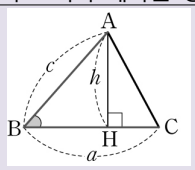
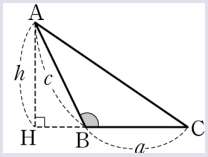
◇「콘텐츠산업 진흥법 시행령」 제33조에 의한 표시
1) 제작연월일 : 2016-10-25
2) 제작자 : 교육지대㈜
3) 이 콘텐츠는 「콘텐츠산업 진흥법」에 따라 최초 제작일부터 5년간 보호됩니다.

◇「콘텐츠산업 진흥법」 외에도 「저작권법」에 의하여 보호되는 콘텐츠의 경우, 그 콘텐츠의 전부 또는 일부를 무단으로 복제하거나 전송하는 것은 콘텐츠산업 진흥법 외에도 저작권법에 의한 법적 책임을 질 수 있습니다.

계산시 참고사항

1. 삼각형의 넓이

$\triangle ABC$에서 두 변의 길이 a, c와 그 끼인 각 $\angle B$의 크기를 알 때, 넓이 S는

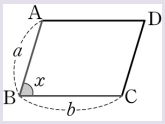
1) 끼인각의 크기가 예각인 경우	2) 끼인 각의 크기가 둔각인 경우
	
$\Rightarrow S=\frac{1}{2}ac\sin B$	$\Rightarrow S=\frac{1}{2}ac\sin(180^\circ-B)$

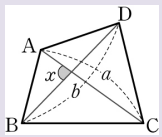
삼각형의 넓이
◉ $h=c\sin B$이므로
$\triangle ABC=\frac{1}{2}ah=\frac{1}{2}ac\sin B$
◉ $h=c\sin(180^\circ-B)$이므로
$\triangle ABC=\frac{1}{2}ah=\frac{1}{2}ac\sin(180^\circ-B)$

2. 사각형의 넓이

1) 평행사변형의 넓이
: 평행사변형 $ABCD$의 이웃하는 두 변의 길이가 a, b이고, 그 끼인 각 x가 예각일 때, 넓이 $S=ab\sin x$

2) 사각형의 넓이
: 사각형 $ABCD$의 두 대각선의 길이가 a, b이고, 두 대각선이 이루는 각 x가 예각일 때, 넓이 $S=\frac{1}{2}ab\sin x$



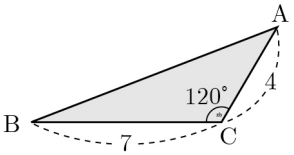


사각형의 넓이
◉ 평행사변형 $ABCD$에서 x가 둔각이면 $S=ab\sin(180^\circ-x)$
◉ 사각형 $ABCD$에서 x가 둔각이면 $S=\frac{1}{2}ab\sin(180^\circ-x)$

삼각형의 넓이 구하기

◪ 다음 그림과 같은 $\triangle ABC$의 넓이를 구하여라.

1.



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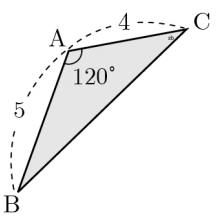

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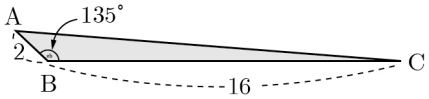

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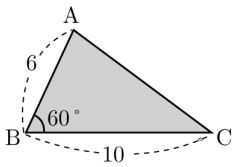

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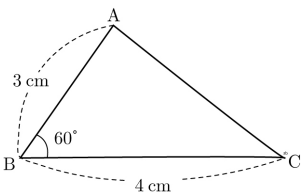

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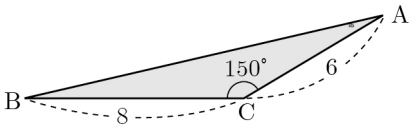
6.



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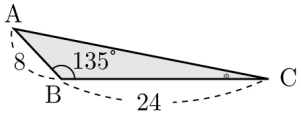

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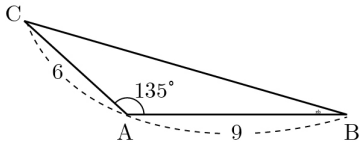

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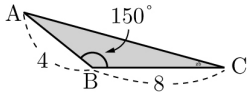

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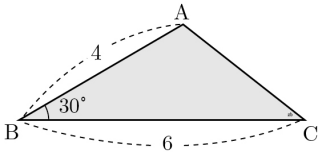

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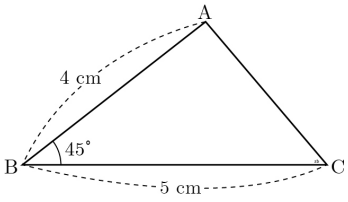

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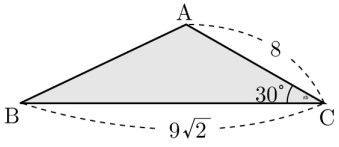

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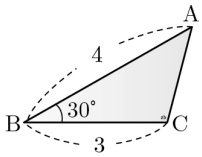

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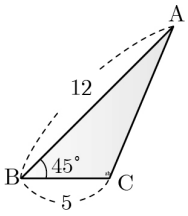

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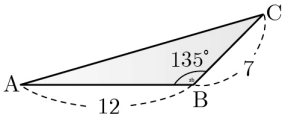

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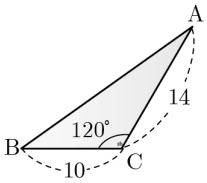

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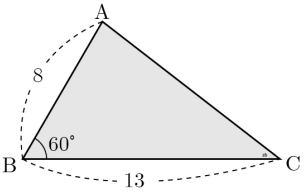

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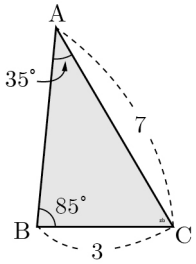

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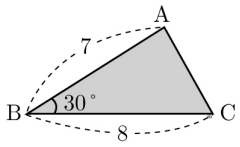

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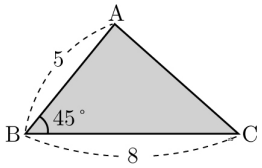

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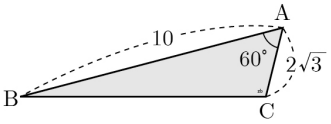

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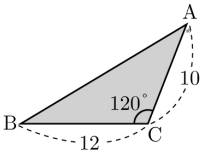

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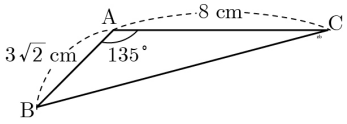

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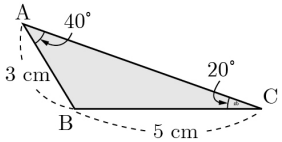

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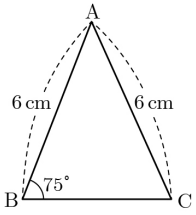
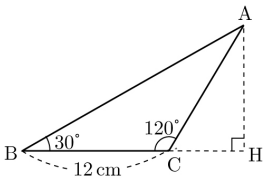


◪ **다음 그림과 같은 $\triangle ABC$의 넓이를 구하여라.**

26.



