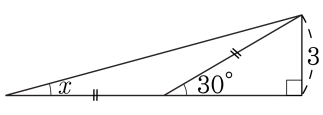
1. 다음 그림을 이용하여 $\tan x$ 의 값을 구하여라.



① $\dfrac{2-\sqrt{3}}{2}$ ② $\dfrac{3-\sqrt{3}}{2}$ ③ $2-\sqrt{3}$

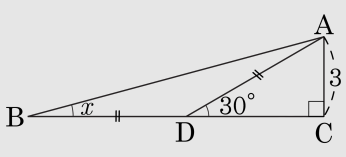
④ $\dfrac{2(1-2\sqrt{3})}{3}$ ⑤ $\dfrac{3(1-\sqrt{3})}{3}$

해설

$\overline{AD} = \overline{BD} = 2\overline{AC} = 6$

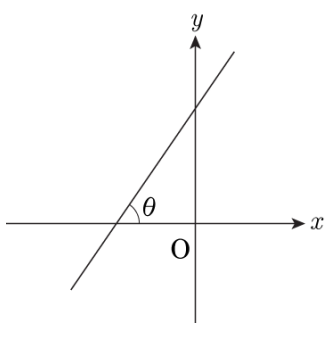
$\overline{DC} = \sqrt{3}\,\overline{AC} = 3\sqrt{3}$

$\overline{BC} = 6 + 3\sqrt{3}$ 이므로



$$\tan x = \frac{3}{6+3\sqrt{3}} = \frac{3(2-\sqrt{3})}{3} = 2-\sqrt{3}$$

2. 다음 그림은 직선 $x-\sqrt{3}y+3=0$ 의 그래프이다. 이때, $\angle\theta$ 의 크기를 구하면?



① $30°$ ② $40°$ ③ $45°$ ④ $50°$ ⑤ $60°$

해설

$y=\frac{\sqrt{3}}{3}x+\sqrt{3}$

$\therefore$ 기울기 : $\frac{\sqrt{3}}{3}$

(기울기) $=\tan\theta$ 이므로 $\tan\theta=\frac{\sqrt{3}}{3}$,

$\therefore \angle\theta=30°$

3. $3\sqrt{3}\sin 60° \cos 30° + 2\tan 60° + \cos^2 45°$를 계산한 값으로 알맞은 것을 고르면?

① $\frac{15\sqrt{3}+2}{4}$ ② $\frac{15\sqrt{3}+3}{4}$ ③ $\frac{17\sqrt{3}+2}{4}$

④ $\frac{17\sqrt{3}+3}{4}$ ⑤ $\frac{17\sqrt{3}+5}{4}$

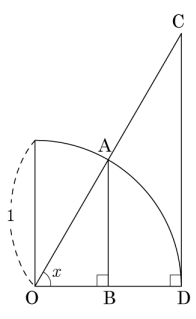
해설

$3\sqrt{3}\sin 60° \cos 30° + 2\tan 60° + \cos^2 45°$

$= 3\sqrt{3} \times \frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2} + 2 \times \sqrt{3} + \left(\frac{\sqrt{2}}{2}\right)^2$

$= \frac{9\sqrt{3}}{4} + 2\sqrt{3} + \frac{1}{2} = \frac{17\sqrt{3}+2}{4}$

4. 그림과 같이 반지름의 길이가 1 인 사분원에서 $\tan x$ 를 나타내는 선분은?

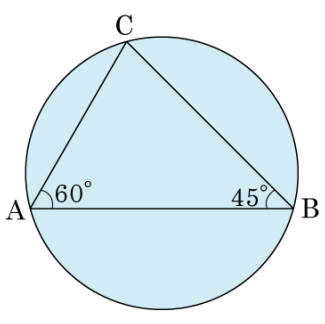


① $\overline{AB}$ ② $\overline{CD}$ ③ $\overline{OB}$ ④ $\overline{OD}$ ⑤ $\overline{BD}$

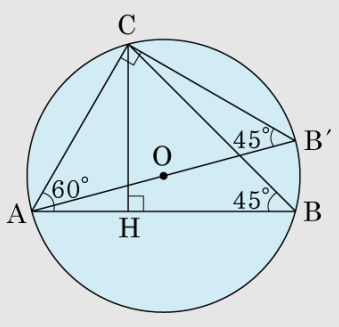
해설

$$\tan x = \frac{\overline{CD}}{\overline{OD}} = \frac{\overline{CD}}{1} = \overline{CD}$$

5. 다음 그림과 같이 반지름의 길이가 2인 원에 내접하는 $\triangle ABC$ 에서 $\angle A = 60°$, $\angle B = 45°$ 일 때, $\overline{AB}$ 의 길이는?



① $\sqrt{2}+\sqrt{3}$ ② $\sqrt{2}+\sqrt{6}$
③ $\sqrt{3}+\sqrt{6}$ ④ $\sqrt{5}+\sqrt{6}$
⑤ $\sqrt{6}+\sqrt{7}$

해설

$\triangle AB'C$ 에서 $\overline{AB'} = 4$, $\angle ACB' = 90°$,
$\angle AB'C = \angle ABC = 45°$,
$\overline{AC} = 4\sin 45° = 2\sqrt{2}$
C 에서 $\overline{AB}$ 에 내린 수선의 발을 H 라 하면
$\overline{AB} = \overline{AH} + \overline{BH}$
$\overline{AH} = 2\sqrt{2}\cos 60° = \sqrt{2}$
$\overline{BH} = \overline{CH} = 2\sqrt{2}\sin 60° =$
$2\sqrt{2} \times \frac{\sqrt{3}}{2} = \sqrt{6}$
$\therefore \overline{AB} = \sqrt{2}+\sqrt{6}$