

VECTORS TOPIC

KCSE QUICK REVISION

*Compilation of Possible Questions in Mathematics Likely to be examined in
KCSE.*

*A Special Analysis of Prediction Questions that may be Tested in KCSE from this
Topic in Form 3.*

MATHEMATICS

SERIES 1

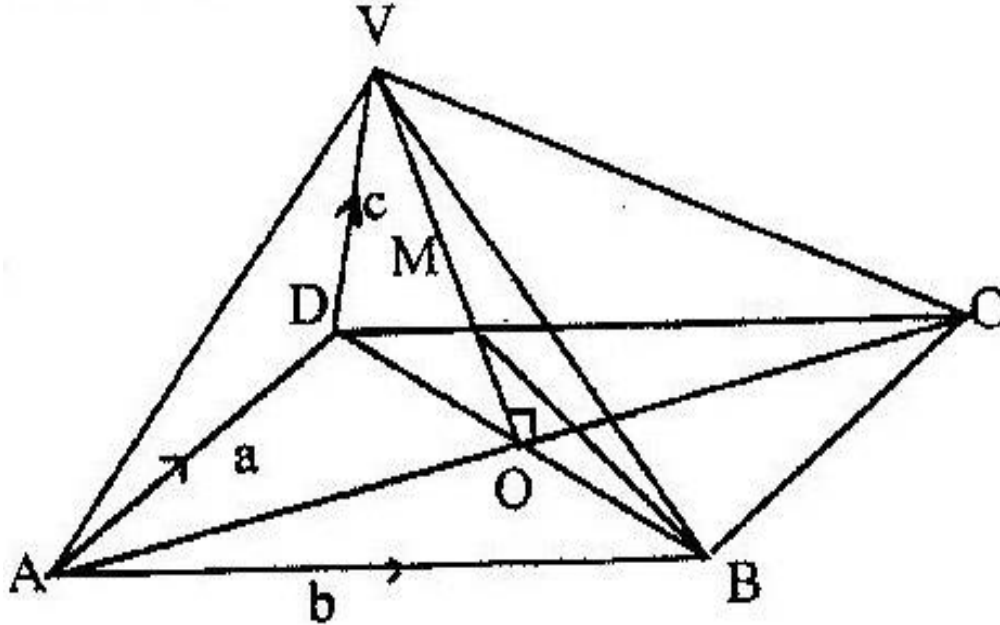
For Marking Schemes

Mr Isaboke 0746 222 000 / 0742 999 000

MWALIMU CONSULTANCY

VECTORS

1. The figure below is a right pyramid with a rectangular base ABCD and VO as the height. The vectors $AD = a$, $AB = b$ and $DV = c$



- a) Express
- (i) AV in terms of a and c
 - (ii) BV in terms of a , b and c
- (b) M is point on OV such that $OM: MV = 3:4$, Express BM in terms of a , b and c .
Simplify your answer as far as possible

2. In triangle OAB , $OA = a$ $OB = b$ and P lies on AB such that $AP: BP = 3:5$

(a) Find the terms of a and b the vectors

(i) AB

(ii) AP

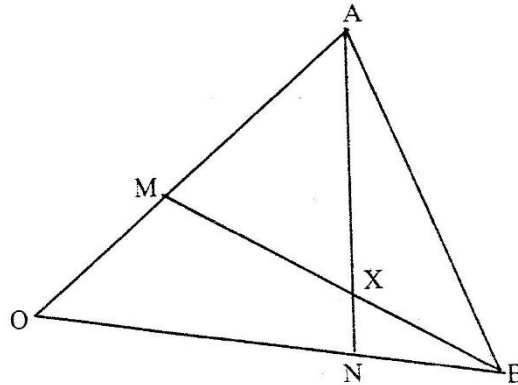
(iii) BP

(iv) OP

(b) Point Q is on OP such that $AQ = \frac{-5}{8}a + \frac{9}{40}b$

Find the ratio $OQ: QP$

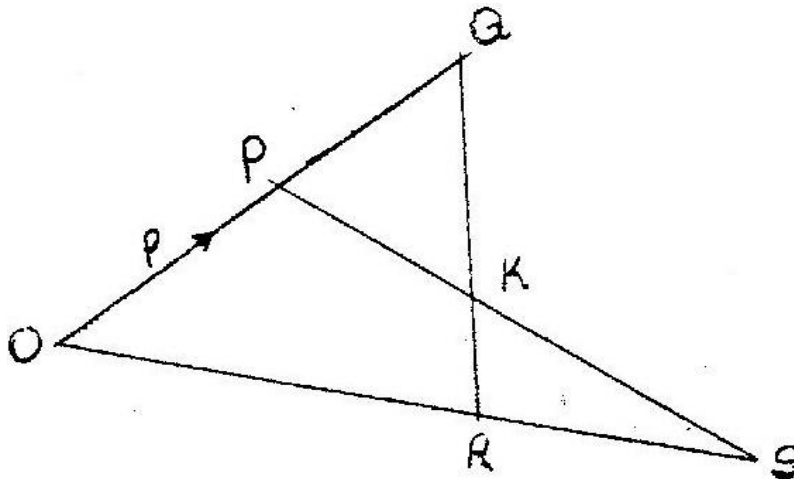
3. The figure below shows triangle OAB in which M divides OA in the ratio 2: 3 and N divides OB in the ratio 4:1 AN and BM intersect at X



