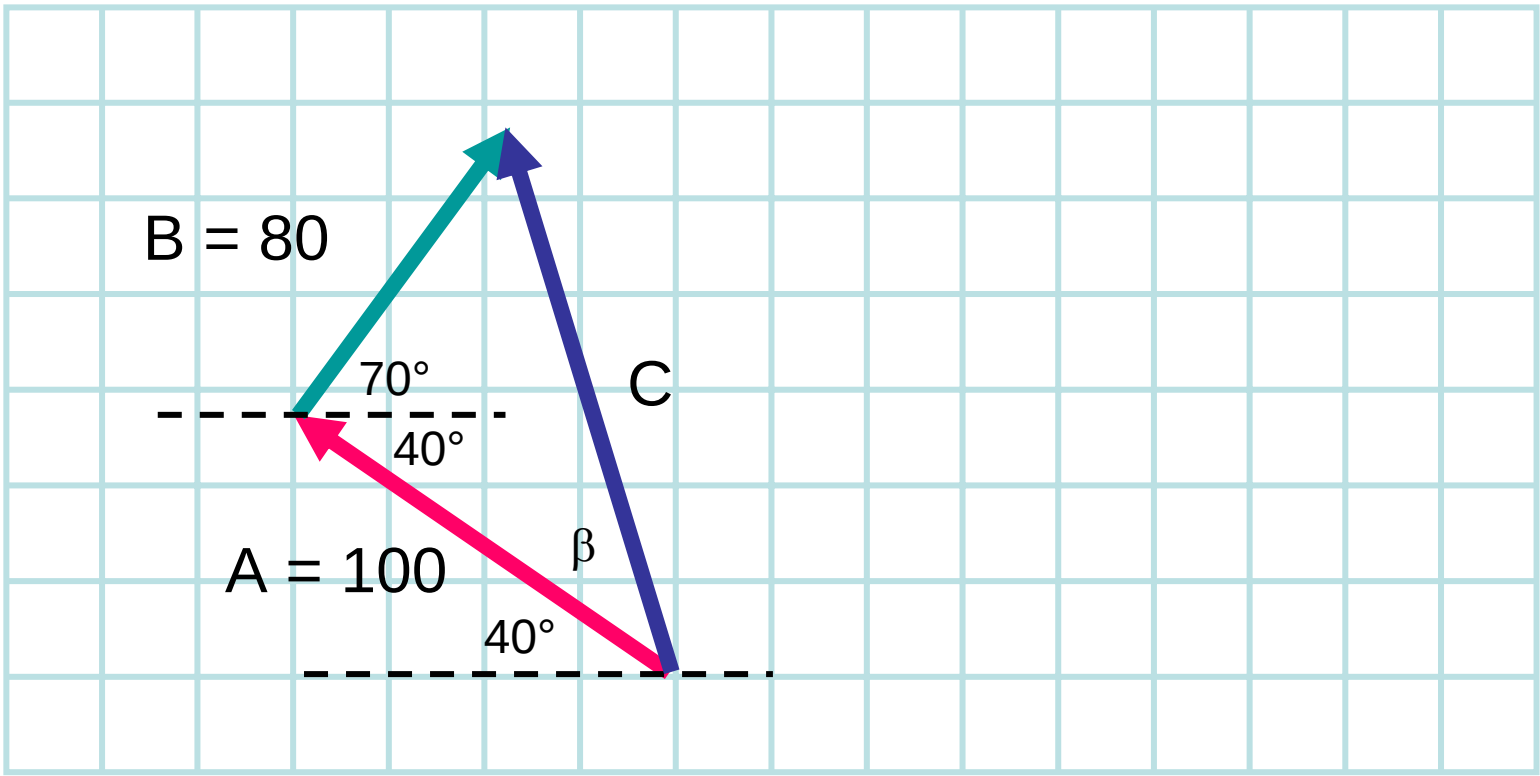


$$Sine\ Law: \quad \frac{\sin\alpha}{A} = \frac{\sin\beta}{B} = \frac{\sin\gamma}{C}$$

