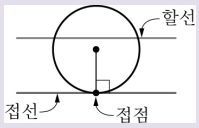
◇「콘텐츠산업 진흥법 시행령」제33조에 의한 표시
1) 제작연월일 : 2016-10-25
2) 제작자 : 교육지대㈜
3) 이 콘텐츠는 「콘텐츠산업 진흥법」에 따라 최초 제작일부터 5년간 보호됩니다.

◇「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

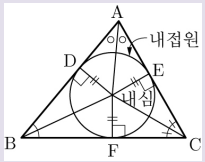
1. 접선과 할선

1) 접선: 원과 한점에서 만나는 직선
2) 할선: 원과 두 점에서 만나는 직선



2. 삼각형의 내심

1) 내접원과 내심: 삼각형의 세 변이 한 원에 접할 때 원은 주어진 삼각형에 내접한다고 한다. 또 이 원을 삼각형의 내접원이라 하고 내접원의 중심을 내심이라고 한다.

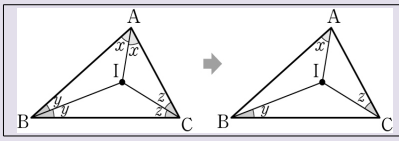


참고
◉ 모든 삼각형의 내심은 삼각형의 내부에 있다.

3. 삼각형의 내심의 성질

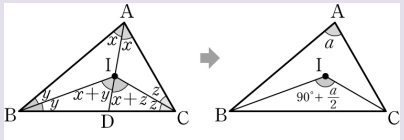
1) 삼각형의 세 내각의 이등분선은 한 점(내심)에서 만난다.
2) 삼각형의 내심에서 세 변에 이르는 거리는 같다.
⇨ $\overline{ID}=\overline{IE}=\overline{IF}$=(내접원 I의 반지름의 길이)

4. 삼각형의 내심의 활용(1)



점 I가 삼각형 ABC의 내심일 때,
$\triangle ABC$에서 $2\angle x+2\angle y+2\angle z=180^\circ$
$\therefore\ \angle x+\angle y+\angle z=90^\circ$

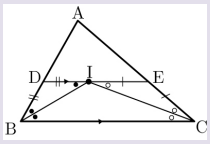
5. 삼각형의 내심의 활용(2)



점 I가 삼각형 ABC의 내심일 때,
$\angle BIC=\angle BID+\angle CID$
$=(\angle IAB+\angle IBA)+(\angle IAC+\angle ICA)$
$=(\angle IAB+\angle IBA+\angle ICA)+\angle IAC$
$=90^\circ+\frac{1}{2}\angle A$

6. 삼각형과 평행선

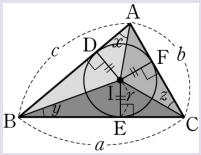
점 I가 $\triangle ABC$의 내심이고 $\overline{DE}//\overline{BC}$일 때,



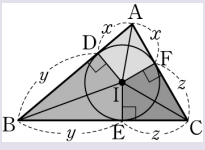
1) $\triangle DBI$, $\triangle EIC$는 이등변삼각형이다.
⇨ $\overline{DB}=\overline{DI}$, $\overline{EI}=\overline{EC}$
2) $\overline{DE}=\overline{DI}+\overline{IE}=\overline{DB}+\overline{EC}$ 이므로 ($\triangle ADE$의 둘레의 길이)$=\overline{AB}+\overline{AC}$

7. 삼각형과 내접원

1) $\triangle ABC$에서 세 변의 길이가 각각 a, b, c이고,
내접원의 반지름의 길이가 r일 때
$\triangle ABC=\triangle IBC+\triangle ICA+\triangle IAB$
$=\frac{1}{2}ar+\frac{1}{2}br+\frac{1}{2}cr=\frac{1}{2}r(a+b+c)$



2) 점 I가 $\triangle ABC$의 내심일 때,
$\triangle IFA\equiv\triangle IDA$, $\triangle IDB\equiv\triangle IEB$, $\triangle IEC\equiv\triangle IFC$(RHA 합동)
⇨ $\overline{AD}=\overline{AF}$, $\overline{BD}=\overline{BE}$, $\overline{CE}=\overline{CF}$



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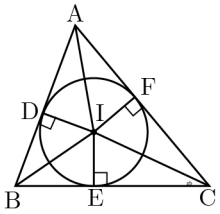
삼각형의 내심

◪ 다음 그림에서 점 I가 △ABC의 내심일 때, [ ]안에 알맞은 것을 써넣어라.