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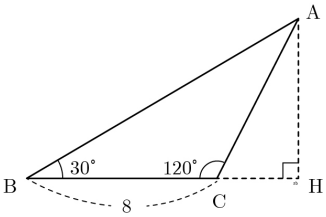
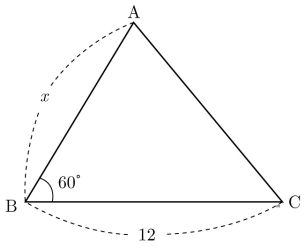
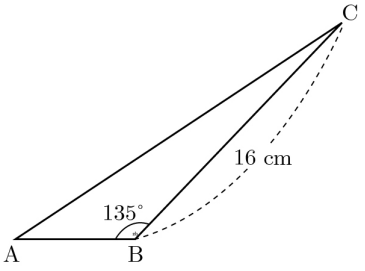


◪ **다음 그림과 같은 삼각형 ABC의 넓이가 주어질 때, 알맞은 길이를 구하여라.**

28. $\triangle ABC$의 넓이가 $30\sqrt{3}$일 때, $\overline{AB}$의 길이를 구하여라.



29. $\triangle ABC$의 넓이가 $24\sqrt{2}\,\text{cm}^2$일 때, $\overline{AB}$의 길이를 구하여라.



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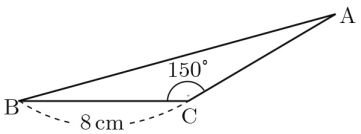
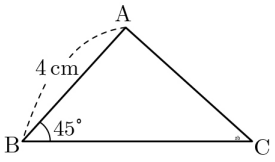
30. $\triangle ABC$의 넓이가 $12\sqrt{3}\,cm^2$일 때, $\overline{AC}$의 길이는?

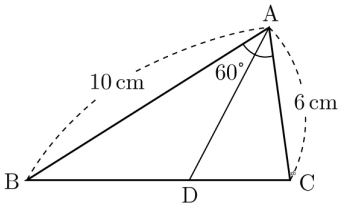


31. $\triangle ABC$의 넓이가 $6\sqrt{2}\,cm^2$일 때, $\overline{BC}$의 길이를 구하여라.

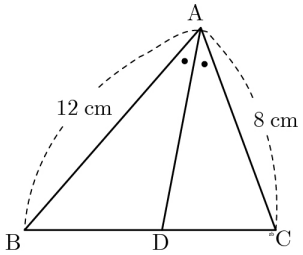


◪ 다음 물음에 답하여라.

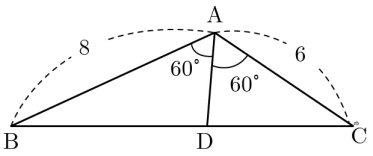
32. 다음 그림과 같이 $\overline{AB}=10cm$, $\overline{AC}=6cm$, $\angle BAC=60°$인 $\triangle ABC$에서 $\angle BAC$의 이등분선이 $\overline{BC}$와 만나는 점을 D라고 할 때, $\overline{AD}$의 길이를 구하여라.



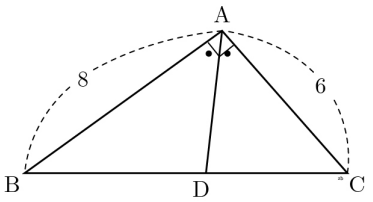
33. 다음 그림과 같은 $\triangle ABC$에서 $\angle A=60°$이고, $\angle A$의 이등분선을 $\overline{AD}$라 할 때, $\overline{AD}$의 길이를 구하여라.



34. 다음 그림과 같은 삼각형 ABC에서 $\overline{AD}$의 길이를 구하여라.



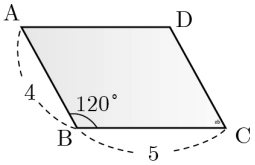
35. $\angle A=90°$, $\overline{AB}=8$, $\overline{AC}=6$인 $\triangle ABC$에서 $\angle A$의 이등분선과 $\overline{BC}$의 교점을 D라 할 때, $\overline{AD}$의 길이를 구하여라.



평행사변형의 넓이 구하기

◪ 다음 그림과 같은 평행사변형 ABCD의 넓이를 구하여라.

36.



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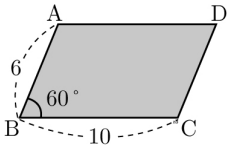

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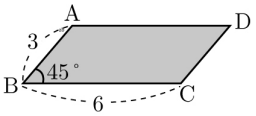

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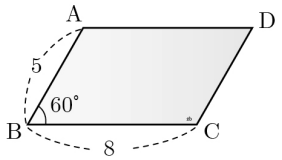
39.



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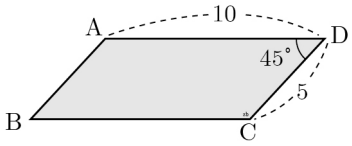

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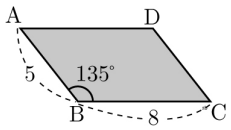

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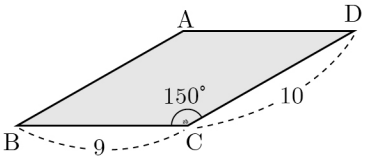

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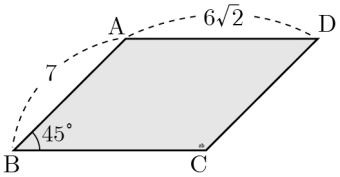

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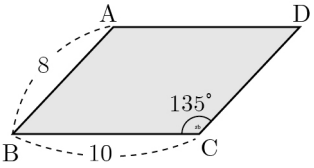

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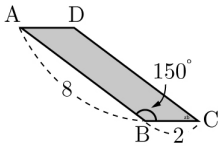

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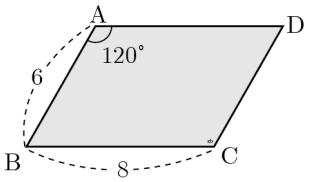

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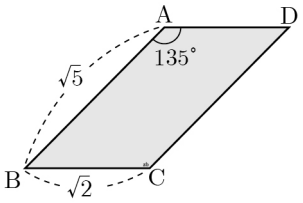
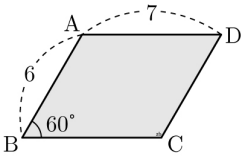


48.



