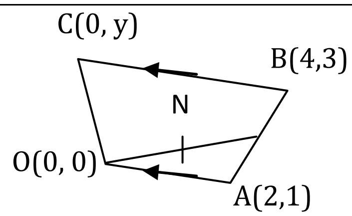
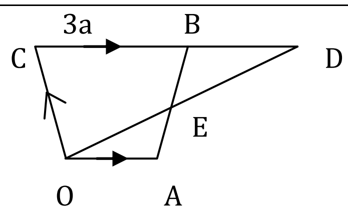
VECTORS MARKING SCHEME

1.	DE = $\frac{2}{3}$p - $\frac{4}{15}$q **1989Q11**	
2.	(i) $\overrightarrow{AC}$ = $\underline{b}$ + 2$\underline{a}$ (ii)AX = m(b +2a) AX = AM + MX = a + N(-A + B) = a + NA +NA mb + 2ma = a (1 –n) + nb mb = nb…………..(i) 2ma = a (1-n)………….(ii) m = n 2m = 1-n 2m = 1-m 2m + m=1 3m =1 m=$^1/_3$ m=n=$^1/_3$ m = $\frac{1}{3}$,n = $\frac{1}{3}$ **1990Q21**	
3.	EC = eb + ba + ac = $-\frac{4}{3}p + \frac{2}{3}q$ + -2p + q = $\frac{4}{3}p - \frac{2}{3}q$ - 2p + q = $\frac{1}{3}q - \frac{2}{3}q$ **1990Q8**	
4.	$\begin{pmatrix}10\\3\end{pmatrix} - \begin{pmatrix}-4\\10\end{pmatrix} = \begin{pmatrix}14\\-7\end{pmatrix}$ $\frac{5}{7}\begin{pmatrix}14\\-7\end{pmatrix} = \begin{pmatrix}10\\-5\end{pmatrix}$ $\begin{pmatrix}-4\\10\end{pmatrix} + \begin{pmatrix}10\\-5\end{pmatrix} = \begin{pmatrix}6\\5\end{pmatrix}$ T (6,5) **1990Q10**	
5.	CA = -$\underline{c}$ + $\underline{a}$ MA = ½ (-c + a) MT = MA + AT -$^1/_2$c + $^1/_2$a + $^3/_2$c = $\frac{1}{2}$ a + c **1991Q6**	
6.	(i) AE = AC + CE = c + ½ (-c + b) = c +$^1/_2$c + $^1/_2$b = $^1/_2$c + $^1/_2$b BD = BA +AD = -b + 3/5c (i)AF = SAE = S($^1/_2$c + $^1/_2$b) =$^1/_2$sc + $^1/_2$sb) Af = AB + BF = b + t (-b + $^3/_5$c) = b – tb + $^3/_5$c ½ sc = $^1/_2$sb = b (1-t) + $^3/_5$tc ½ sc = $^3/_5$tc $^1/_2$sb = b(1-t) $^1/_2$s = $^3/_5$t ………………..(i) $^1/_2$s = (1-t)…………………(ii) T = 1 -$^1/_2$s $^1/_2$S = $^3/_5$ (1 + $^1/_2$s) $^1/_2$S = $^3/_5$ - $^3/_{10}$S $^1/_2$S + $^3/_5$S = $^3/_5$ $^{11}/_{10}$s = $^3/_5$ s = $^3/_5$ x $^{10}/_{11}$ s= $^6/_{11}$ t = 1 – $^1/_2$s t = 1- $^3/_{11}$ = 1 -$^3/_{11}$ t = $^8/_{11}$ S = $^6/_{11}$, t = $^8/_{11}$ **1991Q20**	
7.	(i) AE = $\frac{1}{2}$c + $\frac{1}{2}$b , BD = $\frac{3}{5}$c – b **1992Q20**	

8.	 **1992Q24**	
9.	y = 2p -3q = 2(3t+25) – 3(5t -5) y = 6t + 45 – 15t + 35 y = 7s – 9t (h –k)s + ht = 7s -9t h –k = 7 h = -9 -9 –k =7 -k = 7 + 9 = 16 k = -16 h= -9 : k = - 16 **1992Q7**	
10.	 OE $=\frac{1}{2}$ OD, therefore OE is parallel to OD O is a common point, points O, E, D are collinear **1993Q21**	
11.	**CX** = CA + AX = b + ¼(-b + a) = b – $^1/_4$b + $^1/_4$a = $\frac{3}{4}$b **+** $\frac{1}{4}$a **1993Q16**	
12.	(a) (i)AC $=\frac{10}{9}$a + $\frac{25}{18}$b (ii) DC = $\frac{10}{9}$a + $\frac{7}{18}$b (b) n = $\frac{10}{9}$,m = $\frac{7}{18}$ **1994Q24**	