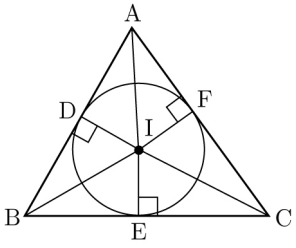


1. $\overline{DI}$ = [ ] = [ ]

2. $\angle DBI$ = [ ]

3. $\triangle ADI \equiv$ [ ]

◪ 다음 그림에서 점 I가 △ABC의 내심일 때, 다음 중 옳은 것은 ○표, 옳지 않은 것은 ×표를 하여라.



4. $\overline{AD}=\overline{AF}$ ( )

5. $\overline{IA}=\overline{IB}=\overline{IC}$ ( )

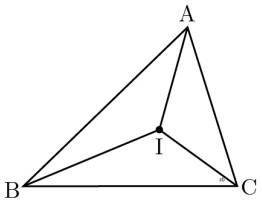
6. $\angle ACI=\angle BCI$ ( )

7. $\triangle IBE \equiv \triangle ICE$ ( )

8. $\overline{ID}=\overline{IE}=\overline{IF}$ ( )

9. $\triangle IBE \equiv \triangle IBD$ ( )

◪ 다음 그림에서 점 I가 △ABC의 내심일 때, 다음 중 옳은 것은 ○표, 옳지 않은 것은 ×표를 하여라.



10. $\overline{AI}=\overline{BI}$ 이다.

( )

11. $\angle IBA=\angle IBC$ 이다.

( )

12. $\overline{IA}$는 $\angle A$의 이등분선이다.

( )

13. $\overline{AB}$의 수직이등분선은 점 I를 지난다.

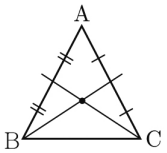
( )

14. 점 I에서 세 변에 이르는 거리는 모두 같다.

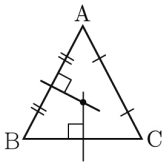
( )

◪ 다음 그림에서 삼각형의 내심을 나타내는 것은 ○표, 내심이 아닌 것은 ×표를 하여라.

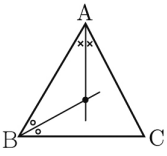
15. ( )



16. ( )



17. ( )



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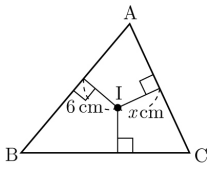
삼각형의 내심의 활용

◪ 다음 그림에서 점 I가 $\triangle ABC$의 내심일 때, x의 값을 구하여라.

18.



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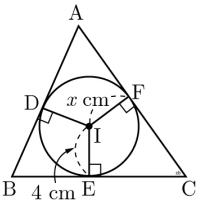

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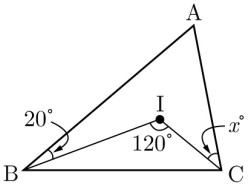

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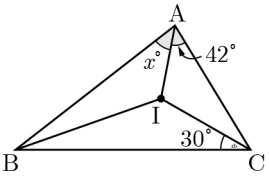

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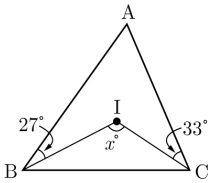
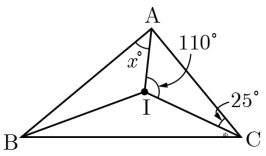
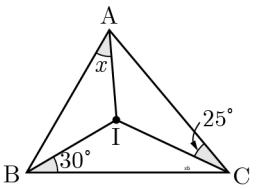


23.



◪ 다음 그림에서 점 I가 $\triangle ABC$의 내심일 때, $\angle x$의 크기를 구하여라.

24.



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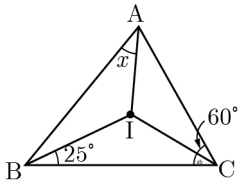

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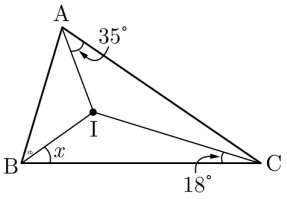

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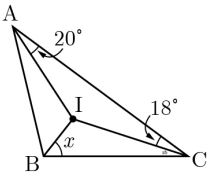

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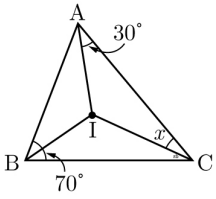

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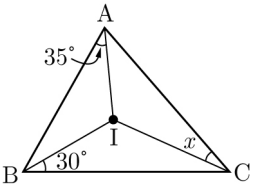

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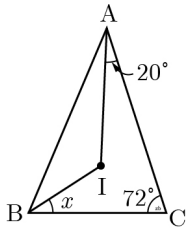
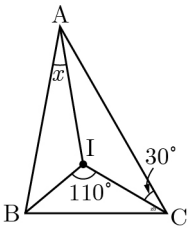
30.



31.