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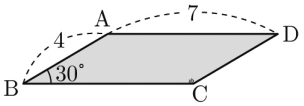

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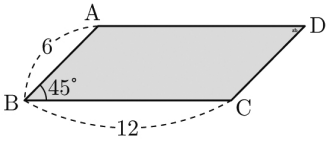

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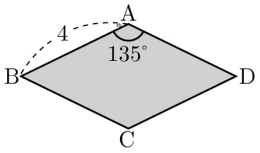
◪ 다음 그림과 같은 마름모의 넓이를 구하여라.

51.



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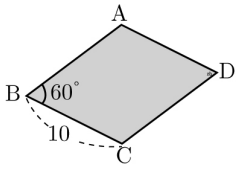

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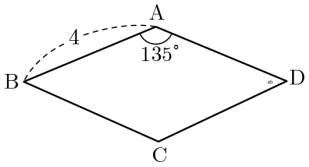
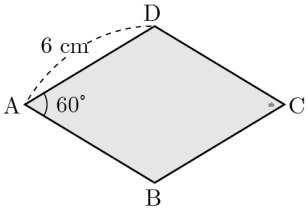
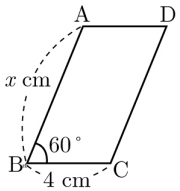


54.

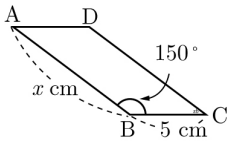


◪ 평행사변형 ABCD의 넓이가 주어질 때, 다음 물음에 답하여라.

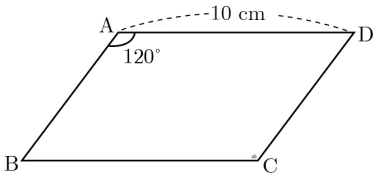
55. 평행사변형 ABCD의 넓이가 $12\sqrt{3}\,\mathrm{cm}^2$일 때, $\overline{AB}$의 길이를 구하여라.



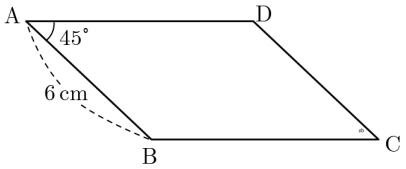
56. 평행사변형 ABCD의 넓이가 $20\mathrm{cm}^2$일 때, $\overline{AB}$의 길이를 구하여라.



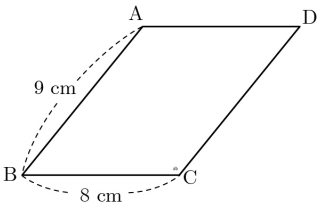
57. 다음 그림에서 평행사변형 ABCD의 넓이가 $35\sqrt{3}\,\mathrm{cm}^2$일 때, $\overline{AB}$의 길이를 구하여라.



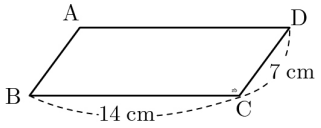
58. 다음 그림과 같은 평행사변형 ABCD의 넓이가 $24\sqrt{2}\,\mathrm{cm}^2$일 때, $\overline{BC}$의 길이를 구하여라.



59. 다음 그림의 평행사변형 ABCD의 넓이가 $36\sqrt{2}\,\mathrm{cm}^2$일 때, $\angle C$의 크기를 구하여라. (단, $90^\circ < \angle C < 180^\circ$)



60. 평행사변형 ABCD의 넓이가 $49\sqrt{3}\,\mathrm{cm}^2$일 때, $\angle A$의 크기를 구하여라. (단, $90^\circ < \angle A < 180^\circ$)



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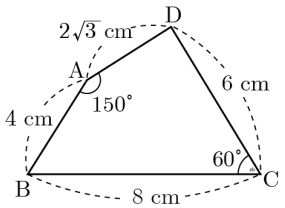
사각형의 넓이 구하기

◪ 다음 그림과 같은 □ABCD의 넓이를 구하여라.

61.



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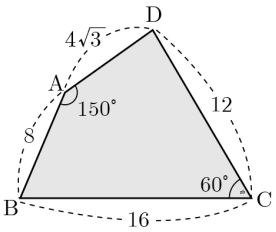
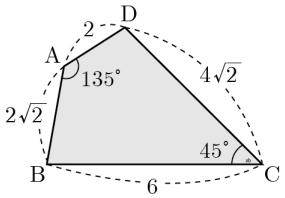
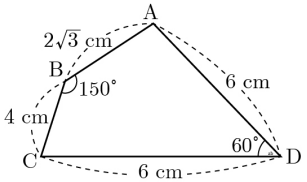


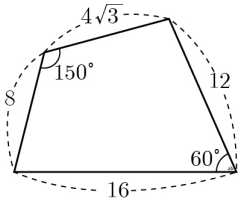
63.



64.

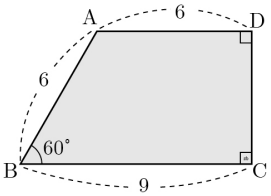


65.

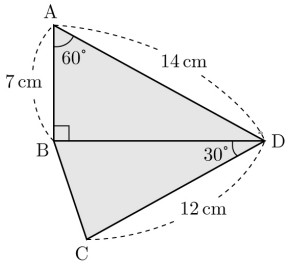


◪ 다음 그림과 같은 □ABCD의 넓이를 구하여라.

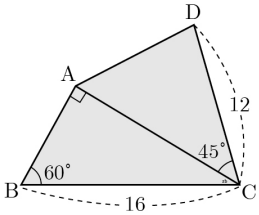
66.



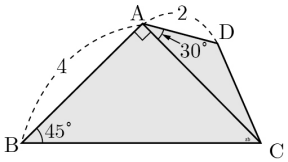
67.



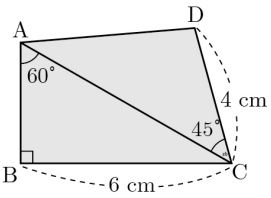
68.



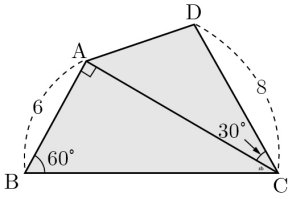
69.



70.



71.



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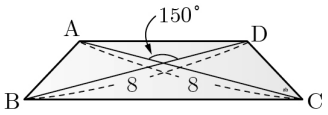
◪ 다음 사각형 ABCD의 넓이를 구하여라.

72.



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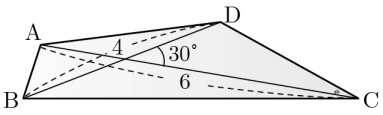
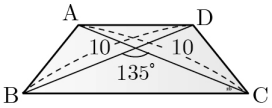


74.



