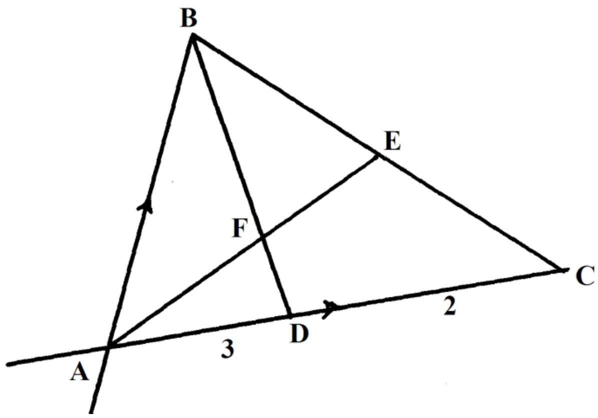
1. Vectors 2

1. In the figure below E is the mid point of BC. AD:DC = 3:2 and F is the meeting point of BD and AE



If AB = $\underset{\sim}{b}$ and AC = $\underset{\sim}{c}$

(a) Express the following in terms of $\underset{\sim}{b}$ and $\underset{\sim}{c}$

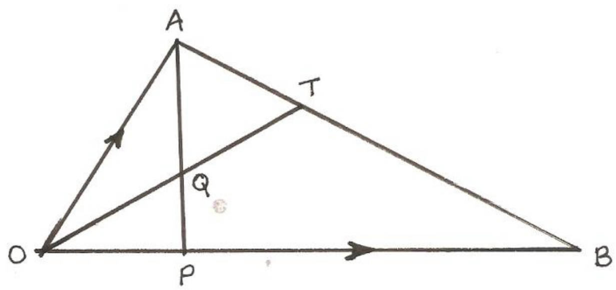
(i) $\underset{\sim}{BD}$ (1mk)

(ii) $\underset{\sim}{AE}$ (2mks)

(b) If $\underset{\sim}{BF} = t\underset{\sim}{BD}$ and $\underset{\sim}{AF} = n\underset{\sim}{AE}$ find the value of t and n. (5mks)

(c) State the ratio of BD to BF. (1mk)

2. In the figure below OA = a and OB = b. Points P and T divide $\overline{OB}$ *and* $\overline{AB}$ internally in the ration 2:3 and 1:3 respectively. Lines $\overline{OT}$ *and* $\overline{AP}$ meet at Q.



Find in terms of $\underset{\sim}{a}$ *and* $\underset{\sim}{b}$

(i) $\underset{\sim}{OT}$ (3mks)

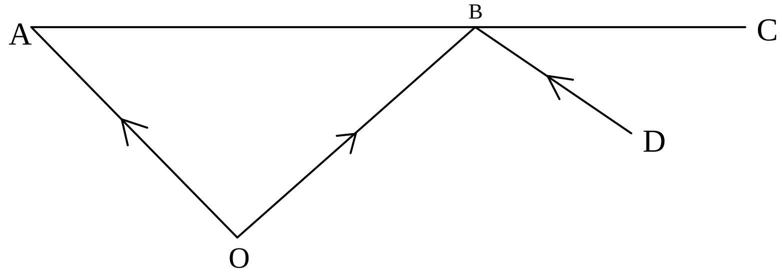
(ii) $\underset{\sim}{OP}$ (1mk)

(iii) $\underset{\sim}{AP}$ (1mk)

(iv) $\underset{\sim}{OQ}$ (5mks)

If OQ = kOT and AQ = hAP where k and h are constants express OQ in two different ways and hence find the values of h and k. (10mks)

