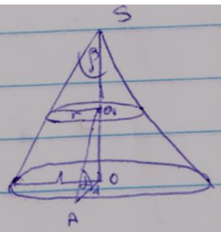
4.24
6

(ב)



h - גובה [illegible] (א)

$$\frac{h}{1} = \cot\beta$$

$$\frac{O_1O}{1} = \tan\alpha$$

$$\frac{r}{1} = \frac{h - O_1O}{h} \rightarrow r = \frac{\cot\beta - \tan\alpha}{\cot\beta} = \frac{\frac{\cos\beta\cos\alpha - \sin\beta\sin\alpha}{\sin\beta\cos\alpha}}{\frac{\cos\beta}{\sin\beta}}$$

$$= \frac{\cos(\alpha+\beta)}{\cos\alpha\cos\beta}$$

$$V = \pi r^2 = O_1O \cdot \pi r^2 = \tan\alpha \cdot \pi \frac{\cos^2(\alpha+\beta)}{\cos^2\alpha\cos^2\beta} =$$

(ג)
$$\frac{V_1}{V} = \frac{\frac{1}{3}\pi \cdot 1^2 \cdot h}{\pi \cdot r^2} = \frac{\frac{1}{3}\pi\cot\beta}{\frac{\pi\tan\alpha\cos^2(\alpha+\beta)}{\cos^2\alpha\cos^2\beta}} = \frac{\cot\beta\cos^2\alpha\cos^2\beta}{3\tan\alpha\cos^2(\alpha+\beta)} = \frac{\cot^3\beta\cos^3\alpha}{3\sin\alpha\sin\beta\cos^2(\alpha+\beta)}$$