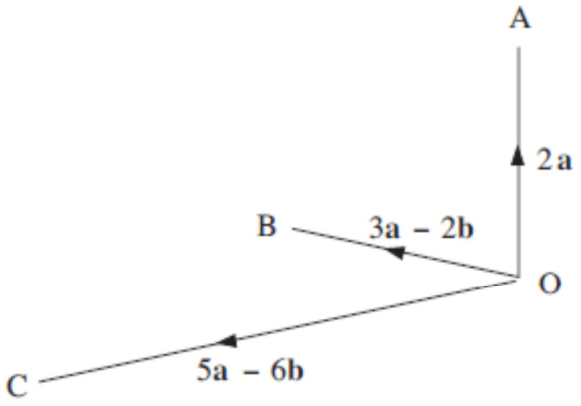
Albert Town High School

Mathematics Practice Paper – Vectors 2

Answer all questions

1.



In the diagram $\overrightarrow{OA} = 2a$, $\overrightarrow{OB} = 3a - 2b$ and $\overrightarrow{OC} = 5a - 6b$. Express in terms of a and b, as simple as possible

a. $\overrightarrow{AB}$

b. $\overrightarrow{BC}$

c. What do your answers to part (a) tell you about the points A, B and C? Give a reason for your answer.

2.

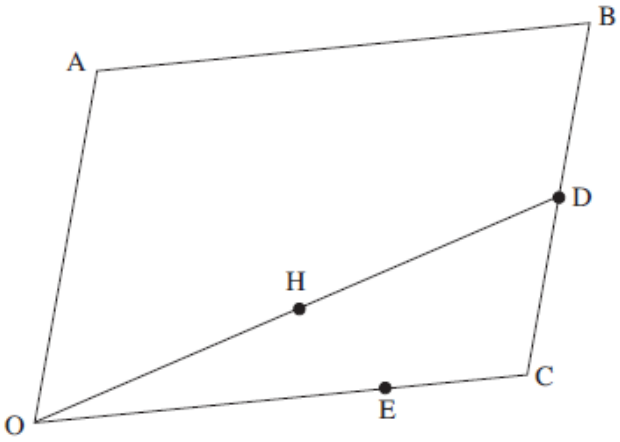
OABC is a parallelogram.

D is the midpoint of CB.

H is the midpoint of OD.

$\overrightarrow{OE} = \frac{2}{3}\overrightarrow{OC}$

Vector $\overrightarrow{OA} = \mathbf{a}$ and vector $\overrightarrow{OC} = \mathbf{c}$.



(a) Express, in terms of **a** and **c**,

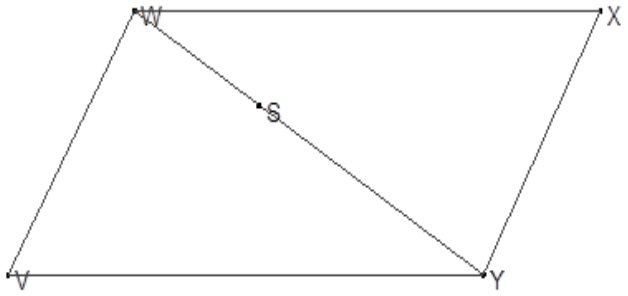
(i) $\overrightarrow{OD}$,

(ii) $\overrightarrow{AE}$

(iii) $\overrightarrow{HE}$ *(5 marks)*

(b) Show that $\overrightarrow{AE} + 4\overrightarrow{HE}$ and explain what this proves about the points A, H and E. *(2 marks)*

3. ***WXYV*** is a parallelogram in which $\overrightarrow{VY} = a$, $\overrightarrow{VW} = b$ and $WS : WY = 1 : 2$



Write in terms of **a** and **b** an expression for

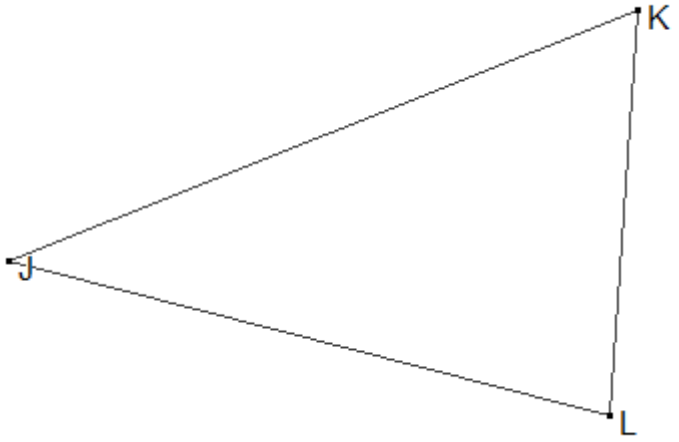
(a) $\overrightarrow{WY}$

(b) $\overrightarrow{WS}$

(c) $\overrightarrow{SX}$

(d) **R** is the midpoint of $\overrightarrow{VW}$. Prove that **R**, **S** and **X** are collinear

4. The diagram below, not drawn to scale shows triangle **JKL**.



M and **N** are points on **JK** and **JL** respectively, such that $JM = \frac{1}{3}JK$ and $JN = \frac{1}{3}JL$

(i) Copy and complete the diagram showing the points **M** and **N**

(ii) Given that $\overrightarrow{JM} = u$ and $\overrightarrow{JN} = v$ write in terms of u and v, an expression for

a. $\overrightarrow{JK}$

b. $\overrightarrow{MN}$

c. $\overrightarrow{KL}$

(iii) Using your findings in b(ii), deduce TWO geometrical relationships between **KL** and **MN**

This paper becomes due on Thursday November 17, 2011

You are strongly advised to do this paper