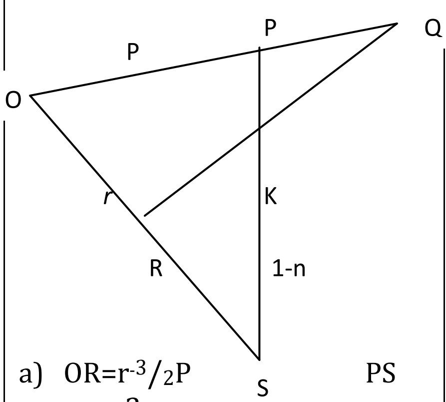
13.	**CD** = - $\frac{3}{4}$ a + $\frac{3}{4}$ b AB = - a + b $\left(-\frac{3}{4}a + \frac{3}{4}b\right)$ = kb –ka Kb = $\frac{3}{4}$ b k = $\frac{3}{4}$ CD = $\frac{3}{4}$ AB **1994Q10**	
14.	$\begin{pmatrix}-5\\1\\-2\end{pmatrix} - \begin{pmatrix}3\\4\\-6\end{pmatrix} = \begin{pmatrix}-8\\-5\\8\end{pmatrix}$ $\begin{pmatrix}-8\\-5\\8\end{pmatrix} = \begin{pmatrix}-3.2\\-2\\3.2\end{pmatrix}$ $\begin{pmatrix}3\\4\\-6\end{pmatrix} + \begin{pmatrix}-3.2\\-2\\3.2\end{pmatrix} = \begin{pmatrix}-0.2\\2\\-2.8\end{pmatrix}$ **1994Q12**	
15.	Let O be the point of intersection of the diagonals, **DC = a** and **DA = b.** Express DO in two different ways using two constants, say m and n Prove that m = n = $\frac{1}{2}$, hence **DO** = $\frac{1}{2}$**DB**, and **AO** = $\frac{1}{2}$ **AC**. This shows that O bisects DB as well as AC! **1994Q15**	
16.	(a) (i) **AV** = **a + c** (ii) **BV** = **a – b + c** (b) (i)**BM** = $\frac{5}{7}$**a** - $\frac{5}{7}$**b** + $\frac{3}{7}$**c** **1995Q18**	
17.	(a) (1) AC= OA + OC = a + b (b) BN = BA + AN =-b$\frac{-2a}{3}$	B1 N1 A1

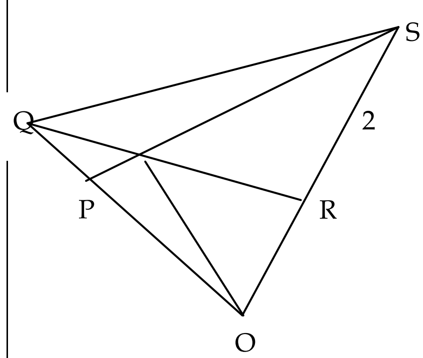
	(c) (i) AX = hAC,BX = Kbn OX = OA + AX = a+h (b-a)….(1) OX = OA + AB + BX A+b+k(-b – 2a)…(2) (1-h) a+hb = $\frac{(1-2k)}{3}$ a + (1 – k)b I –h1 – 2 –k…………(3) H = 1-k………….(4) h = $\frac{2}{5}$ k= $\frac{3}{5}$ (ox = a + $\frac{2}{5}$ (b - a) = $\frac{3a}{5}$ + $\frac{2b}{5}$ **1996Q22**	M1 M1 M1 A1 B1 8mks
18	i). AQ : QC = 4:3 allow 8: 6 ii). QC = $^3/_7$ x 14 = 6cm **1997Q11**	B1 B1
19.	a). i).$\overline{AB}$ = $\overline{OB}$ – $\overline{OA}$ = b –a ii). CD = CB + BD = (a-b) + ½ b …….. = <u>a</u> – $^2/_3$ <u>b</u> …….. b). i). <u>DE</u> = KCD = K(a – $^2/_3$ b). …… ii). In ΔODE <u>OD</u> + <u>DE</u> = <u>OE</u> $^4/_3$b k (a- $^2/_3$ b= <u>a</u> + m<u>a</u> ($^4/_3$ – $^2/_3$k(<u>b</u>) = O K = 2 K<u>a</u> = <u>a</u> + m<u>a</u> K = 1 +m 2 = 1 +m M = 1 **1997Q22**	B1 B1 B1 B1 M1 A1 M1 A1 8 mks
20.	3v – u = w + v 2u = w + v **1998Q9**	M1 A1 2mks
21.	(a) (i) a + b (ii) AD = AB + BD a + $\frac{(-2)b}{3}$	B1 M1 A1