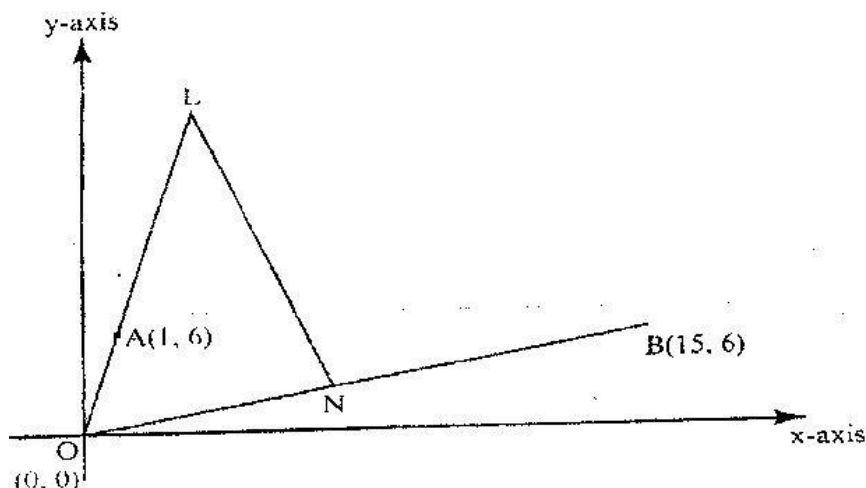
- (a) Given that $OA = a$ and $OB = b$, express in terms of a and b :
- (i) AN
 - (ii) BM
- (b) If $AX = s AN$ and $BX = tBM$, where s and t are constants, write two expressions for OX in terms of a, b, s and t
- Find the value of s
- Hence write OX in terms of a and b

4. The position vectors for points P and Q are $4i + 3j + 6k$ respectively. Express vector PQ in terms of unit vectors i, j and k . Hence find the length of PQ , leaving your answer in simplified surd form.

5. In the figure below, vector $OP = p$ and $OR = r$. Vector $OS = 2r$ and $OQ = \frac{3}{2}p$.

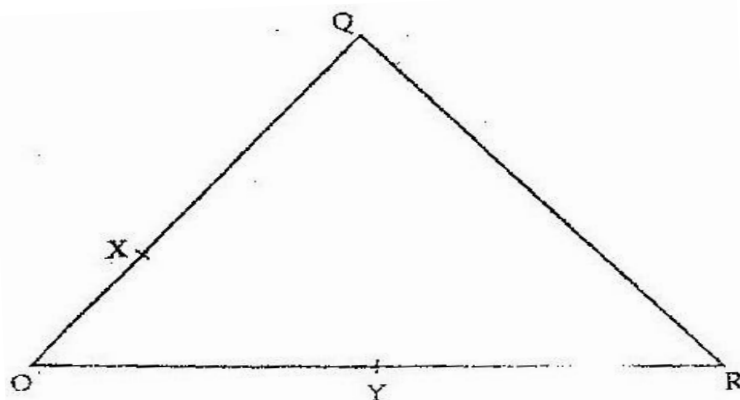


- a) Express in terms of p and r (i) QR and (ii) PS
- b) The lines QR and PS intersect at K such that $QK = m QR$ and $PK = n PS$, where m and n are scalars. Find two distinct expressions for OK in terms of p, r, m and n . Hence find the values of m and n .
- c) State the ratio $PK: KS$
6. Point T is the midpoint of a straight line AB . Given the position vectors of A and T are $i - j + k$ and $2i + 1\frac{1}{2}k$ respectively, find the position vector of B in terms of i, j and k
7. A point R divides a line PQ internally in the ratio $3:4$. Another point S , divides the line PR externally in the ratio $5:2$. Given that $PQ = 8$ cm, calculate the length of RS , correct to 2 decimal places.
8. The points P, Q, R and S have position vectors $2p, 3p, r$ and $3r$ respectively, relative to an origin O . A point T divides PS internally in the ratio $1:6$
- (a) Find, in the simplest form, the vectors OT and QT in terms p and r
- (b) (i) Show that the points Q, T , and R lie on a straight line
(ii) Determine the ratio in which T divides QR
9. Two points P and Q have coordinates $(-2, 3)$ and $(1, 3)$ respectively. A translation map point P to $P' (10, 10)$
- (a) Find the coordinates of Q' the image of Q under the translation
- (b) The position vector of P and Q in (a) above are p and q respectively given that $mp - nq = -12$
- 9
- Find the value of m and n
10. Given that $qi + \frac{1}{3}j + \frac{2}{3}k$ is a unit vector, find q
11. In the diagram below, the coordinates of points A and B are $(1, 6)$ and $(15, 6)$ respectively). Point N is on OB such that $3 ON = 2 OB$. Line OA is produced to L such that $OL = 3 OA$



