

$$A = 2i - j \quad B = 3i + j - 11k \quad C = 4i + 9j - 5k$$

$$\textcircled{1} \quad -5A + 7B - 8C$$

$$\begin{aligned} &= -5(2i - j) + 7(3i + j - 11k) - 8(4i + 9j - 5k) \\ &= -6i + 5j + 21i + 7j - 77k - 32i - 81j + 40k \\ &= -6i + 21i - 32i + 5j + 7j - 81j - 77k + 40k \\ &= -17i - 22j - 37k \end{aligned}$$

$$\textcircled{2} \quad k = 2A + 4B - C$$

$$\begin{aligned} M &= 2C(2i - j) + 4(3i + j - 11k) - (4i + 9j - 5k) \\ &= 4i - 2j + 12i + 4j - 44k - 4i - 9j + 5k \\ &= 4i + 12i - 4i - 2j + 4j - 4j - 44k - 44k + 5k \\ &= 12i - 2j - 39k \end{aligned}$$

$$\begin{aligned} |M| &= \sqrt{12^2 + (-2)^2 + (-39)^2} \\ &= \sqrt{144 + 4 + 1521} \\ &= \sqrt{1669} \\ &= 40.85 \end{aligned}$$

vektorens riktning  $\Rightarrow$

$$L: \cos \delta = \frac{12}{40.85} \quad | \quad M: \cos \beta = \frac{-2}{40.85} \quad | \quad N: \cos \gamma = \frac{-39}{40.85}$$

$$\textcircled{3} \quad A \times (B \times C)$$

$$6 \times C =$$

$$\begin{array}{r|l} i & j & k \\ \hline 5 & 1 & -11 \\ \hline 4 & 4 & -5 \end{array}$$

$$= \frac{i}{7-5} \left| \begin{array}{cc} -j & 5-11 \\ 4 & -5 \end{array} \right| + \frac{+h}{4-9} \left| \begin{array}{cc} -j & 5-11 \\ 4 & -5 \end{array} \right|$$

$$= i(-5+49) - j(-15+49) + h(42-4)$$

$$C(x) = 39i - 20j + 8h$$

$$A \times (6 \times C) = \frac{i \quad j \quad h}{2 \quad -1 \quad 0} \left| \begin{array}{cc} 39 & -298 \end{array} \right|$$

$$= \frac{i}{-298} \left| \begin{array}{cc} -j & 2 \quad 0 \\ 39 \quad 8 \end{array} \right| + \frac{+h}{59 \quad 29} \left| \begin{array}{cc} -j & 2 \quad 0 \\ 39 \quad 8 \end{array} \right|$$

$$= i(-8+72) - j(16-0) + h(358+39)$$

$$= -8i - 16j + 97h$$

10)  $(3A \times B) \cdot (A \times 2B)$

$$3A = 3(2i - j) = 6i - 3j$$

$$3A \times B = \frac{i \quad j \quad h}{6 \quad -3 \quad 0} \left| \begin{array}{cc} -i & h \\ 1 & -11 \end{array} \right| + \frac{-j}{3-11} \left| \begin{array}{cc} -i & h \\ 1 & -11 \end{array} \right| + \frac{+h}{3-11} \left| \begin{array}{cc} -i & h \\ 1 & -11 \end{array} \right|$$

$$= i(33-0) - j(-66-0) + h(6+9)$$

$$= 33i + 66j + 15h$$

$$2B = 2(3i + j - 11h) = 6i + 2j - 22h$$

$$A \times 2B = \begin{vmatrix} i & j & k \\ 2 & -1 & 0 \\ 6 & 2 & -22 \end{vmatrix}$$

$$= i \begin{vmatrix} -1 & 0 \\ 2 & -22 \end{vmatrix} - j \begin{vmatrix} 2 & 0 \\ 6 & -22 \end{vmatrix} + k \begin{vmatrix} 2 & -1 \\ 6 & 2 \end{vmatrix}$$

$$= (22-0) - j(44-0) + k(4+6)$$

$$= 22i + 44j + 10k$$

$$\therefore (3A \times B) \cdot (A \times 2B)$$

$$= (33i + 66j + 5k) \cdot (32i + 44j + 10k)$$

$$= 726 + 2904 + 50$$

$$= \underline{8680}$$

①  $A - 2B - C$

$$= 2i - j - 2(3i + j - 11k) - (4i + 4j - 5k)$$

$$= 2i - j - 6i - 2j + 22k - 4i - 4j + 5k$$

$$= 2i - 6i - 4i - j - 2j - 4j + 22k + 5k$$

$$= -8i - 7j + 27k$$

② - Perpendicularity of vectors

Two vectors  $\vec{A}$  and  $\vec{B}$  are said to be perpendicular if  $\vec{A} \cdot \vec{B} = 0$

Co-planarity of vectors:

Three vectors  $\vec{A}$ ,  $\vec{B}$  and  $\vec{C}$  are said to be

co-planar if  $\vec{A} \cdot (\vec{B} \times \vec{C}) = 0$