	a - $\frac{2a}{3}$ (b) $\frac{-2a}{3}$ AD + $\frac{-4H}{3}$ $^2/_3$ (a - $\frac{2b}{3}$ + $\frac{-4b}{3}$) $\frac{2a}{3}$ - $\frac{4b}{9}$ - $\frac{-4b}{3}$ $\frac{-2a}{3}$ - $\frac{8a}{9}$ = $\frac{2}{3}$ (-a -$\frac{4b}{3}$) (c) $\overline{PR}$ = $\frac{1b}{9}$ - $\frac{8a}{3}$ $\overline{Px}$ = k $\frac{(1b}{9}$ — $\frac{8a)}{3}$ $\overline{BX}$ = h(-a) = ha $\overline{BX}$ = $\frac{-2a}{3}$ - $\frac{8b}{9}$ + $\frac{(1b}{9}$ — $\frac{8a)}{3}$ = 2a + $\frac{k8a}{3}$ - $\frac{8b}{3}$ + $\frac{1kb}{9}$ = $\frac{(-2}{3}$ — $\frac{-8k)}{3}$ a + $\frac{(8}{9}$ — $\frac{1k)}{9}$b -h = $\frac{2}{9}$ + $\frac{8k}{3}$ $\frac{-8}{9}$ + $\frac{1k}{9}$ =0 $\frac{1k}{9}$ = $\frac{8}{9}$ K = 8+ h = $\frac{+2}{3}$ + $\frac{8x}{9}$ k = $\frac{+2}{3}$ + 64 = $\frac{66}{3}$ H =6 h = 22 Px =8 $\frac{(1b}{9}$ — $\frac{8a)}{3}$ $\frac{8b}{9}$ - $\frac{64a}{3}$ PR: RX = 1:7 **1998Q22**	M1 A1 M1 M1 A1 A1 8mks
22.	OQ = $^1/_3$ (2i + 3j + 13k) + $^2/_3$ (Si – 3j + 4k) Or (2i + 3j + 13k) + $^2/_3$ (3i – 6j – 9k) = 4j – j + 7k OQ = √4^2 + (-1)^2 + 7^2 = √66 = 8.124 **1999Q14**	
23.	a). i). AB=b-a	

	ii). AP= $^3/_8$ (b-a) iii). BP = $^5/_8$ (a-b) iv). OP=OA + AP or OB + BP = a = $^5/_5$ (b-a) = $^5/_8$a + $^5/_8$b OQ: OP =$^3/_8$a + $^9/_{40}$b :$^5/_8$a +$^3/_8$b = $^3/_8$(a + $^3/_5$b) : $^5/_8$ (a+$^3/_5$b) = 3;5 OQ:QP=3:2 b). OQ=a – $^5/_8$a + $^9/_{40}$b $^3/_8$a + $^9/_{40}$b OQ + k OP = K($^5/_8$a + $^3/_8$b) $^5/_8$a + $^9/_{40}$b = K($^3/_8$ba+$^3/_8$b) 3($^5/_{40}$a + $^3/_{40}$b)= 5K ($^5/_{40}$a+ $^3/_{40}$b) 3 = 5k OQ:QP=3:2 **1999Q21**	B1 B1 B1 MA A1 M1 M1 A1 8 Mks
24	a) AN = ON - OA = $\frac{4b}{5}$ - a b) BM = OM - OB = $\frac{2b}{5}$ – ad **2000Q2**	B1 B1
25.	PQ =3i -4i -6j+6k-2k =I–9j+4k 0r 4k -7j-I **OR** -9j+4k – i Lenght = $(-1)^2 + (-9)^2 + 4$ = 98 = $7\sqrt{2}$ PQ= $\sqrt{}$ 12 + 92 + 42 =$7\sqrt{2}$ **2001Q16**	B1 M1 A1 3 mks
26.	a) i) 00 = P + £ ii) OT = OR + $^1/_5$ RO = + $^1/_5$p b) i) OS = m OO = m(p+r) = mp + mr	B1 B1 B1