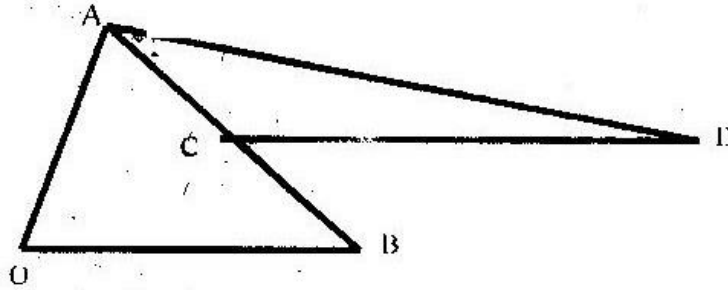
- (a) Find vector $\vec{LN}$
- (b) Given that a point M is on LN such that $LM:MN = 3:4$, find the coordinates of M
- (c) If line OM is produced to T such that $OM:MT = 6:1$
 - (i) Find the position vector of T
 - (ii) Show that points L, T and B are collinear

12. In the figure below, $OQ = q$ and $OR = r$. Point X divides OQ in the ratio 1: 2 and Y divides OR in the ratio 3: 4 lines XR and YQ intersect at E.



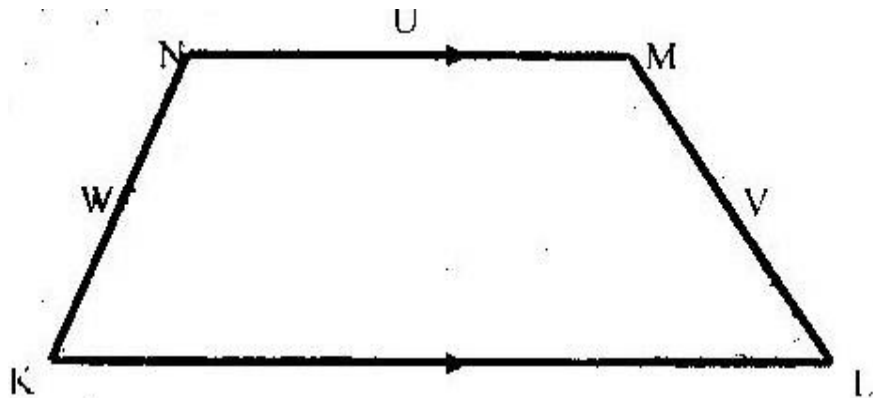
- (a) Express in terms of q and r
 - (i) $\vec{XR}$
 - (ii) $\vec{YQ}$
- (b) If $\vec{XE} = m \vec{XR}$ and $\vec{YE} = n \vec{YQ}$, express $\vec{OE}$ in terms of:
 - (i) r, q and m
 - (ii) r, q and n
- (c) Using the results in (b) above, find the values of m and n .

13. Vector q has a magnitude of 7 and is parallel to vector p . Given that $p = 3i - j + 1\frac{1}{2}k$, express vector q in terms of i , j , and k .
14. In the figure below, $OA = 3i + 3j$, $OB = 8i - j$. C is a point on AB such that $AC:CB = 3:2$, and D is a point such that $OB \parallel CD$ and $2OB = CD$ (T17)



Determine the vector DA in terms of i and j

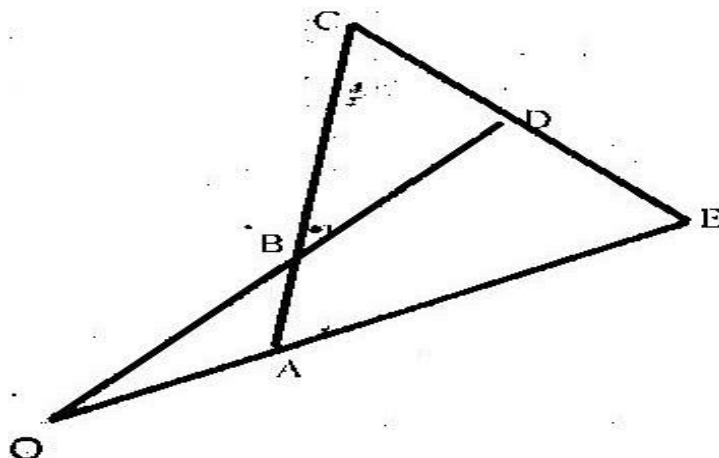
15. In the figure below, $KLMN$ is a trapezium in which KL is parallel to NM and $KL = 3NM$