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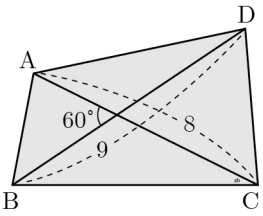
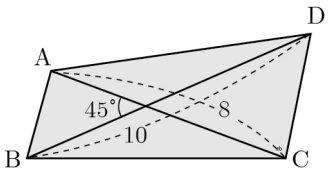
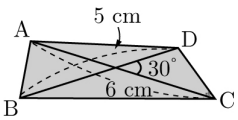


76.



77.



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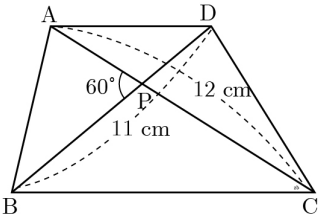
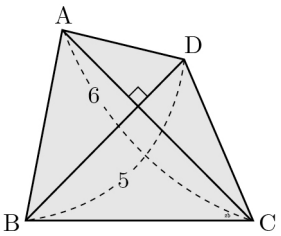
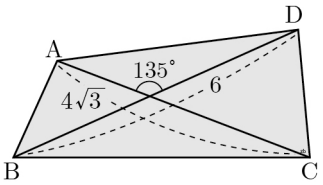


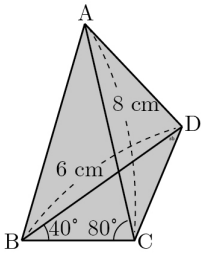
79.



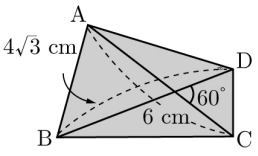
80.



81.



82.



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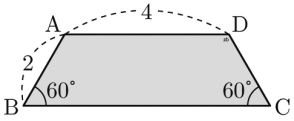
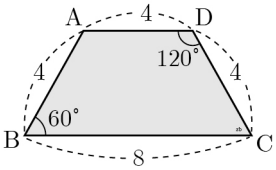
◪ 다음 사다리꼴 ABCD의 넓이를 구하여라.

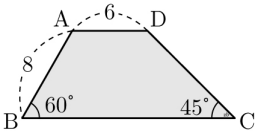
83.



84.

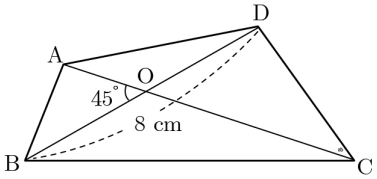


85.

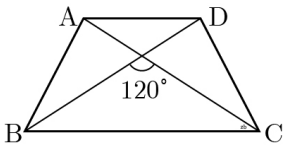


◪ 사각형 ABCD의 넓이가 주어질 때, 다음 물음에 답하여라.

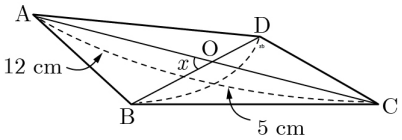
86. □ABCD의 넓이가 $32\sqrt{2}\,\mathrm{cm}^2$일 때, $\overline{AC}$의 길이를 구하여라.



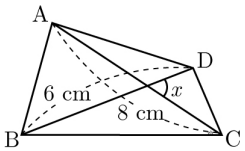
87. 등변사다리꼴 ABCD의 넓이가 $8\sqrt{3}\,\mathrm{cm}^2$일 때, $\overline{AC}$의 길이를 구하여라.



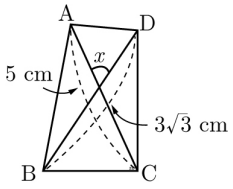
88. 사각형 ABCD의 넓이가 $15\sqrt{2}\,\mathrm{cm}^2$일 때, $\angle x$의 크기를 구하여라. (단, 점 O는 두 대각선의 교점이고, $\angle x < 90^\circ$이다.)



89. 사각형 ABCD의 넓이가 $12\sqrt{2}\,\mathrm{cm}^2$일 때, $\angle x$의 크기를 구하여라. (단, $0^\circ < x < 90^\circ$)



90. 사각형 ABCD의 넓이가 $\frac{45}{4}\,\mathrm{cm}^2$일 때, $\angle x$의 크기를 구하여라. (단, $0^\circ < x < 90^\circ$)



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정답 및 해설

1) $7\sqrt{3}$

⇨ $\triangle ABC=\frac{1}{2}\times 4\times 7\times \sin(180^\circ-120^\circ)$

$=\frac{1}{2}\times 4\times 7\times \frac{\sqrt{3}}{2}=7\sqrt{3}$

2) $5\sqrt{3}$

⇨ $\triangle ABC=\frac{1}{2}\times 4\times 5\times \sin(180^\circ-120^\circ)$

$=\frac{1}{2}\times 4\times 5\times \frac{\sqrt{3}}{2}=5\sqrt{3}$

3) $8\sqrt{2}$

⇨ $\triangle ABC=\frac{1}{2}\times 2\times 16\times \sin(180^\circ-135^\circ)$

$=\frac{1}{2}\times 2\times 16\times \frac{\sqrt{2}}{2}=8\sqrt{2}$

4) $15\sqrt{3}$

⇨ $\frac{1}{2}\times 10\times 6\times \sin 60^\circ=\frac{1}{2}\times 10\times 6\times \frac{\sqrt{3}}{2}=15\sqrt{3}$

5) $3\sqrt{3}\ \mathrm{cm}^2$

⇨ ($\triangle ABC$의 넓이)

$=\frac{1}{2}\times \sin 60^\circ\times 3\times 4=\frac{1}{2}\times \frac{\sqrt{3}}{2}\times 3\times 4=3\sqrt{3}\,(\mathrm{cm}^2)$

6) 12

⇨ $\triangle ABC=\frac{1}{2}\times 6\times 8\times \sin(180^\circ-150^\circ)$

$=\frac{1}{2}\times 6\times 8\times \frac{1}{2}=12$

7) $48\sqrt{2}$

⇨ $\triangle ABC=\frac{1}{2}\times 8\times 24\times \sin(180^\circ-135^\circ)$

$=\frac{1}{2}\times 8\times 24\times \frac{\sqrt{2}}{2}=48\sqrt{2}$

8) $\frac{27\sqrt{2}}{2}$

⇨ $\overline{AB}$의 연장선과 점 C에서 내린 수선과 만나는 점을 H라고 하자.