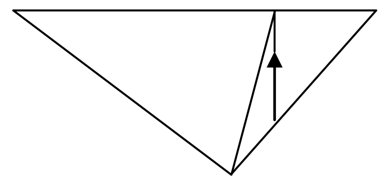
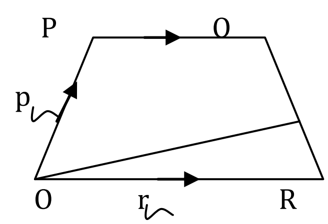
	ii) OS = OT + n TP = (r + $^1/_{5p}$) (+N(R – $^1/_{5P}$ + P) = R(1 – N) + P ($^1/_5$ + $^4/_{5N}$) iii) mp + mr = r(r – n) + p($^1/_5$ +$^4/_5$n) m = $^1/_5$ + $^4/_5$n……….(1) 5m = 1+ 4n = 1+ 4 (1– m) 9m = 5 M = $^5/_9$ iv) QS = $^5/_9$P = 5/9r S divides OQ in the ration 5 : 4 **2001Q19**	B1 M1 M1 A1 B1 8 mks
27.	QP $\begin{pmatrix}-8\\-2\end{pmatrix}$ ½ QR = ½ $\begin{pmatrix}-3\\-4\end{pmatrix}$ = $\begin{pmatrix}½\\-2\end{pmatrix}$ QT = $\begin{pmatrix}-8\\-2\end{pmatrix}$ + $\begin{pmatrix}-1½\\-2\end{pmatrix}$ $\begin{pmatrix}-9½\\-4\end{pmatrix}$ Coordinates of T = (-9 ½ , -4) **2002Q10**	B1 B1 B1 3 mks
28.	XY = OY – OX = $\begin{vmatrix}3\\2\\-2\end{vmatrix}$ - $\begin{vmatrix}2\\1\\-3\end{vmatrix}$ = $\begin{vmatrix}1\\1\\1\end{vmatrix}$ = i + j + k **2002Q4**	A1 M1 2 mks
29.	6p = 3$\begin{pmatrix}2 & -3 & -5\\1 & 4 & 3\\-2 & -1 & 2\end{pmatrix}$ = $\begin{pmatrix}6\\3\\-6\end{pmatrix}$ $\begin{pmatrix}3\\-4\\1\end{pmatrix}$ $\begin{pmatrix}-10\\6\\4\end{pmatrix}$ P = $\begin{pmatrix}-1\\5\\1\end{pmatrix}$ or p=-i+5j-k P = $\sqrt{-1)2 + (5)2 + (-1)2}$ = $\sqrt{27}$ = 5.196 To 3 sf=5.20 **2003Q6**	M1 A1 M1 4 mks

30.	 a) $OR=r-{}^{3}/_{2}P$ PS $= 2r-p$ b). $OK = {}^{3}/_{2}p+m(r-{}^{3}/_{2}p)$ $OK = p+n(2r-p)$ ${}^{3}/_{2}+m(r-3np)=P+np+2nr$ ${}^{3}/_{2}-{}^{3}/_{2}m)p+mr=(1-n)p+2nr$ $2n=m$......(1) ${}^{3}/_{2}-{}^{3}/_{2}m=1-n$......(2) $m=\frac{1}{2}$ $N={}^{1}/_{4}$ c). PK : KS = 1: 3 **2003Q21**	B1 B1 M1 M1 M M1 A1 B1 8 mks
31.	OB-OA=(4i+j-3k)-(3i-2j+k) =4i+j-3k-3i+2j-k AB=i+3j-4k accept column rectors $= 12-32+(-4)^2$ = 1+3j-4k =1+9+6 =26 =5.099 = 5.10 to 2 places **2004Q4**	M1 A1 2 mks
32.	a). AB=DC $\begin{pmatrix}4\\0\end{pmatrix} \begin{pmatrix}2\\-4\end{pmatrix} = \begin{pmatrix}1\\6\end{pmatrix} \begin{pmatrix}X\\Y\end{pmatrix}$ $\begin{pmatrix}X\\Y\end{pmatrix} = \begin{pmatrix}1\\5\end{pmatrix} \begin{pmatrix}-2\\4\end{pmatrix}$ D (-1,2) b). i). $PR = \frac{3q}{2} - \frac{1}{2}p - p$ $= \frac{3q}{2} \frac{-3p}{2}$ ii). $RQ = \frac{q}{2} - \frac{3q}{2} + 1p$	M1 M1 A1 B1 B1

