

1. $\tan A = 2$ 일 때, $\sin^2 A - \cos^2 A$ 의 값을 구하여라. (단, $0^\circ \leq A \leq 90^\circ$)

▶ 답 :

▷ 정답 : $\frac{3}{5}$

해설

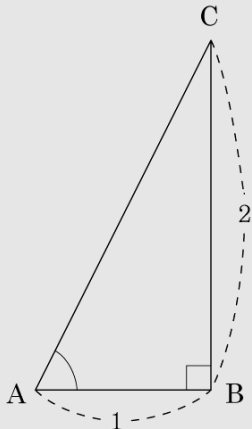
$\tan A = 2$ 를 만족하는 직각삼각형
ABC 를 만들면

$$\overline{AC} = \sqrt{1^2 + 2^2} = \sqrt{5}$$

$$\therefore \sin A = \frac{2}{\sqrt{5}},$$

$$\cos A = \frac{1}{\sqrt{5}}$$

$$\begin{aligned}\therefore \sin^2 A - \cos^2 A \\ = \frac{4}{5} - \frac{1}{5} = \frac{3}{5}\end{aligned}$$



2. $\tan A = \sqrt{3}$ 일 때, $(1 + \sin A)(1 - \cos A)$ 의 값은? (단, $0^\circ < A < 90^\circ$)

① $\frac{1 + \sqrt{2}}{4}$

② $\frac{1 + \sqrt{3}}{4}$

③ $\frac{2 + \sqrt{2}}{4}$

④ $\frac{2 + \sqrt{3}}{4}$

⑤ $\frac{3 + \sqrt{3}}{4}$

해설

$$\tan A = \sqrt{3} \text{ 일 때, } A = 60^\circ$$

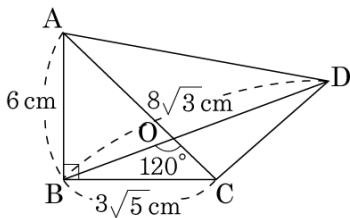
$$(1 + \sin A)(1 - \cos A)$$

$$= (1 + \sin 60^\circ)(1 - \cos 60^\circ)$$

$$= \left(1 + \frac{\sqrt{3}}{2}\right) \left(1 - \frac{1}{2}\right)$$

$$= \frac{1}{2} \left(\frac{2 + \sqrt{3}}{2}\right) = \frac{2 + \sqrt{3}}{4}$$

3. 다음 그림의 $\square ABCD$ 에서 $\angle B = 90^\circ$, $\overline{AB} = 6\text{ cm}$, $\overline{BC} = 3\sqrt{5}\text{ cm}$, $\overline{BD} = 8\sqrt{3}\text{ cm}$ 일 때, $\square ABCD$ 의 넓이를 구하여라.



▶ 답 :

cm^2

▶ 정답 : 54cm^2

해설

$$\overline{AC} = \sqrt{6^2 + (3\sqrt{5})^2} = \sqrt{81} = 9(\text{cm})$$

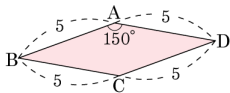
$\square ABCD$ 의 넓이

$$= \frac{1}{2} \times 8\sqrt{3} \times 9 \times \sin(180^\circ - 120^\circ)$$

$$= \frac{1}{2} \times 8\sqrt{3} \times 9 \times \sin 60^\circ$$

$$= \frac{1}{2} \times 8\sqrt{3} \times 9 \times \frac{\sqrt{3}}{2} = 54(\text{cm}^2)$$

4. 다음 사각형의 넓이를 구하여라.



▶ 답 :

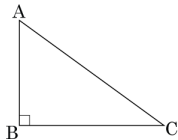
▶ 정답 : $\frac{25}{2}$

해설

$$\begin{aligned}\text{넓이} &: 5 \times 5 \times \sin 150^\circ \\ &= 5 \times 5 \times \sin 30^\circ \\ &= 5 \times 5 \times \frac{1}{2} \\ &= \frac{25}{2}\end{aligned}$$

$$\therefore \frac{25}{2}$$

5. 다음 그림의 직각삼각형에 대하여 옳은 것은?



- ① $\cos A = \cos C$ ② $\tan C = \frac{1}{\tan C}$ ③ $\tan C = \frac{1}{\tan A}$
④ $\sin A = \cos A$ ⑤ $\cos C = \frac{1}{\cos A}$

해설

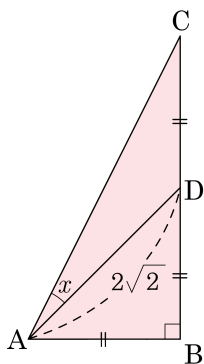
$$\tan C = \frac{\overline{AB}}{\overline{CB}}, \quad \tan A = \frac{\overline{CB}}{\overline{AB}} \quad \text{이므로} \quad \tan C = \frac{1}{\tan A} \quad \text{이다.}$$

6. 다음 직각삼각형에서 $\overline{AB} = \overline{BD} = \overline{DC}$, $\overline{AD} = 2\sqrt{2}$ 일 때, $\cos x$ 의 값을 구하면?