$\triangle ACH$에서 $1:\sqrt{2}=\overline{CH}:6,\ \sqrt{2}\,\overline{CH}=6$

$\therefore\ \overline{CH}=\frac{6}{\sqrt{2}}=\frac{6\sqrt{2}}{2}=3\sqrt{2}$

$\therefore$ ($\triangle ABC$의 넓이)$=\frac{1}{2}\times 9\times 3\sqrt{2}=\frac{27\sqrt{2}}{2}$

9) 8

⇨ $\frac{1}{2}\times 8\times 4\times \sin(180^\circ-150^\circ)=\frac{1}{2}\times 8\times 4\times \frac{1}{2}=8$

10) 6

⇨ $\triangle ABC=\frac{1}{2}\times 4\times 6\times \sin 30^\circ=\frac{1}{2}\times 4\times 6\times \frac{1}{2}=6$

11) $5\sqrt{2}\ \mathrm{cm}^2$

⇨ $\triangle ABC=\frac{1}{2}\times 4\times 5\times \sin 45^\circ=5\sqrt{2}\,(\mathrm{cm}^2)$

12) $18\sqrt{2}$

⇨ $\triangle ABC=\frac{1}{2}\times 8\times 9\sqrt{2}\times \sin 30^\circ$

$=\frac{1}{2}\times 8\times 9\sqrt{2}\times \frac{1}{2}=18\sqrt{2}$

13) 3

⇨ ($\triangle ABC$의 넓이)

$=\frac{1}{2}\times 4\times 3\times \sin 30^\circ=\frac{1}{2}\times 4\times 3\times \frac{1}{2}=3$

14) $15\sqrt{2}$

⇨ ($\triangle ABC$의 넓이)

$=\frac{1}{2}\times 12\times 5\times \sin 45^\circ=\frac{1}{2}\times 12\times 5\times \frac{\sqrt{2}}{2}=15\sqrt{2}$

15) $21\sqrt{2}$

⇨ ($\triangle ABC$의 넓이)

$=\frac{1}{2}\times 12\times 7\times \sin(180^\circ-135^\circ)$

$=\frac{1}{2}\times 12\times 7\times \frac{\sqrt{2}}{2}=21\sqrt{2}$

16) $35\sqrt{3}$

⇨ ($\triangle ABC$의 넓이)

$=\frac{1}{2}\times 10\times 14\times \sin(180^\circ-120^\circ)$

$=\frac{1}{2}\times 10\times 14\times \frac{\sqrt{3}}{2}=35\sqrt{3}$

17) $26\sqrt{3}$

⇨ $\triangle ABC=\frac{1}{2}\times 8\times 13\times \sin 60^\circ$

$=\frac{1}{2}\times 8\times 13\times \frac{\sqrt{3}}{2}=26\sqrt{3}$

18) $\frac{21\sqrt{3}}{4}$

⇨ $\angle ACB=180^\circ-(35^\circ+85^\circ)=60^\circ$이므로

$\triangle ABC=\frac{1}{2}\times 7\times 3\times \sin 60^\circ$

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$= \frac{1}{2} \times 7 \times 3 \times \frac{\sqrt{3}}{2} = \frac{21\sqrt{3}}{4}$

19) 14

⇨ $\frac{1}{2} \times 8 \times 7 \times \sin 30^\circ = \frac{1}{2} \times 8 \times 7 \times \frac{1}{2} = 14$

20) $10\sqrt{2}$

⇨ $\frac{1}{2} \times 8 \times 5 \times \sin 45^\circ = \frac{1}{2} \times 8 \times 5 \times \frac{\sqrt{2}}{2} = 10\sqrt{2}$

21) 15

⇨ $\triangle ABC = \frac{1}{2} \times 10 \times 2\sqrt{3} \times \sin 60^\circ$

$= \frac{1}{2} \times 10 \times 2\sqrt{3} \times \frac{\sqrt{3}}{2} = 15$

22) $30\sqrt{3}$

⇨ $\frac{1}{2} \times 12 \times 10 \times \sin(180^\circ - 120^\circ)$

$= \frac{1}{2} \times 12 \times 10 \times \frac{\sqrt{3}}{2} = 30\sqrt{3}$

23) $12\,\mathrm{cm}^2$

⇨ (△ABC의 넓이)

$= \frac{1}{2} \times 3\sqrt{2} \times 8 \times \sin 135^\circ$

$= \frac{1}{2} \times 3\sqrt{2} \times 8 \times \sin(180^\circ - 135^\circ)$

$= \frac{1}{2} \times 3\sqrt{2} \times 8 \times \frac{\sqrt{2}}{2} = 12(\mathrm{cm}^2)$

24) $\frac{15\sqrt{3}}{4}\,\mathrm{cm}^2$

⇨ $\angle ABC = 180^\circ - (40^\circ + 20^\circ) = 120^\circ$ 이므로

$\triangle ABC = \frac{1}{2} \times 3 \times 5 \times \sin(180^\circ - 120^\circ)$

$= \frac{1}{2} \times 3 \times 5 \times \frac{\sqrt{3}}{2} = \frac{15\sqrt{3}}{4}(\mathrm{cm}^2)$

25) $9\mathrm{cm}^2$

⇨ $\overline{AB} = \overline{AC}$ 이므로 $\angle ABC = \angle ACB = 75^\circ$

$\therefore \angle BAC = 30^\circ$

$\therefore$ (△ABC의 넓이) $= \frac{1}{2} \times 6 \times 6 \times \sin 30^\circ = 9(\mathrm{cm}^2)$

26) $36\sqrt{3}\,\mathrm{cm}^2$

⇨ $\angle BAC = 30^\circ$ 이므로 $\overline{AC} = \overline{BC} = 12\,\mathrm{cm}$

$\therefore \triangle ABC = \frac{1}{2} \times 12 \times 12 \times \sin(180^\circ - 120^\circ) = 36\sqrt{3}\ (\mathrm{cm}^2)$

27) $16\sqrt{3}$

⇨ $\angle BAC = 180^\circ - (30^\circ + 120^\circ) = 30^\circ$ 이므로

$\overline{AC} = \overline{BC} = 8$이다.

$\therefore$ (△ABC의 넓이)

$= \frac{1}{2} \times 8 \times 8 \times \sin(180^\circ - 120^\circ) = 16\sqrt{3}$

28) 10

⇨ (△ABC의 넓이) $= \frac{1}{2} \times x \times 12 \times \sin 60^\circ = 30\sqrt{3}$

$3\sqrt{3}x = 30\sqrt{3}$ $\therefore x = 10$

29) 6

⇨ (△ABC의 넓이)

$= \frac{1}{2} \times \overline{AB} \times 16 \times \sin(180^\circ - 135^\circ) = 24\sqrt{2}$

따라서 $\overline{AB} = 6$ 이 된다.

30) $6\sqrt{3}\,\mathrm{cm}$

⇨ $\overline{AC} = x\,\mathrm{cm}$라 하면

$\frac{1}{2} \times 8 \times x \times \sin(180^\circ - 150^\circ) = 12\sqrt{3}$

$2x = 12\sqrt{3}$ $\therefore x = 6\sqrt{3}$

31) 6cm

32) $\frac{15\sqrt{3}}{4}\,\mathrm{cm}$

⇨ $\overline{AD}$의 길이를 x라고 하자.