	$= \frac{-1q}{2} + \frac{1p}{2}$ $PR = \frac{3(9-P)}{2}$ $Rq = -\frac{1}{2}(q-p)$ PR = 3 QR PR // QR is a common point Hence P.Q.R are collinear iii). PQ = q-p $QR = \frac{1q}{2} - \frac{1p}{2}$ In PQ, OR = 2 : 1 **2004Q21**	B1 B1 B1 5 mks
33.	$A = \begin{pmatrix}1\\-1\\1\end{pmatrix}$ B $\begin{pmatrix}X\\Y\\z\end{pmatrix}$ and $T = \begin{pmatrix}2\\0\\1.5\end{pmatrix}$ Mid point - AB $= \left(\frac{X_1+X_2}{2}, \frac{Y_1+Y_2}{2}, \frac{Z_1+Z_2}{2}\right)$ $\left(\frac{1+X}{2}, \frac{Y-1}{2}\ \frac{1+z}{2}\right) = (2,0,1.5)$ X = 3, y=1 and z =2 Hence B $\begin{pmatrix}X\\Y\\Z\end{pmatrix} = \begin{pmatrix}3\\1\\2\end{pmatrix}$ B = 3i + j + 2k Ans **2005Q13**	M1 B1 A1
34.	 a). PS = -PO + OS = 2p+3r = 3r-2p $OT = {}^{1}/_{7}OS + {}^{6}/_{7}OP$ $= {}^{1}/_{7} \times 3r + {}^{6}/_{7} \times 2P$	M1

