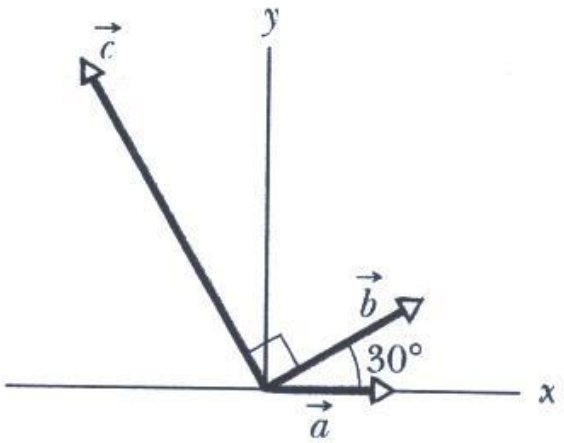
**Phys 101 – Sec # 1**
**Quiz # 2 (Ch. 3)**

Key

**Name:** **ID #**




The magnitudes of the vectors **a**, **b** and **c** are 3, 4, and 10 m respectively.

If $\vec{c} = m\vec{a} + n\vec{b}$, what are the values of m and n?

(**Hint**: Start by writing the vectors in unit vector notation)

$\vec{a} = 3\,\hat{i}$

$\vec{b} = (4\cos 30)\hat{i} + (4\sin 30)\hat{j} = 3.5\,\hat{i} + 2\,\hat{j}$

$\vec{c} = (10\cos 120)\hat{i} + (10\sin 120)\hat{j} = -5\,\hat{i} + 8.7\,\hat{j}$

Then $\vec{C} = m\,\vec{a} + n\,\vec{b}$

$\Rightarrow \quad -5\,\hat{i} + 8.7\,\hat{j} = m(3\,\hat{i}) + n(3.5\,\hat{i} + 2\,\hat{j})$

$-5\,\hat{i} + 8.7\,\hat{j} = 3m\,\hat{i} + 3.5n\,\hat{i} + 2n\,\hat{j}$

The i components should be equal in both sides

$\Rightarrow \boxed{-5 = 3m + 3.5n}$ (1)

The j-components should be equal in both sides:

$\Rightarrow \quad 8.7 = 2n$

$\Rightarrow \boxed{n = \frac{8.7}{2} = 4.3}$

then $-5 = 3m + 3.5(4.35)$

$m = \dfrac{-5 - 3.5(4.35)}{3} = -6.7$