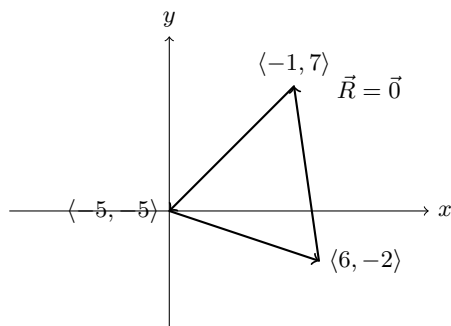


Question 5

Three forces $\langle 6, -2 \rangle$, $\langle -1, 7 \rangle$, and $\langle p, -5 \rangle$ act on an object. Find p so the horizontal component of the resultant vanishes, then find the resultant. Is it a nonzero vertical force?

Question 5 – Solution

Strategy Write every vector in matching component order. Perform scalar multiplication before addition or subtraction, then interpret the resulting components in the context of the problem.



Step 1 Add components: $\vec{R} = \langle 6 - 1 + p, -2 + 7 - 5 \rangle = \langle p + 5, 0 \rangle$.

Step 2 A vertical vector must have horizontal component zero, so $p + 5 = 0$ and $p = -5$.

Step 3 Here the vertical component is also zero, so the resultant is the zero vector: $\boxed{\vec{R} = \vec{0}}$. This is equilibrium. The zero vector has no direction, so no value of p produces a nonzero vertical resultant.

Verification The result follows from the defining vector formulas used above, and each component, magnitude, or scalar condition has been checked against the information in the question.

Key idea Vector equations behave like ordinary algebra provided that every operation is performed component by component. A final component check is often the fastest verification.