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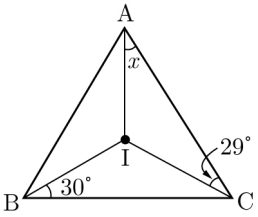

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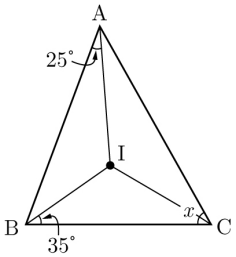

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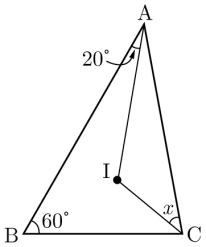
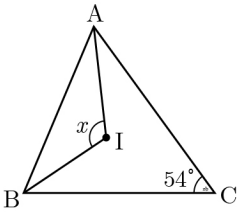


◪ 다음 그림에서 점 I가 $\triangle ABC$의 내심일 때, $\angle x$의 크기를 구하여라.

35.



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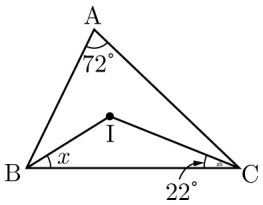

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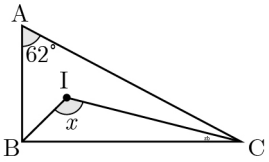

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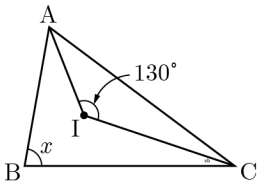

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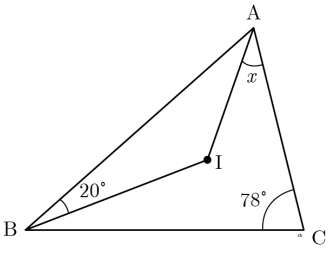

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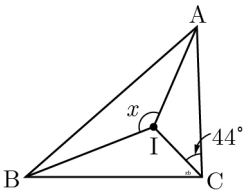

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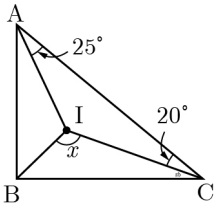

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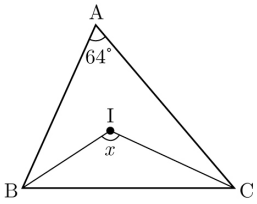

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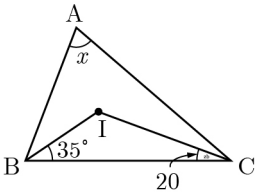
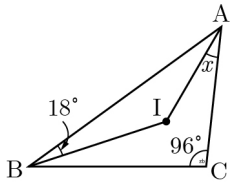
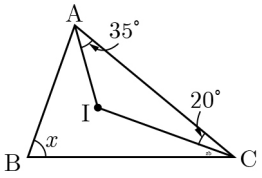


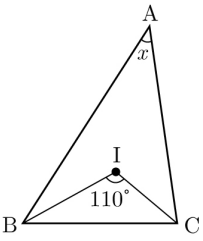
44.



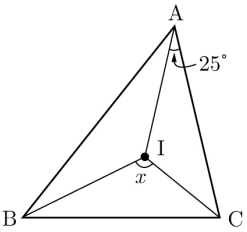
45.



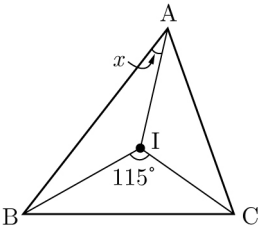
46.



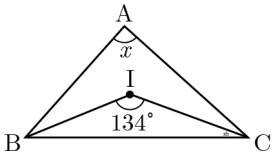
47.



48.



49.



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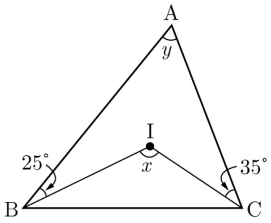
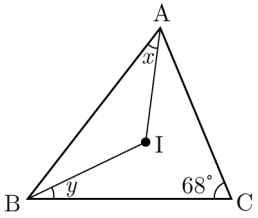
◪ 다음 그림에서 점 I는 △ABC의 내심일 때, $\angle x+\angle y$의 크기를 구하여라.

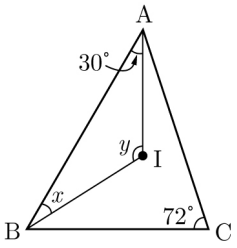
50.



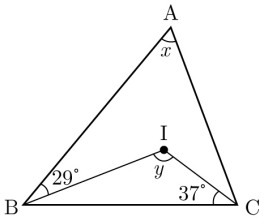
51.