	$= {}^{3}/_{7}r + {}^{12}/_{7}p$ QT = QP+ PT $= {}^{-1}/_{3}(3p) + {}^{1}/_{7}(3r-2p)$ $= {}^{3}/_{7}r {}^{-9}/_{7}p$ b). QT $= {}^{3}/_{7}r {}^{-9}/_{7}p$ QR = r-3p Q R= QT if QR = KQT $r - 3p = K({}^{3}/_{2}r {}^{-9}/_{7}p)$ $r = {}^{3}/_{7}kr$ k = 7/3 also $-3p = {}^{-9}/_{7}pk$ $k = {}^{7}/_{3}$ **2005Q18**	A1 A1 M1
35.	a). p(-2,3) p^1 (10,10) $\begin{pmatrix} 10-2 \\ 10-3 \end{pmatrix}$ $= \begin{pmatrix} 12 \\ 7 \end{pmatrix}$ $Q^1 = (1+12, 3+7)$ = (13, 10) b). $m\begin{pmatrix} -2 \\ 3 \end{pmatrix} - n\begin{pmatrix} 1 \\ 3 \end{pmatrix} = \begin{pmatrix} -12 \\ 9 \end{pmatrix}$ -2m-n=-12 <u>3m -3n = 9</u> m = n+3 2(n+3)+n = 12 3n = 6 m=5 n = 2 **2006Q12**	M1 M1 A1 B1 M1 A1
36.	a). OL $= 3\begin{pmatrix} 1 \\ 6 \end{pmatrix} = \begin{matrix} 3 \\ 18 \end{matrix}$ ON $= {}^{2}/_{3}\begin{pmatrix} 15 \\ 6 \end{pmatrix} = \begin{pmatrix} 10 \\ 4 \end{pmatrix}$ LN = ON – OL $= \begin{pmatrix} 10 \\ 4 \end{pmatrix} - \begin{pmatrix} 3 \\ 18 \end{pmatrix} = \begin{pmatrix} 7 \\ 14 \end{pmatrix}$ b). OM = OL + ${}^{3}/_{7}$ LN $= \begin{pmatrix} 3 \\ 18 \end{pmatrix} + \begin{pmatrix} 3 \\ 7 \end{pmatrix} \begin{pmatrix} 7 \\ -14 \end{pmatrix}$ $\begin{pmatrix} 3 + \\ 18 \end{pmatrix}\begin{pmatrix} 3 \\ 6 \end{pmatrix} = \begin{pmatrix} 6 \\ 12 \end{pmatrix}$ = M (6,12) c). i). OT $= {}^{7}/_{6}\begin{pmatrix} 6 \\ 12 \end{pmatrix} = \begin{pmatrix} 7 \\ 14 \end{pmatrix}$ ii). LT $= \begin{pmatrix} 7 \\ 14 \end{pmatrix} - \begin{pmatrix} 3 \\ 18 \end{pmatrix} = \begin{pmatrix} 4 \\ -4 \end{pmatrix}$ LB $= \begin{pmatrix} 15 \\ 6 \end{pmatrix} - \begin{pmatrix} 3 \\ 18 \end{pmatrix}$ $= \begin{pmatrix} 12 \\ -12 \end{pmatrix}$ LB = 3 LT L is common point **2006Q22**	B1 B1 B1 M1 A1 B1 B1 B1 B1 B1 10 mks
37.	$Q^2 + ({}^{1}/_{3})^2 + ({}^{2}/_{3})^2 = 12$ $Q^2 = 1 - {}^{5}/_{9} = {}^{4}/_{9}$ $Q^2 = 1 - {}^{5}/_{9} = {}^{4}/_{9}$ $Q = +{}^{2}/_{3}$ **2006Q9**	M1 A1
38.	a). i). $XR = r - {}^{1}/_{3}q$ ii). $YQ = q - {}^{3}/_{7}r$ b). i). $OE = {}^{1}/_{3}q - {}^{1}/_{3}mg + mr$ ii). $OQ = {}^{3}/_{7}r - {}^{3}/_{7}nr + nq$ c). $OE = {}^{1}/_{3}q + m9r - {}^{1}/_{3})$ ${}^{3}/_{7}r + n(q - {}^{3}/_{7}r)$ $({}^{1}/_{3} - {}^{1}/_{3}m) = n$ $m = {}^{3}/_{7} - {}^{3}/_{7}n$ $m = {}^{3}/_{7} - {}^{3}/_{7}({}^{1}/_{3} - {}^{1}/_{3}m)$ $m = {}^{3}/_{7} - {}^{1}/_{7} + {}^{1}/_{7}m$ $m = {}^{1}/_{3}$ $n = {}^{1}/_{3} - {}^{1}/_{3} \times {}^{1}/_{3} = {}^{2}/_{9}$ **2007Q21**	M1 M1 A1 A1 M1 A1 M1 A1 A1 10 mks
39.	$/p/ = \sqrt{32} + (-1)2 + (1\tfrac{1}{2})^2$ = 3.5 = 2/p/ = 6i-2j+3b **2007Q12**	B1 B1 2 mks

40.	a). i). BD = q-p ii). DC = $^2/_3$ (q-p) iii). CD = $^1/_3$ (q-p) iv). AC = p+ $^2/_3$q-$^2/_3$p = $^1/_3$p + $^2/_3$q b). i). CE = CD + DE $^1/_3$q + $^1/_6$p AC = k($^1/_3$q+$^1/_6$p) $^1/_3$p + $^2/_3$q = $^1/_3$ kq + $^1/_6$kp $^1/_6$k = $^1/_3$ ii). AC = 2CE AC : CE = 2.1 **2008Q19**	B1 B1 B1 M1 A1 M1 A1 M1 A1 B1 10 mks
41.	AB = $\begin{pmatrix} 8 \\ -6 \\ 6 \end{pmatrix}$ $\begin{pmatrix} 3 \\ -1 \\ -4 \end{pmatrix}$ $\begin{pmatrix} 5 \\ -5 \\ 10 \end{pmatrix}$ OP = 0A + AP = $\begin{pmatrix} 3 \\ -1 \\ -4 \end{pmatrix}$ + $^2/_5$ $\begin{pmatrix} 5 \\ -5 \\ 10 \end{pmatrix}$ = $\begin{pmatrix} 5 \\ -3 \\ 0 \end{pmatrix}$ **2008Q4**	M1 M1 A1 3 mks
42.	a). i). ON = ½ $\begin{pmatrix} -8 \\ 5 \end{pmatrix}$ = $\begin{pmatrix} -4 \\ 2.5 \end{pmatrix}$ N is (-4, 2.5) M = $\left(\frac{-8+12}{2}, \frac{5-5}{2}\right)$ M is (2,0) ii). NM = $\begin{pmatrix} 6 \\ -2\frac{1}{2} \end{pmatrix}$ /NM/ = $\sqrt{6^2+(2.5)^2}$ = 6.5 b). OB = $\begin{pmatrix} 12 \\ -5 \end{pmatrix}$ NM = $\begin{pmatrix} 6 \\ -2\frac{1}{2} \end{pmatrix}$ NM = ½ OB c). OP = $\begin{pmatrix} 2 \\ 0 \end{pmatrix}$ + 2 $\begin{pmatrix} -6 \\ 2\frac{1}{2} \end{pmatrix}$ = $\begin{pmatrix} -10 \\ 5 \end{pmatrix}$ OP = $\begin{pmatrix} -10 \\ 5 \end{pmatrix}$ + $\begin{pmatrix} -5 \\ 8 \end{pmatrix}$ = $\begin{pmatrix} -15 \\ 13 \end{pmatrix}$; P' is (-15, 13) **2009Q20**	B1 M1 A1 B1 M1 A1 B1 A1 B1 M1 M1 A1 10 mks

