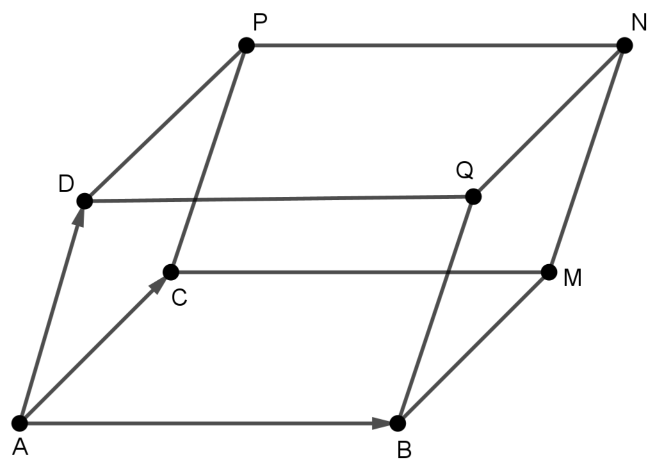
VOLUME OF THE PARALLELIPIPED

DANIEL SITARU - ROMANIA



Let be $A(1,1,1); B(1,2,3); C(2,3,1); D(4,4,4)$.
Find the volume of the parallelipiped build on the vectors $\overrightarrow{AB}; \overrightarrow{AC}; \overrightarrow{AD}$.

$$\overrightarrow{AB} = (x_B - x_A)\overrightarrow{i} + (y_B - y_A)\overrightarrow{j} + (z_B - z_A)\overrightarrow{k} =$$
$$= (1-1)\overrightarrow{i} + (2-1)\overrightarrow{j} + (3-1)\overrightarrow{k} = \overrightarrow{j} + 2\overrightarrow{k}$$
$$\overrightarrow{AC} = (x_C - x_A)\overrightarrow{i} + (y_C - y_A)\overrightarrow{j} + (z_c - z_A)\overrightarrow{k} =$$
$$= (2-1)\overrightarrow{i} + (3-1)\overrightarrow{j} + (1-1)\overrightarrow{k} = \overrightarrow{i} + 2\overrightarrow{j}$$
$$\overrightarrow{AB} \times \overrightarrow{AC} = \begin{vmatrix} \overrightarrow{i} & \overrightarrow{j} & \overrightarrow{k} \\ 0 & 1 & 2 \\ 1 & 2 & 0 \end{vmatrix} = 2\overrightarrow{j} - \overrightarrow{k} - 4\overrightarrow{i} = -4\overrightarrow{i} + 2\overrightarrow{j} - \overrightarrow{k}$$
$$\overrightarrow{AD} = (x_D - x_A)\overrightarrow{i} + (y_D - y_A)\overrightarrow{j} + (z_D - z_A)\overrightarrow{k} =$$
$$= (4-1)\overrightarrow{i} + (4-1)\overrightarrow{j} + (4-1)\overrightarrow{k} = 3\overrightarrow{i} + 3\overrightarrow{j} + 3\overrightarrow{k}$$
$$\overrightarrow{AD} \cdot (\overrightarrow{AB} \times \overrightarrow{AC}) = -4 \cdot 3 + 2 \cdot 3 - 1 \cdot 3 = -12 + 6 - = -9$$
$$V[ABMCDQNP] = |\overrightarrow{AD} \cdot (\overrightarrow{AB} \times \overrightarrow{AC})| = 9$$

Mathematics Department, National Economic College "Theodor Costescu", Drobeta Turnu - Severin, Romania
Email address: dansitaru63@yahoo.com