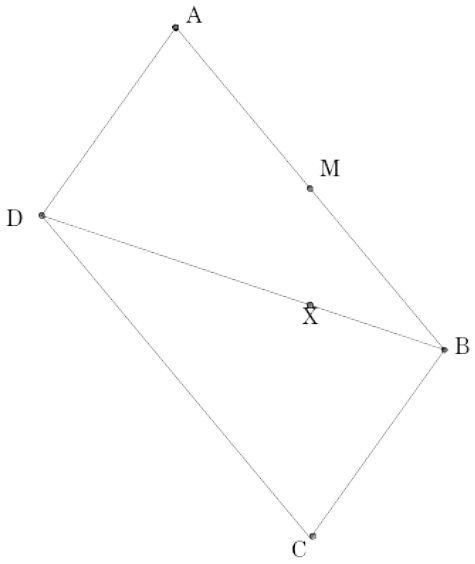
MATHEMATICS SPECIALIST 3,4
TEST 3 SECTION ONE 2016
NON Calculator Section
Chapters 4,5

Name_____ **Time: 15minutes**
Total: 13 marks

Question 1 **[5 marks]**

The diagram to the right shows parallelogram ABCD where $\overrightarrow{AB} = \mathbf{a}$ and $\overrightarrow{BC} = \mathbf{b}$.

Point X divides DB internally in the ratio 2:1.
Point M is the midpoint of AB.



a) Show that $\overrightarrow{DX} = \frac{2}{3}\mathbf{a} - \frac{2}{3}\mathbf{b}$. [1]

b) Find $\overrightarrow{CX}$ in terms of **a** and **b**. [1]

c) Prove that points M, X and C are collinear. [3]

Question 2 **[6 marks]**

Given the vectors, $\mathbf{a} = 2\mathbf{i} - 3\mathbf{j} + \mathbf{k}$, $\mathbf{b} = 4\mathbf{j} - \mathbf{k}$ and $\mathbf{c} = \mathbf{i} - 2\mathbf{j} - 3\mathbf{k}$, find:

a) $3\mathbf{b} - \mathbf{a}$ [1]

b) $|\mathbf{c}|$ [1]

c) the vector equation of the line passing through the point with position vector $3\mathbf{b}$ and the point with position vector $\mathbf{a}$. [2]

d) the vector equation of the plane passing through the point with position vector $\mathbf{b}$ and normal to the vector $\mathbf{c}$. [2]

Question 3 **[2 marks]**

Find $\underline{a} \times \underline{b}$ given that $\underline{a} = \begin{pmatrix} 2 \\ 3 \\ -2 \end{pmatrix}$ and $\underline{b} = \begin{pmatrix} 3 \\ -2 \\ 2 \end{pmatrix}$