43.	 CO = $^1/_3$ $\begin{pmatrix} 6 \\ -3 \end{pmatrix}$ = $\begin{pmatrix} -2 \\ 1 \end{pmatrix}$ or OC = $\begin{pmatrix} 2 \\ -1 \end{pmatrix}$ AD = $\frac{3}{4}$ $\begin{pmatrix} 4 \\ -4 \end{pmatrix}$ OR $\begin{pmatrix} 3 \\ -3 \end{pmatrix}$ CD = CO + OA + AD = $\begin{pmatrix} 2 \\ -1 \end{pmatrix}$ + $\begin{pmatrix} 2 \\ 1 \end{pmatrix}$ + $\begin{pmatrix} 3 \\ -3 \end{pmatrix}$ = $\begin{pmatrix} 3 \\ -1 \end{pmatrix}$ **2009Q6**	B1 M1 A1 3 mks
44.	 RQ = -r + P + $^1/_3$r = P $-^2/_3$r OM = R + ½ (P-$^2/_3$r) = $\frac{2}{3}$ r + $\frac{1}{2}$ p **2010Q7**	

45.	a) OB = 3p + 3r AT = 2p - 2r b) OX = m(OB) = n(3p + 3r) 3mp + 3mr ii) OX = 2r + p + n(2p - 2r) = (1 + 2nrp + (2 - 2n)r ii) m(3p + 3r) = 2r -2nr + p + 2np 3mp + 3mr = r(2 - 2n) + p(1 + 2n) 3m = 2 - 2n.... (ii) 3m = 1 + 2n........i) 1 + 2n = 2 -2 n 4n = 1 = n = $^1/_4$ subst/ for n = $^1/_4$ in 9i) 3m = 1 + 2 x $^1/_4$ 3m = 1$^1/_2$ = n = $^3/_{2r^3}$ = $^1/_2$ Ration 1:3 AX = nAJ = $^1/_4$AJ The ration in which x dives AJ **2010Q18**	B1 B1 B1 B1 M1 M1 M1 A1 B1 R1
46.	PQ = -(6i + j) (-2i +5j) = -8i + 4j PN = ¾ (-8i + 4j) = -6i + 3j **2011Q13**	M1 M1 A1
47.	(a) (i) BC = BD + DC = -d – a + 2a = = a – d (ii) AX = KA ⟹ AX = k(2a – d) (iii) DX = h ⟹ DX = h(d + a) (b) QAX = -d + hd + ha ⟹ AX = d (h-1) + ha Also AX = 2ka –kd Therefore D(h-i) + ha = 2ka – kd ⟹ H = 2k and h -1 = -k ⟹ = -k -1 ⟹ 2k = -k + 1 3k = 1 K = $^1/_3$ h = 2k ⟹ h = 2x$^1/_3$ = $^2/_3$ **2011Q23**	M1 A1 M1 A1 B1 M1 M1 M1 A1 B1 10

48.	$\binom{3}{-2} - \binom{2}{3}$ $= \binom{1}{-5}$ Magnitude $= \sqrt{1^2 + (-5)^2}$ $= \sqrt{26} \approx 5.1$ **2012Q9**	M1 M1 A1 3