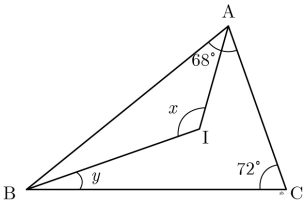
52.



53.

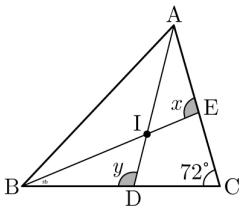


54.

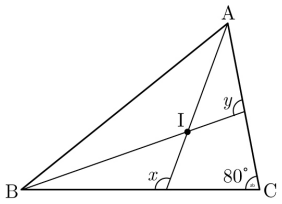


◪ 다음 그림에서 점 I는 △ABC의 내심일 때, $\angle x+\angle y$의 크기를 구하여라.

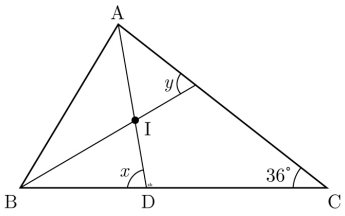
55.



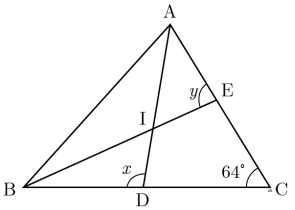
56.



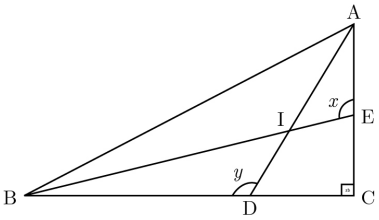
57.



58.



59.



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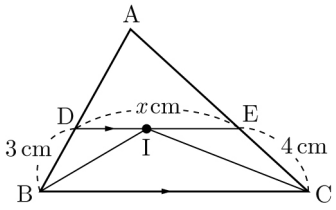
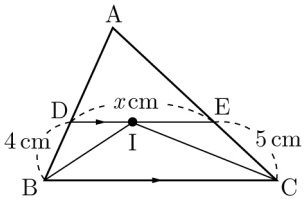
삼각형과 평행선

◪ 다음 그림에서 점 I가 $\triangle ABC$의 내심이고 $\overline{DE}//\overline{BC}$일 때, x의 값을 구하여라.

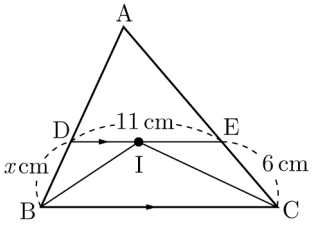
60.



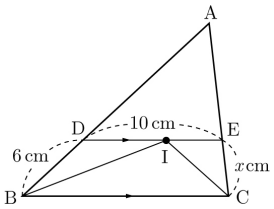
61.



62.

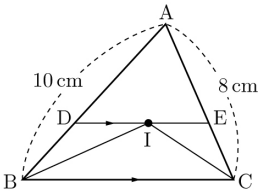


63.

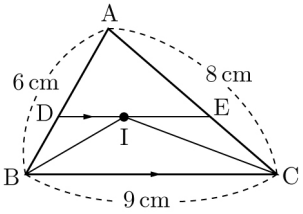


◪ 다음 그림에서 점 I가 $\triangle ABC$의 내심이고 $\overline{DE}//\overline{BC}$일 때, $\triangle ADE$의 둘레의 길이를 구하여라.

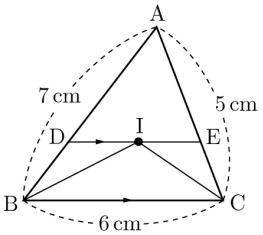
64.



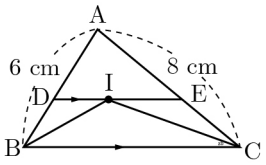
65.



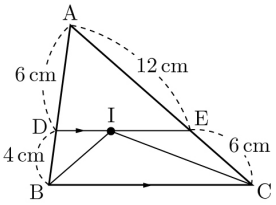
66.



67.



68.



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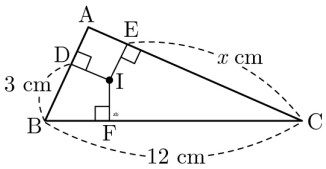
삼각형과 내접원

◪ **다음 그림에서 점 I는 △ABC의 내심이고, 내접원이 $\overline{AB}$, $\overline{BC}$, $\overline{CA}$와 만나는 점을 각각 D, E, F라 할 때, x의 값을 구하여라.**

69.



