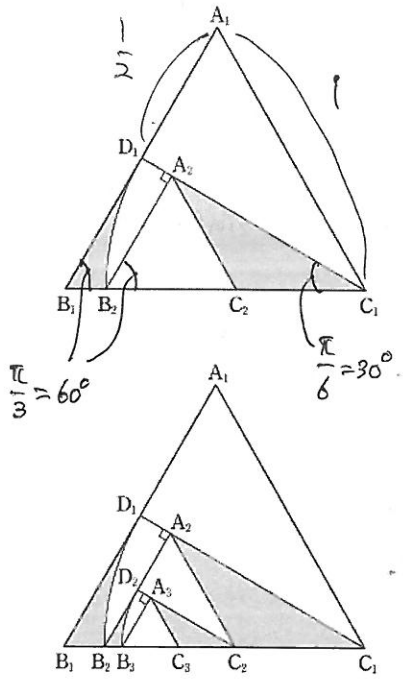
* 2018학년도 대수능 수학 나형 19번.



$\triangle A_1B_1C_1$ ≒ 정삼각형. $\overline{A_1D_1} = \overline{D_1B_1}$. $\therefore \angle A_1D_1C_1 = \frac{\pi}{2}$.

$\angle A_1B_1C_1 = \frac{\pi}{3}$. $\angle D_1C_1B_1 = \frac{\pi}{6}$. $\angle A_2B_2C_2 = \frac{\pi}{3}$ (대응각)

$\overline{D_1C_1} = \overline{B_2C_1} = \frac{\sqrt{3}}{2}$. $\overline{B_2A_2} = \overline{B_2C_1} \times \cos\frac{\pi}{3} = \frac{\sqrt{3}}{4}$.

$\overline{B_2C_2} = \frac{1}{2}\overline{B_2C_1} = \frac{\sqrt{3}}{4}$. $\angle A_2B_2C_2 = \frac{\pi}{3}$. $\therefore \triangle A_2B_2C_2$ ≒ 정삼각형.

$\triangle B_1C_1D_1 = \frac{1}{2} \times \frac{1}{2} \times \frac{\sqrt{3}}{2} = \frac{\sqrt{3}}{8}$.

$\square C_1D_1B_2 = \frac{1}{2} \times \left(\frac{\sqrt{3}}{2}\right)^2 \times \frac{\pi}{6} = \frac{\pi}{16}$

$\triangle A_2B_2C_2 = \triangle A_2C_2C_1 = \frac{1}{2} \times \frac{\sqrt{3}}{4} \times \frac{\sqrt{3}}{4} \times \sin\frac{\pi}{3} = \frac{3\sqrt{3}}{64}$.

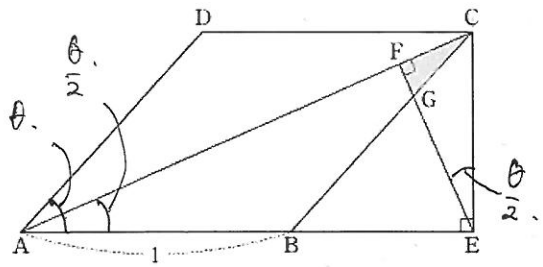
1) n : $2 \to 2$. $\therefore n = 1$.

2) l_r : $\overline{A_1B_1} \to \overline{A_2B_2}$: $1 \to \frac{\sqrt{3}}{4}$. $\therefore l_r = \frac{\sqrt{3}}{4}$. $S_r = \frac{3}{16}$.

3) a : $\triangle B_1C_1D_1 - \square C_1D_1B_2 + \triangle A_2C_2C_1 = \frac{\sqrt{3}}{8} - \frac{\pi}{16} + \frac{3\sqrt{3}}{64} = \frac{11\sqrt{3}}{64} - \frac{4\pi}{64}$.

$\therefore \lim_{n\to\infty} S_n = \frac{\frac{11\sqrt{3}-4\pi}{64}}{1 - \frac{3}{16} \times 1} = \frac{\frac{11\sqrt{3}-4\pi}{64}}{\frac{13}{16}} = \frac{11\sqrt{3}-4\pi}{52}$ //

* 2018학년도 대수능 수학 가형 17번.



$\angle DAB=\theta$. $\therefore \angle CAE=\angle ACB=\angle FEC=\frac{\theta}{2}$.

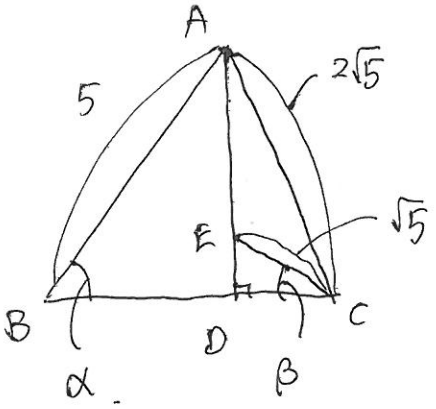
□ ABCD는 사다리꼴.

$\overline{CE}=\sin\theta$, $\overline{FC}=\overline{CE}\times\sin\frac{\theta}{2}=\sin\theta\cdot\sin\frac{\theta}{2}$.

$\overline{FG}=\overline{FC}\times\tan\frac{\theta}{2}$. $\therefore \triangle CFG=\frac{1}{2}\times\overline{CF}\times\overline{FG}=\frac{1}{2}\times\sin^2\theta\times\sin^2\frac{\theta}{2}\times\tan\frac{\theta}{2}$.

$$\therefore \lim_{\theta\to 0+}\frac{S(\theta)}{\theta^5}=\lim_{\theta\to 0+}\frac{\frac{1}{2}\times\sin^2\theta\times\sin^2\frac{\theta}{2}\times\tan\frac{\theta}{2}}{\theta^2\times\frac{\theta^2}{4}\times 4\times\frac{\theta}{2}\times 2}=\frac{1}{2\times 4\times 2}=\frac{1}{16}$$

* 2018학년도 대수능 수학 가형 14번.



$\overline{AE}:\overline{ED}=3:1$. $\therefore \overline{AD}=k$ $(k>0)$라 하면

$\overline{ED}=\frac{k}{4}$, $\overline{BD}=\sqrt{25-k^2}$, $\overline{DC}=\underbrace{\sqrt{20-k^2}}_{(\triangle ADC)}=\underbrace{\sqrt{5-\frac{k^2}{16}}}_{(\triangle EDC)}$

$\therefore \frac{15}{16}k^2=15$에서 $k=4$. $\therefore \overline{BD}=4$, $\overline{DC}=2$.

$$\therefore \begin{cases}\cos\alpha=\frac{3}{5}\\ \sin\alpha=\frac{4}{5}\end{cases}\quad\begin{cases}\cos\beta=\frac{2}{\sqrt{5}}\\ \sin\beta=\frac{1}{\sqrt{5}}\end{cases}.$$

$\therefore \cos(\alpha-\beta)=\cos\alpha\cdot\cos\beta+\sin\alpha\cdot\sin\beta$

$=\frac{6}{5\sqrt{5}}+\frac{4}{5\sqrt{5}}=\frac{10}{5\sqrt{5}}=\frac{2}{\sqrt{5}}=\frac{2\sqrt{5}}{5}$