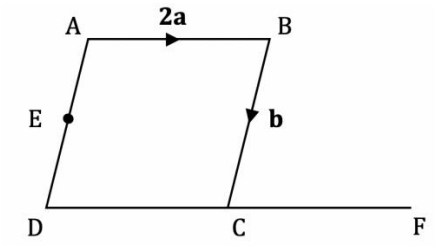
Functional Mathematics

Task 5 – **Vectors**
Due date:

1. The diagram shows a rhombus, *ABCD*. $\overrightarrow{CF}$ is an extension of $\overrightarrow{DC}$, such that *DC : CF* = 5:3 and *E* is the midpoint of *AD*. Find an expression for the vector $\overrightarrow{EF}$ in terms of ***a*** and ***b***?



[3 marks]

2. Given $\vec{v} = \hat{\imath} + 3\hat{\jmath} + 9\hat{k}$ and $\vec{w} = -5\hat{\imath} + 8\hat{\jmath} + 4\hat{k}$. Compute $|-2v + 5w|$?

[1.5 marks]

3. Determine if $\vec{v} = \widehat{3\imath} - 2\hat{\jmath} - 8\hat{k}$ and $\vec{w} =< -12, 8, 24 >$ are parallel vectors?

[1.5 marks]

4. Given $\vec{a} = \hat{\imath} + 3\hat{\jmath} - 2\hat{k}$ and $\vec{b} = -9\hat{\imath} + \hat{\jmath} - 5\hat{k}$. Determine the angle between the two vectors using the dot product and cross product?

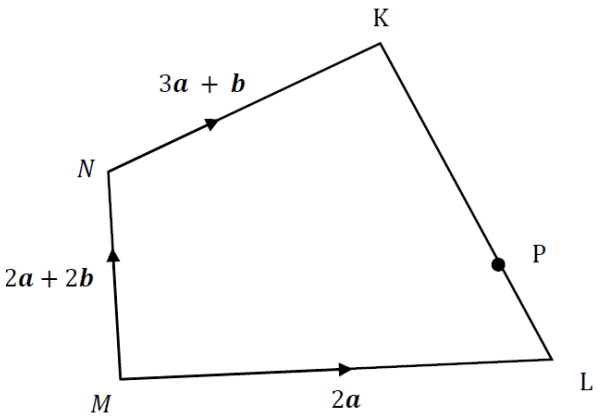
[4 marks]

Bonus Task

5. *KLMN* is an irregular quadrilateral. $\overrightarrow{ML} = 2a$, $\overrightarrow{MN} = 2a + 2b$ and $\overrightarrow{NK} = 3a + b$. Point *P* is positioned such that *LP:PK* = 1:2.

a) Find the vector $\overrightarrow{LK}$ in terms of ***a*** and ***b***.

b) Show that $\overrightarrow{MP} = \overrightarrow{NK}$.



[5 marks]