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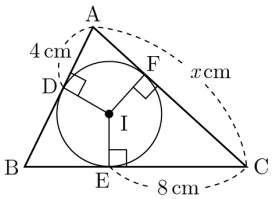
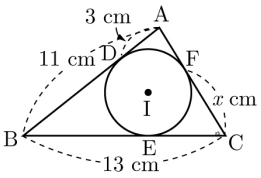
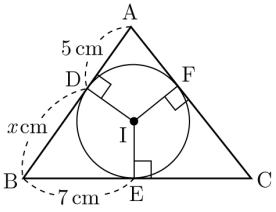


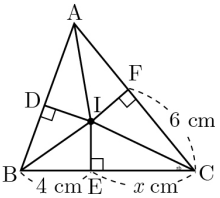
71.



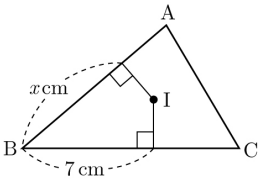
72.



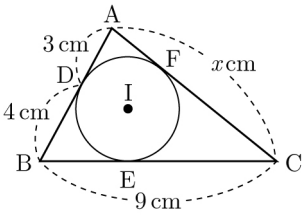
73.



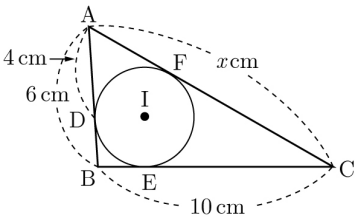
74.



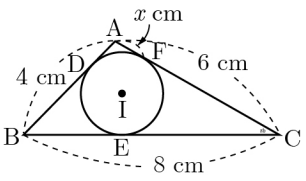
75.



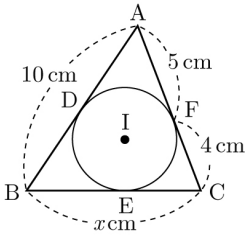
76.



77.



78.



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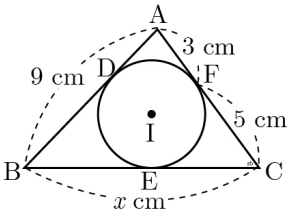
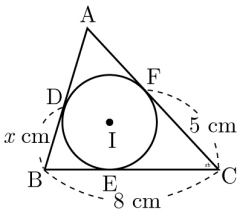
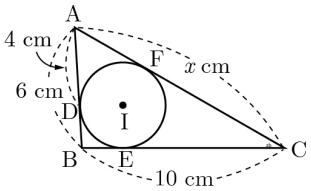
79.



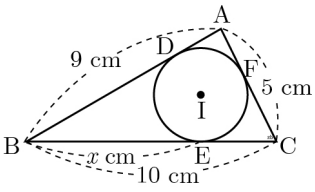
80.



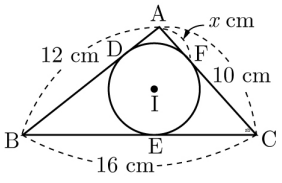
81.



82.

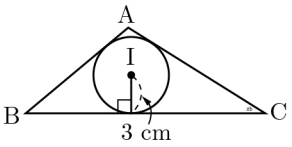


83.

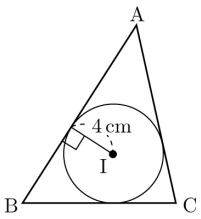


◪ **점 I가 △ABC의 내심이고, 다음과 같이 △ABC의 넓이가 주어졌을 때, △ABC의 둘레의 길이를 구하여라.**

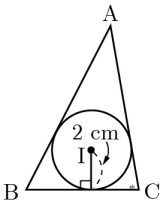
84. $\triangle ABC = 30\,cm^2$



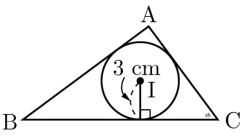
85. $\triangle ABC = 72cm^2$



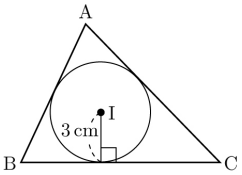
86. $\triangle ABC = 25\,cm^2$



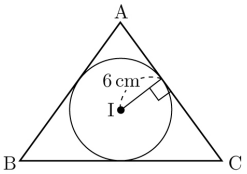
87. $\triangle ABC = 54\,cm^2$



88. $\triangle ABC = 72cm^2$



89. $\triangle ABC = 48cm^2$



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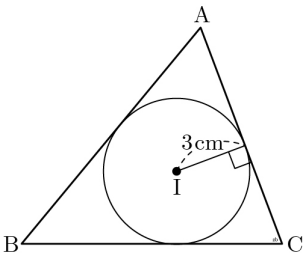
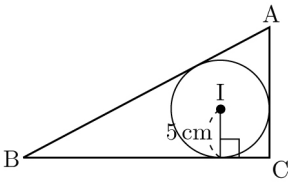
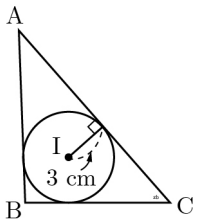
90. $\triangle ABC = 36\,cm^2$