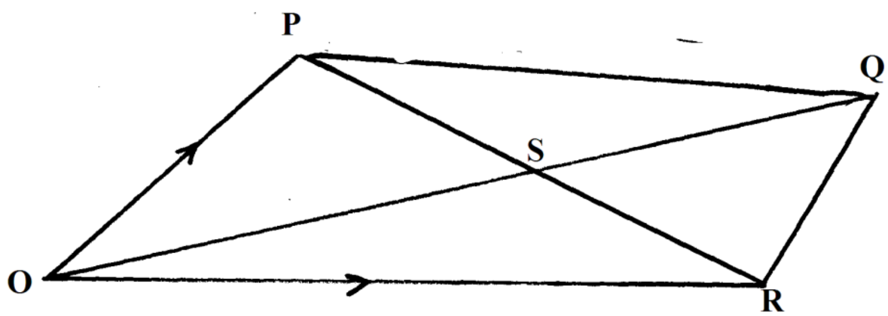
3. In the figure below $\underset{-}{OA} = \underset{-}{a}$, $\underset{-}{OB} = \underset{-}{b}$ and DB is parallel to OA. C is on AB extended such that AB: BC = 2:1 and that OA = 3DB.



a) Express the vector BC in terms of **a** and **b.** (1mk)

b) Show by vector methods that the points O, D and C are collinear. (3mks)

4. In the figure below $\vec{OP} = \frac{1}{2}\underset{\sim}{a} + \underset{\sim}{b}$, $\vec{OR} = \frac{7}{2}\underset{\sim}{a} - \underset{\sim}{b}$, $\vec{RQ} = \frac{3}{2}k\underset{\sim}{b} + \frac{1}{2}m\underset{\sim}{a}$, where k and m are scalars 2PS = 3SR.



(a) Express as simply as possible in terms of $\underset{\sim}{a}$ *and* $\underset{\sim}{b}$ each of the following vectors.

(i) $\vec{PR}$ (1mk)

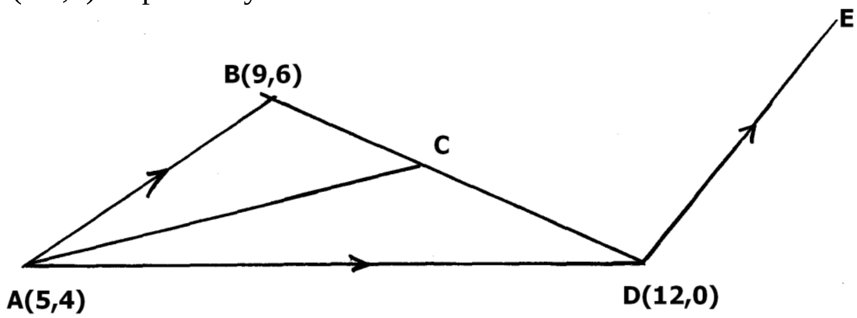
(ii) $\vec{PS}$ (1mk)

(iii) $\vec{OS}$ (1mk)

(b) Express $\vec{OQ}$ in terms of a, b, k and m. (2mks)

(c) If Q lies on $\vec{OS}$ produced with $\vec{OQ}$; $\vec{OS}$ = 5:4, find the value of k and m. (5mks)

5. In the figure below, DE = ½ AB and BC = 2/3 BD and the co ordinates of A,B and D are (5,4),(9,6) and (12,0) respectively.



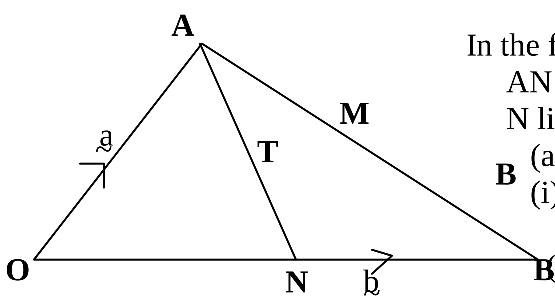
Find the vectors

(i)	BD	(1mk)
(ii)	BC	(1mk)
(iii)	CD	(1mk)
(iv)	AC	(2mks)

b) Given that AC = kCE; where k is a scalar,
Find

(i)	the value of k	(4mks)
(ii)	the ratio in which C divide AE.	(1mk)

6.



