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

$= (33 \times 22) + (66 \times 44) + (15 \times 10) = 3740$

v) $A - 2B - C$

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

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

2) Perpendicular	Coplanar
Two vectors A and B are perpendicular if their Scalar product is zero $(A \times B)$	Three vectors A, B and C are coplanar if their Scalar Product is equal to 0 $(A \cdot (B \times C))$

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If $A = 2i - j$, $B = 3i + j - 11k$ and $C = 4i + 4j + 5k$

i) $3A + 7B - 8C$

$-6i + 3j + 21i + 7j - 77k - 32i - 32j - 40k$

$-17i - 22j - 87k$

ii) $K = 2A + 4B - C$

$2A = 2(2i - j) = 4i - 2j$

$+B = 4(3i + j - 11k) = 12i + 4j - 44k$

$2A + 4B - C = 12 - 2i - 39k$

$|K| = \sqrt{(12)^2 + (-2)^2 + (-39)^2} = \sqrt{1669} = 40.85$

The direction cosines of K are

$\cos\alpha = \frac{12}{40.85} = 0.2938$

$\cos\beta = \frac{-2}{40.85} = 0.0490$

$\cos\gamma = \frac{-39}{40.85} = 0.9547$

iii) $A \times B \times C - A \times B = \begin{vmatrix} i & j & k \\ 2 & -1 & 0 \\ 3 & 1 & -11 \end{vmatrix}$

$= i(11-0) - j(-22-0) + k(2+3)$

$= 11i + 22j + 5k$

$A \times B \times C = \begin{vmatrix} i & j & k \\ 11 & 22 & 5 \\ 4 & 4 & -5 \end{vmatrix}$

$= i(-110-20) - j(-55-20) + k(44-88)$

$= -130i + 75j - 44k$

iv) $(3A \times B) - (A \times 2B)$

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

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

$3A \times B = \begin{vmatrix} i & j & k \\ 6 & -3 & 0 \\ 3 & 1 & -11 \end{vmatrix}$

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

$= 33i + 66j + 15k$

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

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

$= 22i + 44j + 10k$