

Answer on question #58166, Physics / Mechanics — Relativity

Question Two forces on the object are $F_1 = 3.6 \text{ N}$ at 74° below the $+x$ -axis and $F_2 = 3.6 \text{ N}$ at 34° above the $-x$ -axis. Is there a third force on the object, and why?

If yes, what is it? (If there is none, specify zero magnitude and direction.)

Solution There is the third force because the geometrical sum of all forces must be equal to zero if object is in rest. To find it, we first find net force of give two on X and Y axes. On X axis it is

$$F_y = 3.6 \cos(-74)^\circ + 3.6 \cos(34)^\circ \approx 3.96 \text{ N}$$

On Y axis:

$$F_x = 3.6 \sin(-74)^\circ + 3.6 \sin(34)^\circ \approx -1.45 \text{ N}$$

So the third force must have amplitude:

$$\sqrt{F_x^2 + F_y^2} = \sqrt{3.96^2 + 1.45^2} \approx 4.22 \text{ N}$$

And angle:

$$\alpha = \arctan \frac{-1.45}{3.96} + \pi \approx 2.78 \text{ rad} \approx 159.9^\circ$$

above X-axis.