In the figure alongside $\overrightarrow{OA} = \underset{\sim}{a}$, $\overrightarrow{OB} = \underset{\sim}{b}$. T lies on AN such that AN : TN = 13:6. M lies on AB such that $\overrightarrow{AM}:\overrightarrow{MB}$=1:3 and N lies on OB such that OB:BN = 7:-5.

(a) Express in terms of a and b in the simplest form

(i) $\overrightarrow{AN}$

(ii) $\overrightarrow{AT}$

(iii) $\overrightarrow{AM}$

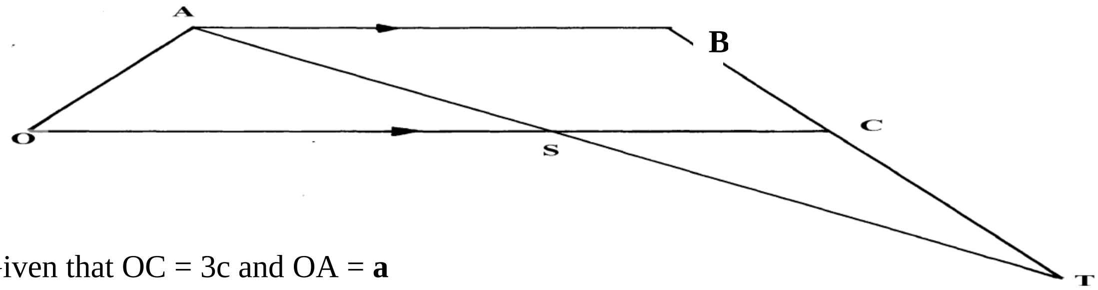
(b) Show that O, T and M are collinear and state the ratio of OT: TM

7. A point (-3, 4) divides **AB** internally in the ratio 3:5. Find the coordinates of point **A** given that point **B** is (6, -5)

8. Given that O is the origin, OA = 3i + 2j – 4k and OB = 6i + 11j + 2k. If **x** divides AB in the ratio1:2, find the modulus of OX to 2d.p

9. a) Expand $(2 - {}^{1}/_{5}x)^5$
b) Hence use the expansion to find the value of $(1.96)^5$ correct to 3 decimal places

10. In the figure OABC is a trapezium in which 3 AB = 2OC. S divides OC in the ratio 2:1 and AS produced meets BC produced at T



Given that OC = 3c and OA = **a**

(a) Express AS and BC in terms of **a** and **c**

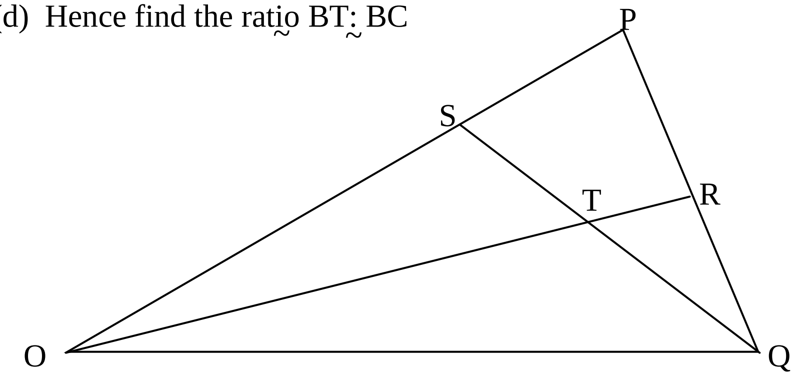
(b) Given further that AT = hAS and BT = KBC where h and k are constants

(i) Express AT in two ways in terms a, c , h and k

(c) The obtuse angle between the lines PQ

(d) Hence find the ratio BT: BC

11.



In the figure above, OPQ is a triangle in which OS = ¾ OP and PR: RQ = 2 : 1. Lines OR and SQ meet at T.

(a) Given that OP = P and OQ = q, express the following vectors in term of p and q

(i) PQ

(ii) OR

(iii) SQ

(b) You area further given that ST = m SQ and OT = n OR. Determine the values of m and n