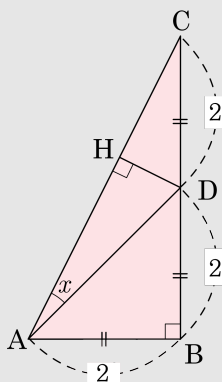
① $\frac{3\sqrt{10}}{10}$
④ $\frac{10\sqrt{10}}{3}$

② $\frac{\sqrt{10}}{10}$
⑤ $\frac{10\sqrt{3}}{3}$

③ $\frac{3}{10}$



해설



$$\cos x = \frac{\overline{AH}}{\overline{AD}}$$

$$\overline{AB} = \overline{BD} = \overline{CD} = 2$$

$$\overline{AC} = \sqrt{4 + 16} = \sqrt{20} = 2\sqrt{5}$$

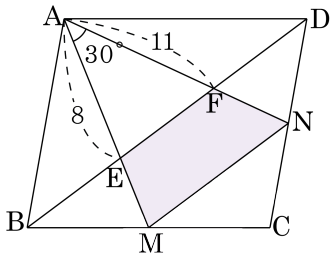
$$\triangle ACD = \triangle ABC - \triangle ABD = 2$$

$$\triangle ACD = \frac{1}{2} \cdot \overline{AC} \cdot \overline{DH} = \frac{1}{2} \cdot 2\sqrt{5} \cdot \overline{DH} = 2$$

$$\Rightarrow \overline{DH} = \frac{2}{\sqrt{5}}, \quad \overline{AH} = \sqrt{\overline{AD}^2 - \overline{DH}^2} = \frac{6}{\sqrt{5}}$$

$$\text{따라서 } \cos x = \frac{\overline{AH}}{\overline{AD}} = \frac{\frac{6}{\sqrt{5}}}{2\sqrt{2}} = \frac{3}{\sqrt{10}} = \frac{3\sqrt{10}}{10} \text{ 이다.}$$

7. 다음 그림과 같이 평행사변형 ABCD의 두 변 BC, CD의 중점을 각각 M, N이라 하고 $\overline{AM}$, $\overline{AN}$ 과 대각선 BD와의 교점을 E, F라 하자. $\overline{AE} = 8$, $\overline{AF} = 11$, $\angle EAF = 30^\circ$ 일 때, $\square EMNF$ 의 넓이를 구하여라.



▶ 답 :

▶ 정답 : $\frac{55}{2}$

해설

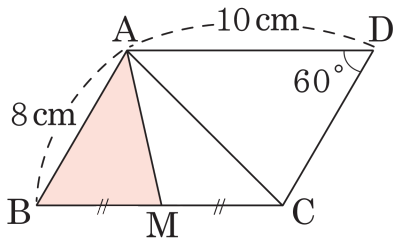
점 E와 F는 $\triangle ABC$ 와 $\triangle ACD$ 의 무게중심이므로

$$\overline{AM} = 8 \times \frac{3}{2} = 12$$

$$\overline{AN} = 11 \times \frac{3}{2} = \frac{33}{2}$$

$$\begin{aligned} \square EMNF &= \triangle AMN - \triangle AEF \\ &= \frac{1}{2} \times 12 \times \frac{33}{2} \times \sin 30^\circ \\ &\quad - \frac{1}{2} \times 8 \times 11 \times \sin 30^\circ \\ &= \frac{55}{2} \end{aligned}$$

8. 다음 그림과 같은 평행사변형 ABCD 에서 $\overline{BC}$ 의 중점을 M 이라 할 때, $\triangle ABM$ 의 넓이를 구하여라.



▶ 답 :

cm²

▷ 정답 : $10\sqrt{3}$ cm²

해설

$$\begin{aligned}\square ABCD &= 10 \times 8 \times \sin 60^\circ \\ &= 10 \times 8 \times \frac{\sqrt{3}}{2} = 40\sqrt{3} \text{ (cm}^2\text{)}\end{aligned}$$

$$\begin{aligned}\therefore \triangle ABM &= \frac{1}{4} \square ABCD \\ &= \frac{1}{4} \times 40\sqrt{3} \\ &= 10\sqrt{3} \text{ (cm}^2\text{)}\end{aligned}$$