$\triangle ABC = \triangle ABD + \triangle ACD$

$\frac{1}{2} \times \sin 60^\circ \times 10 \times 6 = \frac{1}{2} \times \sin 30^\circ \times 10x + \frac{1}{2} \times \sin 30^\circ \times 6x$

$5x + 3x = 30\sqrt{3}$

$\therefore x = \frac{30\sqrt{3}}{8} = \frac{15\sqrt{3}}{4}$

따라서 $\overline{AD} = \frac{15\sqrt{3}}{4}(\mathrm{cm})$이다.

33) $\frac{24\sqrt{3}}{5}\,\mathrm{cm}$

⇨ $\overline{AD} = x$ 라고 하면 △ABC의 넓이는 △ABD와 △ACD의 넓이의 합과 같으므로

$\frac{1}{2} \times \sin 60^\circ \times 12 \times 8$

$= \frac{1}{2} \times \sin 30^\circ \times 12 \times x + \frac{1}{2} \times \sin 30^\circ \times 8 \times x$

$3x + 2x = 24\sqrt{3},\ 5x = 24\sqrt{3}$ $\therefore x = \frac{24\sqrt{3}}{5}(\mathrm{cm})$

34) $\frac{24}{7}$

⇨ $\triangle ABC = \frac{1}{2} \times 8 \times 6 \times \sin 120^\circ = 12\sqrt{3}$

$\triangle ABC = \triangle ABD + \triangle ADC$이므로 $\overline{AD} = x$라 하면

$12\sqrt{3} = \frac{1}{2} \times 8 \times x \times \sin 60^\circ + \frac{1}{2} \times x \times 6 \times \sin 60^\circ$

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$12\sqrt{3}=2\sqrt{3}x+\frac{3\sqrt{3}}{2}x$

$\frac{7\sqrt{3}}{2}x=12\sqrt{3}$ $\therefore x=\frac{24}{7}$

35) $\frac{24\sqrt{2}}{7}$

⇨ $\overline{AD}=x$라고 하면

(△ABC의 넓이)=(△ABD의 넓이)+(△ACD의 넓이)

$\frac{1}{2}\times\sin 90^\circ\times 8\times 6$

$=\frac{1}{2}\times\sin 45^\circ\times 8\times x+\frac{1}{2}\times\sin 45^\circ\times 6\times x$

$7\sqrt{2}x=48$ $\therefore x=\frac{48}{7\sqrt{2}}=\frac{48\sqrt{2}}{14}=\frac{24\sqrt{2}}{7}$

36) $10\sqrt{3}$

⇨ (□ABCD의 넓이)

$=4\times 5\times\sin(180^\circ-120^\circ)=4\times 5\times\frac{\sqrt{3}}{2}=10\sqrt{3}$

37) $30\sqrt{3}$

⇨ $6\times 10\times\sin 60^\circ=6\times 10\times\frac{\sqrt{3}}{2}=30\sqrt{3}$

38) $9\sqrt{2}$

⇨ $3\times 6\times\sin 45^\circ=3\times 6\times\frac{\sqrt{2}}{2}=9\sqrt{2}$

39) $20\sqrt{3}$

⇨ (□ABCD의 넓이)

$=5\times 8\times\sin 60^\circ=5\times 8\times\frac{\sqrt{3}}{2}=20\sqrt{3}$

40) $25\sqrt{2}$

⇨ $\square ABCD=10\times 5\times\sin 45^\circ=10\times 5\times\frac{\sqrt{2}}{2}=25\sqrt{2}$

41) $20\sqrt{2}$

⇨ $5\times 8\times\sin(180^\circ-135^\circ)=5\times 8\times\frac{\sqrt{2}}{2}=20\sqrt{2}$

42) 45

⇨ $\square ABCD=9\times 10\times\sin(180^\circ-150^\circ)$

$=9\times 10\times\frac{1}{2}=45$

43) 42

⇨ $\overline{BC}=\overline{AD}=6\sqrt{2}$이므로

$\square ABCD=7\times 6\sqrt{2}\times\sin 45^\circ=7\times 6\sqrt{2}\times\frac{\sqrt{2}}{2}=42$

44) $40\sqrt{2}$

⇨ $\overline{CD}=\overline{AB}=8$이므로

$\square ABCD=8\times 10\times\sin(180^\circ-135^\circ)$

$=8\times 10\times\frac{\sqrt{2}}{2}=40\sqrt{2}$

45) 8

⇨ $2\times 8\times\sin(180^\circ-150^\circ)=2\times 8\times\frac{1}{2}=8$

46) $24\sqrt{3}$

⇨ $\overline{AD}=\overline{BC}=8$이므로

$\square ABCD=6\times 8\times\sin(180^\circ-120^\circ)$

$=6\times 8\times\frac{\sqrt{3}}{2}=24\sqrt{3}$

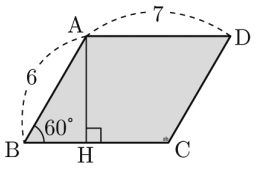
47) $\sqrt{5}$

⇨ $\overline{AD}=\overline{BC}=\sqrt{2}$이므로

$\square ABCD=\sqrt{5}\times\sqrt{2}\times\sin(180^\circ-135^\circ)$

$=\sqrt{5}\times\sqrt{2}\times\frac{\sqrt{2}}{2}=\sqrt{5}$

48) $21\sqrt{3}$

⇨ 

꼭짓점 A에서 $\overline{BC}$에 내린 수선의 발을 H라 하면,

△ABH에서 $\overline{AH}:6=\sqrt{3}:2$ $\therefore \overline{AH}=3\sqrt{3}$

$\therefore$ (평행사변형 ABCD의 넓이)$=7\times 3\sqrt{3}=21\sqrt{3}$

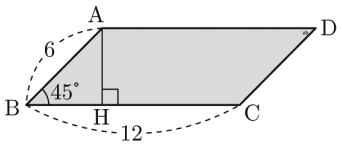
49) 14

⇨ 꼭짓점 A에서 $\overline{BC}$에 내린 수선의 발을 H라 하면

△ABH에서 $\overline{AH}:4=1:2$ $\therefore \overline{AH}=2$

$\therefore$ (평행사변형 ABCD의 넓이)$=7\times 2=14$

50) $36\sqrt{2}$

⇨ 

꼭짓점 A에서 $\overline{BC}$에 내린 수선의 발을 H라 하면

△ABH에서 $\overline{AH}:6=1:\sqrt{2}$ $\therefore \overline{AH}=3\sqrt{2}$

$\therefore$ (평행사변형 ABCD의 넓이)$=12\times 3\sqrt{2}=36\sqrt{2}$

51) $8\sqrt{2}$

⇨ $4\times 4\times\sin(180^\circ-135^\circ)=4\times 4\times\frac{\sqrt{2}}{2}=8\sqrt{2}$

52) $50\sqrt{3}$

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⇨ $10\times10\times\sin60^\circ=10\times10\times\frac{\sqrt{3}}{2}=50\sqrt{3}$

53) $8\sqrt{2}$

54) $18\sqrt{3}\,\mathrm{cm}^2$

⇨ $\square ABCD=6\times6\times\sin60^\circ$

$=6\times6\times\frac{\sqrt{3}}{2}=18\sqrt{3}(cm^2)$

55) 6

⇨ $4\times x\times\sin60^\circ=12\sqrt{3}$

$\therefore\ x=6$

56) 8

⇨ $5\times x\times\sin(180^\circ-150^\circ)=20$

$\therefore\ x=8$

57) 7cm

⇨ $\overline{AB}=x$ 라고 하자.

