Answer on Question #51026 – Math – Vector Calculus

<u>Problem</u>

The centroid of the triangle OAB is denoted by G. If o is the origin and line(OA) = 4i + 3j, line(OB) = 6i - j, find line(OG) in terms of the unit vectors i and j.

a. 10i - 3j
b. 1/2(10i–2j)
c. 10i + 2j
d. 1/3(10i+2j)

<u>Solution</u>

Vector $\overline{OB} = \overline{OA} + \overline{AB}$, hence $\overline{AB} = \overline{OB} - \overline{OA}, \overline{AM} = \frac{1}{2}\overline{AB}$.

Vector $\overline{OM} = \overline{OA} + \overline{AM} = \overline{OA} + \frac{1}{2}\overline{AB} = \overline{OA} + \frac{1}{2}(\overline{OB} - \overline{OA}) = \frac{1}{2}(\overline{OA} + \overline{OB})$.

Let OM be the median of the triangle OAB. By properties of centroid, $OG = \frac{2}{3}OM$ then.

Thus,

$$\overline{OG} = \frac{2}{3}\overline{OM} = \frac{2}{3} \cdot \frac{1}{2}(\overline{OA} + \overline{OB}) = \frac{1}{3}(\overline{OA} + \overline{OB}) = \frac{1}{3}(4i + 3j + 6i - j) = \frac{1}{3}(10i + 2j) = \frac{10}{3}i + \frac{2}{3}j$$

<u>Answer</u> : d. 1/3(10i+2j)