$$Cosine\ Law: \quad C^2 = A^2 + B^2 - 2AB\cos\gamma$$

Find $\vec{C} = \vec{A} + \vec{B}$ *and* $\vec{D} = \vec{A} - \vec{B}$

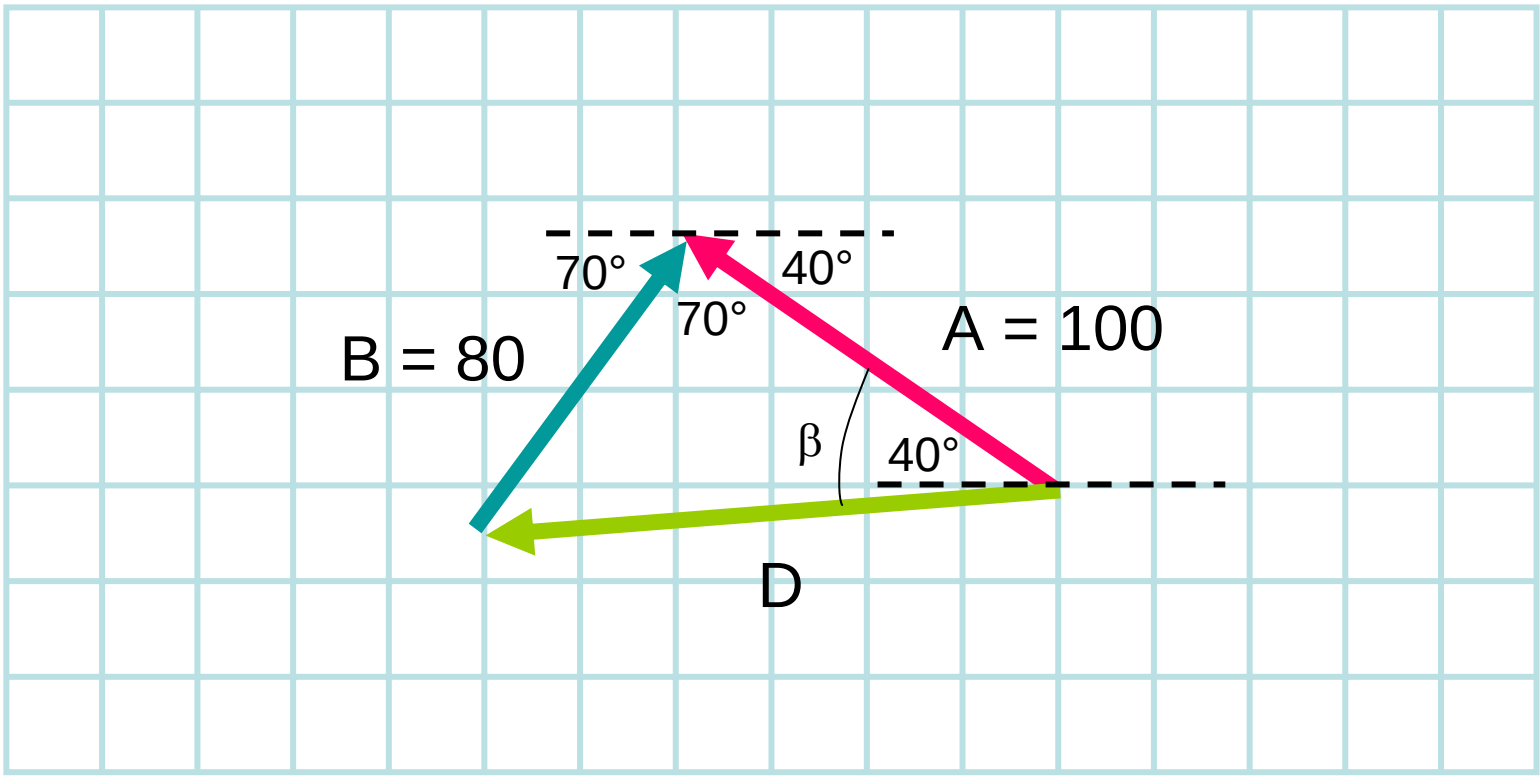




$$C = \sqrt{100^2 + 80^2 - 2(100)(80)\cos(110°)} = 147.89$$

$$\frac{\sin\beta}{80} = \frac{\sin(110°)}{147.89} \qquad \beta = \arcsin(0.5083) = 30.55°$$

$\vec{C}$ = 148 at 70.6° to –x axis



$$D = \sqrt{100^2 + 80^2 - 2(100)(80)\cos(70°)} = 104.54$$

$$\frac{\sin\beta}{80} = \frac{\sin(70°)}{104.54} \qquad \beta = \arcsin(0.7191) = 45.98°$$

$\vec{D}$ = 105 at 6.0° below –x axis