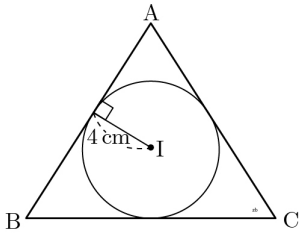
91. $\triangle ABC = 60cm^2$



92. $\triangle ABC = 45\,cm^2$

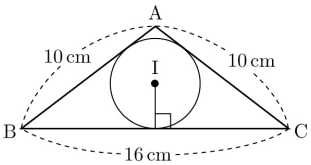


93. $\triangle ABC = 84cm^2$

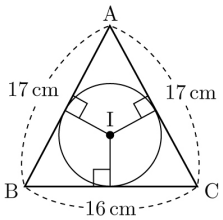


◪ 점 I가 $\triangle ABC$의 내심이고, 다음과 같이 $\triangle ABC$의 넓이가 주어졌을 때, 내접원의 반지름의 길이를 구하여라.

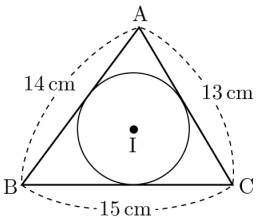
94. $\triangle ABC = 48cm^2$



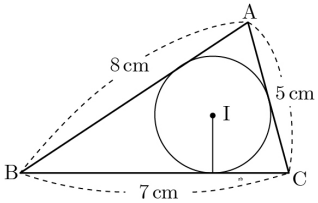
95. $\triangle ABC = 120cm^2$



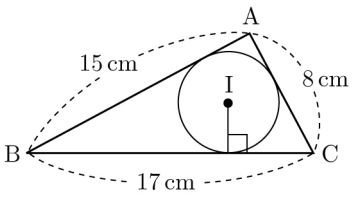
96. $\triangle ABC = 84cm^2$



97. $\triangle ABC = 27cm^2$



98. $\triangle ABC = 60cm^2$



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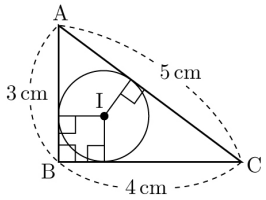
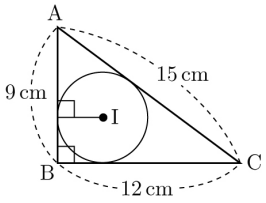
◪ 다음 그림과 같은 직각삼각형 ABC에서 점 I가 내심일 때, 내접원의 반지름의 길이를 구하여라.

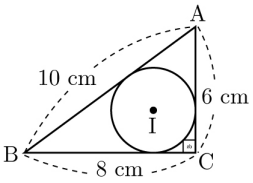
99.



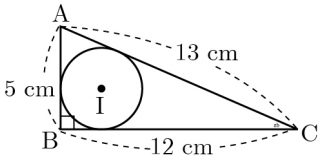
100.



101.



102.



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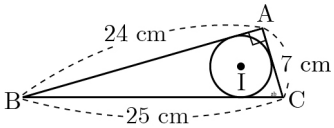

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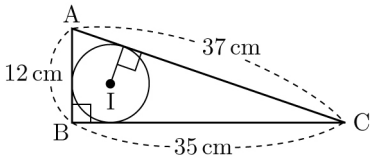
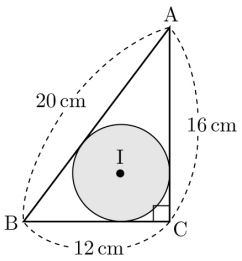
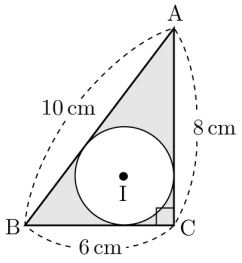


◪ 다음 그림에서 점 I가 △ABC의 내심일 때, 색칠한 부분의 넓이를 구하여라.

105.



106.