Given that $KN = w$, $NM = u$ and $ML = v$. Show that $2u = v + w$

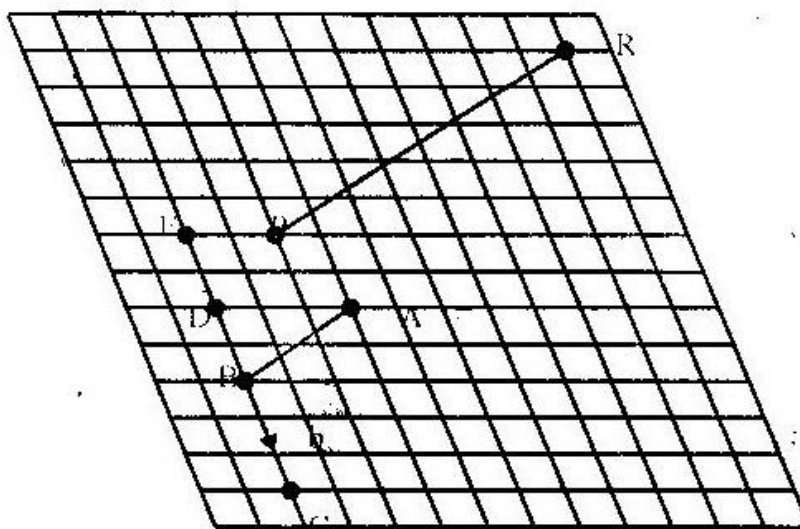
16. The points P , Q and R lie on a straight line. The position vectors of P and R are $2i + 3j + 13k$ and $5i - 3j + 4k$ respectively; Q divides PR internally in the ratio $2:1$. Find the
- (a) Position vector of Q
 - (b) Distance of Q from the origin
17. Co-ordinates of points O , P , Q and R are $(0, 0)$, $(3, 4)$, $(11, 6)$ and $(8, 2)$ respectively. A point T is such that the vector OT , QP and QR satisfy the vector equation $OT = QP + \frac{1}{2}QT$. Find the coordinates of T .

18. In the figure below $OA = a$, $OB = b$, $AB = BC$ and $OB:BD = 3:1$



(a) Determine

- (i) AB in terms of a and b
 - (ii) CD , in terms of a and b
 - (b) If $CD:DE = 1:k$ and $OA:AE = 1:m$ determine
 - (i) DE in terms of a , b and k
 - (ii) The values of k and m
19. The figure below shows a grid of equally spaced parallel lines



$AB = a$ and $BC = b$

- (a) Express
 - (i) AC in terms of a and b
 - (ii) AD in terms of a and b

(b) Using triangle BEP, express BP in terms of a and b

(c) PR produced meets BA produced at X and $PR = \frac{1}{9}b - \frac{8}{3}a$

By writing PX as kPR and BX as hBA and using the triangle BPX determine the ratio
PR: RX

20. The position vectors of points x and y are $x = 2i + j - 3k$ and $y = 3i + 2j - 2k$ respectively. Find XY

21. Given that $X = 2i + j - 2k$, $y = -3i + 4j - k$ and $z = 5i + 3j + 2k$ and that $p = 3x - y + 2z$, find the magnitude of vector p to 3 significant figures.

For Marking Schemes/Answers

Contact Mr Isaboke

0746-222-000

OR

0742-999-000

FOR THE FOLLOWING;

- ✓ **ONLINE TUITION**
- ✓ **REVISION NOTES**
- ✓ **SCHEMES OF WORK**
- ✓ **SETBOOKS VIDEOS**
- ✓ **TERMLY EXAMS**
- ✓ **QUICK REVISION KITS**
- ✓ **KCSE TOPICALS**
- ✓ **KCSE PREMOCKS**
- ✓ **TOP SCHOOLS PREMOCKS**
- ✓ **JOINT PREMOCKS**
- ✓ **KCSE MOCKS**
- ✓ **TOP SCHOOLS MOCKS**
- ✓ **JOINT MOCKS**
- ✓ **KCSE POSTMOCKS**
- ✓ **TOP SCHOOLS PREDICTIONS**
- ✓ **KCSE PREDICTIONS**
- ✓ **KCSE REVEALED SETS**

CALL/TEXT/WHATSAPP

0746 222 000 / 0742 999 000

mwalimuconsultancy@gmail.com

This is a Copyright Property of Mwalimu Consultancy Ltd.

***POWERED
BY
MR ISABOKE***