Question 5

The following diagram shows a particle in equilibrium under the action of three concurrent coplanar forces $\underset{\sim}{P}$, $\underset{\sim}{Q}$ and $\underset{\sim}{R}$. The forces $\underset{\sim}{P}$, $\underset{\sim}{Q}$ and $\underset{\sim}{R}$ have magnitudes of P, Q and R respectively. Which one of the following statements is **not** correct?

A. $P\sec(\theta) = Q\cosec(\theta)$
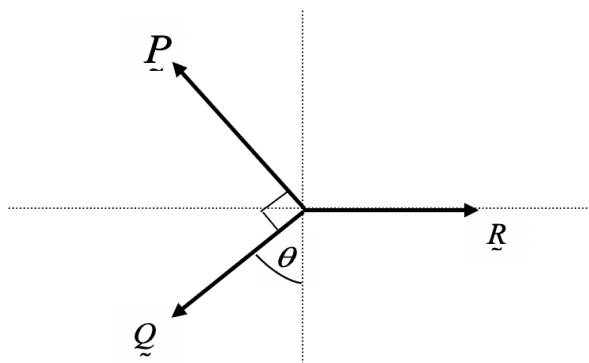
B. $\cot(\theta) = \dfrac{P}{Q}$

C. $R = Q\sin(\theta) + P\cos(\theta)$

D. $R^2 = P^2 + Q^2$

E. $P + Q + R = 0$

ANSWER E

resolving vertically $P\cos(90-\theta) - Q\cos(\theta) = 0 \;\Rightarrow\; P\sin(\theta) = Q\cos(\theta)$

$\dfrac{P}{\cos(\theta)} = \dfrac{Q}{\sin(\theta)}$, $P\sec(\theta) = Q\cosec(\theta)$ **A**. is true

$\dfrac{P}{Q} = \dfrac{\cos(\theta)}{\sin(\theta)} = \cot(\theta)$ **B**. is true

resolving horizontally $R - Q\sin(\theta) - P\sin(90-\theta) = 0 \;\Rightarrow\; R = Q\sin(\theta) + P\cos(\theta)$ **C**. is true

D. is true $R^2 = P^2 + Q^2$ as magnitudes

$\underset{\sim}{P} + \underset{\sim}{Q} + \underset{\sim}{R} = \underset{\sim}{0}$ as vectors is true, but as magnitudes $P + Q + R \neq 0$ **E**. is false