



$$B_1A = 6\sqrt{2}$$

$$\angle B_1DB = 45^\circ$$

$$\angle DBC = 30^\circ$$

$$V = AD \cdot AB \cdot AA_1$$

$\triangle B_1BD$ - прямоугольный.

$$\angle B_1BD = 90^\circ$$

$$\sin \angle B_1DB = \frac{BB_1}{B_1A}$$

$$\sin 45^\circ = \frac{BB_1}{6\sqrt{2}}$$

$$BB_1 = \frac{\sqrt{2}}{2} \cdot 6\sqrt{2} = \frac{12}{2} = 6$$

$$\cos \angle B_1DB = \frac{BD}{B_1A}$$

$$\cos 45^\circ = \frac{BD}{6\sqrt{2}}$$

$$BD = \frac{\sqrt{2}}{2} \cdot 6\sqrt{2} = \frac{12}{2} = 6$$

$\triangle BCD$ - прямоугольный. $\angle BCD = 90^\circ$
 $\angle DBC = 30^\circ$

$$\sin \angle DBC = \frac{CD}{BD}$$

$$\sin 30^\circ = \frac{CD}{6}$$

$$CD = \frac{1}{2} \cdot 6 = 3$$

$$\cos \angle DBC = \frac{BC}{BD}$$

$$\cos 30^\circ = \frac{BC}{6}$$

$$BC = \frac{\sqrt{3}}{2} \cdot 6 = 3\sqrt{3}$$

$$V = 3\sqrt{3} \cdot 3 \cdot 6 = 54\sqrt{3}$$