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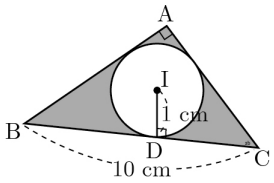

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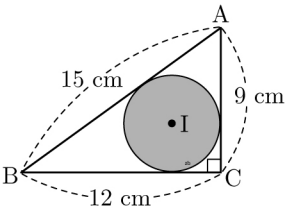

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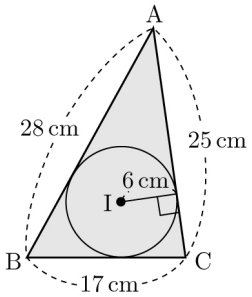
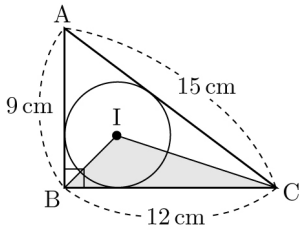
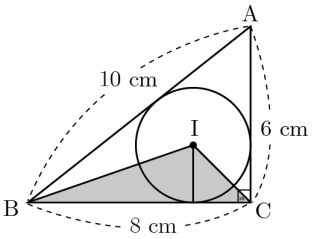
109



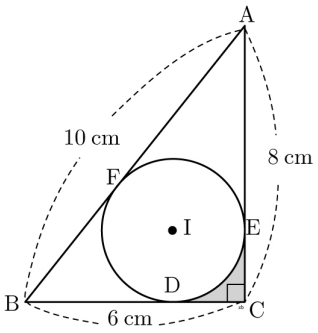
110



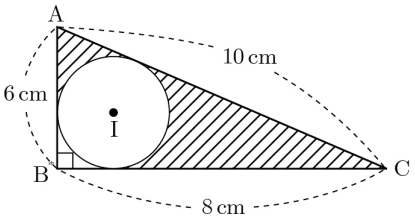
111



112



113



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정답 및 해설

1) $\overline{EI}$, $\overline{FI}$

2) $\angle EBI$

3) $\triangle AFI$

4) ○

5) ×

6) ○

7) ×

8) ○

9) ○

10) ×
⇨ 외심의 성질

11) ○

12) ○

13) ×
⇨ 외심의 성질

14) ○

15) ×

16) ×

17) ○

18) 6

19) 4

20) 40
⇨ $\angle IBC = \angle IBA = 20^\circ$ 이므로 $\triangle IBC$에서
$\angle ICB = 180^\circ - (120^\circ + 20^\circ) = 40^\circ$
따라서 $\angle ICA = \angle ICB = 40^\circ$ 이므로 $x = 40$

21) 42

22) 120
⇨ $\angle IBC = \angle IBA = 27^\circ$, $\angle ICB = \angle ICA = 33^\circ$ 이므로
$\triangle IBC$에서
$\angle BIC = 180^\circ - (27^\circ + 33^\circ) = 120^\circ$ $\therefore x = 120$

23) 45
⇨ $\triangle AIC$에서 $\angle IAC = 180^\circ - (110^\circ + 25^\circ) = 45^\circ$
$\angle BAI = \angle CAI = 45^\circ$ $\therefore x = 45$

24) 35°
⇨ $\angle x + 30^\circ + 25^\circ = 90^\circ$ $\therefore \angle x = 35^\circ$

25) 35°
⇨ $\angle ICA = \frac{1}{2} \times 60^\circ = 30^\circ$ 이므로
$\angle x + 25^\circ + 30^\circ = 90^\circ$ $\therefore \angle x = 35^\circ$

26) 37°
⇨ $\angle x + 35^\circ + 18^\circ = 90^\circ$ 이므로 $\angle x = 37^\circ$ 이다.

27) 52°
⇨ $\angle x + 18^\circ + 20^\circ = 90^\circ$ $\therefore \angle x = 52^\circ$

28) 25°
⇨ $\angle IBC = \frac{1}{2} \times 70^\circ = 35^\circ$ 이므로
$35^\circ + \angle x + 30^\circ = 90^\circ$ $\therefore \angle x = 25^\circ$

29) 25°
⇨ $35^\circ + 30^\circ + \angle x = 90^\circ$ $\therefore \angle x = 25^\circ$

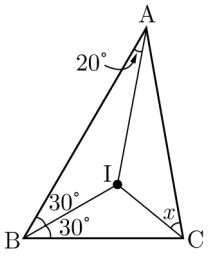
30) 34°
⇨ $20^\circ + \angle x + \frac{1}{2} \times 72^\circ = 90^\circ$ $\therefore \angle x = 34^\circ$

31) 20°
⇨ $\angle ICB = \angle ICA = 30^\circ$ 이므로
$\triangle IBC$에서 $\angle IBC = 180^\circ - (110^\circ + 30^\circ) = 40^\circ$
$\angle x + 40^\circ + 30^\circ = 90^\circ$ $\therefore \angle x = 20^\circ$

32) 31°
⇨ $\angle x + 30^\circ + 29^\circ = 90^\circ$ $\therefore \angle x = 31^\circ$

33) 60°
⇨ $25^\circ + 35^\circ + \angle ICA = 90^\circ$ 이므로 $\angle ICA = 30^\circ$
$\therefore \angle x = 2\angle ICA = 2 \times 30^\circ = 60^\circ$