(평행사변형 ABCD의 넓이)

$=x\times10\times\sin(180^\circ-120^\circ)=35\sqrt{3}$

$\therefore\ x=7$

따라서 $\overline{AB}=7$ 이 된다.

58) 8cm

59) 135°

60) 120°

61) $14\sqrt{3}\,cm^2$

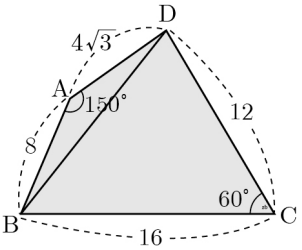
⇨ $\square ABCD=\triangle ABD+\triangle BCD$

$=\frac{1}{2}\times4\times2\sqrt{3}\times\sin(180^\circ-150^\circ)+\frac{1}{2}\times8\times6\times\sin60^\circ$

$=2\sqrt{3}+12\sqrt{3}=14\sqrt{3}$

62) $56\sqrt{3}$

⇨ 대각선 BD를 그으면



$\square ABCD=\triangle ABD+\triangle BCD$

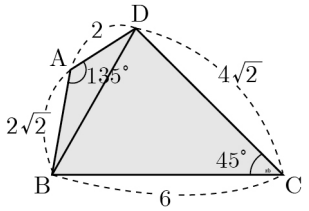
$=\frac{1}{2}\times4\sqrt{3}\times8\times\sin(180^\circ-150^\circ)+\frac{1}{2}\times12\times16\times\sin60^\circ$

$=\frac{1}{2}\times4\sqrt{3}\times8\times\frac{1}{2}+\frac{1}{2}\times12\times16\times\frac{\sqrt{3}}{2}$

$=8\sqrt{3}+48\sqrt{3}=56\sqrt{3}$

63) 14

⇨ 대각선 BD를 그으면



$\square ABCD=\triangle ABD+\triangle BCD$

$=\frac{1}{2}\times2\times2\sqrt{2}\times\sin(180^\circ-135^\circ)+\frac{1}{2}\times4\sqrt{2}\times6\times\sin45^\circ$

$=\frac{1}{2}\times2\times2\sqrt{2}\times\frac{\sqrt{2}}{2}+\frac{1}{2}\times4\sqrt{2}\times6\times\frac{\sqrt{2}}{2}$

$=2+12=14$

64) $11\sqrt{3}$

⇨ $\square ABCD=\triangle ABC+\triangle ACD$

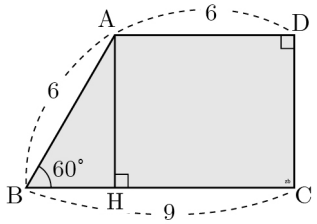
$=\frac{1}{2}\times4\times2\sqrt{3}\times\sin150^\circ+\frac{1}{2}\times6\times6\times\sin60^\circ$

$=2\sqrt{3}+9\sqrt{3}=11\sqrt{3}$

65) $56\sqrt{3}$

66) $\frac{45\sqrt{3}}{2}$

⇨ 다음 그림과 같이 꼭짓점 A에서 $\overline{BC}$에 내린 수선의 발을 H라 하면 $\triangle ABH$에서



$\overline{AH}=6\sin60^\circ=6\times\frac{\sqrt{3}}{2}=3\sqrt{3}$

$\therefore\square ABCD=\frac{1}{2}\times(6+9)\times3\sqrt{3}=\frac{45\sqrt{3}}{2}$

67) $\frac{91\sqrt{3}}{2}\,\mathrm{cm}^2$

⇨ 직각삼각형 ABD에서 $\overline{BD}=\sqrt{14^2-7^2}=7\sqrt{3}\,(\mathrm{cm})$

$\therefore\ \square ABCD=\triangle ABD+\triangle BCD$

$=\frac{1}{2}\times7\times14\times\sin60^\circ+\frac{1}{2}\times7\sqrt{3}\times12\times\sin30^\circ$

$=\frac{49\sqrt{3}}{2}+21\sqrt{3}=\frac{91\sqrt{3}}{2}(\mathrm{cm}^2)$

68) $32\sqrt{3}+24\sqrt{6}$

⇨ $\triangle ABC$에서 $\overline{AC}=16\sin60^\circ=16\times\frac{\sqrt{3}}{2}=8\sqrt{3}$이고

$\angle ACB=180^\circ-(90^\circ+60^\circ)=30^\circ$ 이므로

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$\square ABCD = \triangle ABC + \triangle ACD$

$= \frac{1}{2} \times 16 \times 8\sqrt{3} \times \sin 30^\circ + \frac{1}{2} \times 8\sqrt{3} \times 12 \times \sin 45^\circ$

$= \frac{1}{2} \times 16 \times 8\sqrt{3} \times \frac{1}{2} + \frac{1}{2} \times 8\sqrt{3} \times 12 \times \frac{\sqrt{2}}{2}$

$= 32\sqrt{3} + 24\sqrt{6}$

69) 10

⇨ $\triangle ABC$에서 $\overline{AC} = 4\tan 45^\circ = 4 \times 1 = 4$이므로

$\square ABCD = \triangle ABC + \triangle ACD$

$= \frac{1}{2} \times 4 \times 4 + \frac{1}{2} \times 2 \times 4 \times \sin 30^\circ$

$= 8 + \frac{1}{2} \times 2 \times 4 \times \frac{1}{2}$

$= 8 + 2 = 10$

70) $(6\sqrt{3} + 4\sqrt{6})\text{cm}^2$

⇨ $\triangle ABC$에서 $\overline{AC} = \frac{6}{\sin 60^\circ} = 6 \times \frac{2}{\sqrt{3}} = 4\sqrt{3}(cm)$이고,

$\angle ACB = 180^\circ - (60^\circ + 90^\circ) = 30^\circ$ 이므로

$\square ABCD = \triangle ABC + \triangle ACD$

$= \frac{1}{2} \times 4\sqrt{3} \times 6 \times \sin 30^\circ + \frac{1}{2} \times 4\sqrt{3} \times 4 \times \sin 45^\circ$

$= \frac{1}{2} \times 4\sqrt{3} \times 6 \times \frac{1}{2} + \frac{1}{2} \times 4\sqrt{3} \times 4 \times \frac{\sqrt{2}}{2}$

