

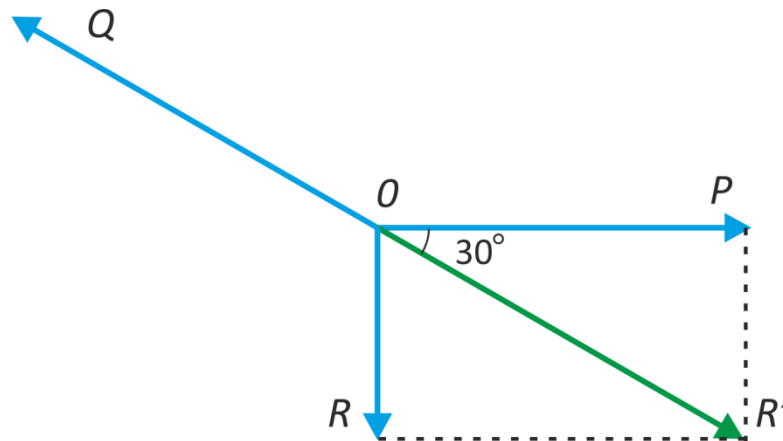
Answer on Question #47774, Physics, Other

Three forces P, Q and R are acting at a point in a plane. The angle between P & Q, Q & R are 150 degrees & 120 degrees respectively. Then for equilibrium, are forces P,Q & R in the ratio?

Solution:

Draw the diagram to represent P, Q and R in the plane, say OPQR, with O as origin and OP along x axis say. O is initial point and P is terminal point for the vector P. Similar thing holds good for other vectors Q and R.

- Note that the angle $ROP = 360 - (150 + 120) = 90^\circ$
- Represent vector R or OR as PR' , so that the line segment PR' is parallel to OR.
- By triangle law $P + R = OR'$
- OR' must be opposite and equal to Q in order to keep the particle at O in equilibrium
- So angle $POR' = 30^\circ$
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- Let $|P|$, $|Q|$, $|R|$ be the respective magnitudes
- Apply sine rule to the force triangle OPR'

$$OR' = \frac{|R|}{\sin 30^\circ} = \frac{|P|}{\sin 60^\circ} = |Q|$$

or

$$\frac{|P|}{1} = \frac{|Q|}{2} = \frac{|R|}{\sqrt{3}}$$

Answer: 1: 2: $\sqrt{3}$