$= 6\sqrt{3} + 4\sqrt{6}(\text{cm}^2)$

71) $30\sqrt{3}$

⇨ $\triangle ABC$에서 $\overline{AC} = 6\tan 60^\circ = 6 \times \sqrt{3} = 6\sqrt{3}$이므로

$\square ABCD = \triangle ABC + \triangle ACD$

$= \frac{1}{2} \times 6 \times 6\sqrt{3} + \frac{1}{2} \times 6\sqrt{3} \times 8 \times \sin 30^\circ$

$= 18\sqrt{3} + \frac{1}{2} \times 6\sqrt{3} \times 8 \times \frac{1}{2}$

$= 18\sqrt{3} + 12\sqrt{3} = 30\sqrt{3}$

72) 16

⇨ ($\square ABCD$의 넓이)

$= \frac{1}{2} \times 8 \times 8 \times \sin(180^\circ - 150^\circ) = \frac{1}{2} \times 8 \times 8 \times \frac{1}{2} = 16$

73) 6

⇨ ($\square ABCD$의 넓이)

$= \frac{1}{2} \times 4 \times 6 \times \sin 30^\circ = \frac{1}{2} \times 4 \times 6 \times \frac{1}{2} = 6$

74) $25\sqrt{2}$

⇨ ($\square ABCD$의 넓이)

$= \frac{1}{2} \times 10 \times 10 \times \sin(180^\circ - 135^\circ)$

$= \frac{1}{2} \times 10 \times 10 \times \frac{\sqrt{2}}{2} = 25\sqrt{2}$

75) $18\sqrt{3}$

⇨ $\square ABCD = \frac{1}{2} \times 8 \times 9 \times \sin 60^\circ$

$= \frac{1}{2} \times 8 \times 9 \times \frac{\sqrt{3}}{2} = 18\sqrt{3}$

76) $20\sqrt{2}$

⇨ $\square ABCD = \frac{1}{2} \times 8 \times 10 \times \sin 45^\circ$

$= \frac{1}{2} \times 8 \times 10 \times \frac{\sqrt{2}}{2} = 20\sqrt{2}$

77) $\frac{15}{2}\text{cm}^2$

⇨ $\frac{1}{2} \times 5 \times 6 \times \sin 30^\circ = \frac{1}{2} \times 5 \times 6 \times \frac{1}{2} = \frac{15}{2}(\text{cm}^2)$

78) $33\sqrt{3}\ \text{cm}^2$

79) 15

⇨ $\square ABCD = \frac{1}{2} \times 6 \times 5 \times \sin 90^\circ = \frac{1}{2} \times 6 \times 5 \times 1 = 15$

80) $6\sqrt{6}$

⇨ $\square ABCD = \frac{1}{2} \times 4\sqrt{3} \times 6 \times \sin(180^\circ - 135^\circ)$

$= \frac{1}{2} \times 4\sqrt{3} \times 6 \times \frac{\sqrt{2}}{2} = 6\sqrt{6}$

81) $12\sqrt{3}\ \text{cm}^2$

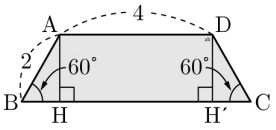
82) 18cm^2

⇨ $\frac{1}{2} \times 6 \times 4\sqrt{3} \times \sin 60^\circ$

$= \frac{1}{2} \times 6 \times 4\sqrt{3} \times \frac{\sqrt{3}}{2} = 18(\text{cm}^2)$

83) $5\sqrt{3}$

⇨



꼭짓점 A, D에서 $\overline{BC}$에 내린 수선의 발을 각각 H, H′이라 하면 $\triangle ABH$에서

$\overline{AH} : 2 = \sqrt{3} : 2 \quad \therefore \overline{AH} = \sqrt{3}$

$\overline{BH} : 2 = 1 : 2 \quad \therefore \overline{BH} = 1$

$\therefore$ (사다리꼴 ABCD의 넓이)

$= \frac{1}{2} \times \{4 + (1 + 4 + 1)\} \times \sqrt{3} = 5\sqrt{3}$

84) $12\sqrt{3}$

⇨ 대각선 AC를 그으면

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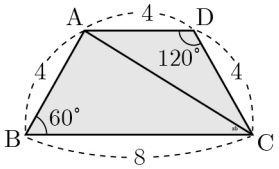


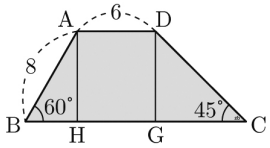
$\square ABCD = \triangle ABC + \triangle ACD$

$= \frac{1}{2} \times 4 \times 8 \times \sin 60^\circ + \frac{1}{2} \times 4 \times 4 \times \sin(180^\circ - 120^\circ)$

$= \frac{1}{2} \times 4 \times 8 \times \frac{\sqrt{3}}{2} + \frac{1}{2} \times 4 \times 4 \times \frac{\sqrt{3}}{2}$

$= 8\sqrt{3} + 4\sqrt{3} = 12\sqrt{3}$

85) $8(4\sqrt{3}+3)$



⇨ 꼭짓점 A에서 $\overline{BC}$에 내린 수선의 발을 H,
꼭짓점 D에서 $\overline{BC}$에 내린 수선의 발을 G라 하면

$\triangle ABH$에서 $\overline{AH} : 8 = \sqrt{3} : 2$ $\therefore \overline{AH} = 4\sqrt{3}$

$\overline{BH} : 8 = 1 : 2$ $\therefore \overline{BH} = 4$

$\triangle DCG$에서 $\overline{CG} : 4\sqrt{3} = 1 : 1$ $\therefore \overline{CG} = 4\sqrt{3}$

$\therefore$ ($\square ABCD$의 넓이)

$= \frac{1}{2} \times \{6 + (4 + 6 + 4\sqrt{3})\} \times 4\sqrt{3} = 8(4\sqrt{3}+3)$

86) 16cm

87) $4\sqrt{2}$cm

⇨ 등변사다리꼴의 두 대각선의 길이가 같으므로 $\overline{AC} = x$라 하면

$8\sqrt{3} = \frac{1}{2}x^2 \sin 60^\circ$, $\frac{\sqrt{3}}{4}x^2 = 8\sqrt{3}$, $x^2 = 32$

$\therefore x = 4\sqrt{2}\,(\text{cm})$

88) 45°

89) 45°

⇨ $\frac{1}{2} \times 6 \times 8 \times \sin x = 12\sqrt{2}$

$\sin x = \frac{\sqrt{2}}{2}$ $\therefore \angle x = 45^\circ$

90) 60°

⇨ $\frac{1}{2} \times 5 \times 3\sqrt{3} \times \sin x = \frac{45}{4}$

$\sin x = \frac{\sqrt{3}}{2}$ $\therefore \angle x = 60^\circ$

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