34) 40°
⇨ 다음 그림과 같이 $\overline{BI}$를 그으면



$\angle IBC = \angle IBA = \frac{1}{2}\angle B = \frac{1}{2} \times 60^\circ = 30^\circ$
따라서 $\angle x + 20^\circ + 30^\circ = 90^\circ$ 이므로 $\angle x = 40^\circ$

35) 117°

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⇨ $\angle x = 90^\circ + \frac{1}{2} \times 54^\circ = 117^\circ$

36) 32°

⇨ $\angle BIC = 90^\circ + \frac{1}{2} \times 72^\circ = 126^\circ$

$\therefore \angle x = 180^\circ - (126^\circ + 22^\circ) = 32^\circ$

37) 121°

⇨ $\angle x = 90^\circ + \frac{1}{2} \times 62^\circ = 121^\circ$

38) 80°

⇨ $130^\circ = 90^\circ + \frac{1}{2} \angle x \quad \therefore \angle x = 80^\circ$

39) 31°

40) 134°

⇨ $\angle x = 90^\circ + 44^\circ = 134^\circ$

41) 115°

⇨ $\angle x = 90^\circ + 25^\circ = 115^\circ$

42) $\angle x = 122^\circ$

43) 70°

⇨ $\frac{1}{2} \angle x + 35^\circ + 20^\circ = 90^\circ \quad \therefore \angle x = 70^\circ$

44) 24°

⇨ $\angle AIB = 90^\circ + \frac{1}{2} \times 96^\circ = 138^\circ$

$\therefore \angle x = \angle IAB = 180^\circ - (138^\circ + 18^\circ) = 24^\circ$

45) 70°

⇨ $\angle AIC = 180^\circ - (35^\circ + 20^\circ) = 125^\circ$

$90^\circ + \frac{1}{2} \angle x = 125^\circ \quad \therefore \angle x = 70^\circ$

46) $\angle x = 40^\circ$

47) $\angle x = 115^\circ$

⇨ $\angle BAC = 25^\circ + 25^\circ = 50^\circ$ 이므로

$\angle x = 90^\circ + \frac{1}{2} \times 50^\circ = 115^\circ$

48) $\angle x = 25^\circ$

⇨ $115^\circ = 90^\circ + \frac{1}{2} \angle BAC$ 이므로 $\angle BAC = 50^\circ$

$\therefore \angle x = \frac{1}{2} \angle BAC = \frac{1}{2} \times 50^\circ = 25^\circ$

49) 88°

⇨ $90^\circ + \frac{1}{2} \angle x = 134^\circ \quad \therefore \angle x = 88^\circ$

50) 180°

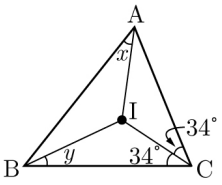
⇨ $\angle IBC = \angle IBA = 25^\circ$, $\angle ICB = \angle ICA = 35^\circ$ 이므로

$\angle y = 180^\circ - (50^\circ + 70^\circ) = 60^\circ$

$\therefore \angle x = 90^\circ + \frac{1}{2} \times 60^\circ = 120^\circ$

51) 56°

⇨ 다음 그림과 같이 $\overline{CI}$를 그으면



$\angle ICA = \angle ICB = \frac{1}{2} \angle C = \frac{1}{2} \times 68^\circ = 34^\circ$

따라서 $\angle x + \angle y + 34^\circ = 90^\circ$ 이므로 $\angle x + \angle y = 56^\circ$

52) 150°

⇨ $\angle y = 90^\circ + \frac{1}{2} \times 72^\circ = 126^\circ$

$\angle x = 180^\circ - (126^\circ + 30^\circ) = 24^\circ$

53) 162°

⇨ $\angle IBC = \angle IBA = 29^\circ$ 이므로 $\triangle IBC$에서

$\angle y = 180^\circ - (29^\circ + 37^\circ) = 114^\circ$

$114^\circ = 90^\circ + \frac{1}{2} \angle x$에서 $\angle x = 48^\circ$

54) 146°

⇨ 내심의 성질에 의해서 $\angle AIB = 90^\circ + \frac{1}{2} \angle C$이므로

$\angle x = 90^\circ + 36^\circ = 126^\circ$ 이다.

또, $\angle B = 180^\circ - (68^\circ + 72^\circ) = 40^\circ$ 이고, 내심은 삼각형의 세 내각의 이등분선의 교점이므로 $\angle y = 20^\circ$ 이다.

55) 198°

⇨ 삼각형의 한 외각은 이웃하지 않는 두 내각의 크기와 같다. 즉, $\angle x = 72^\circ + \frac{1}{2} \angle B$, $\angle y = 72^\circ + \frac{1}{2} \angle A$이다.

이 때, $\angle A + \angle B = 108^\circ$ 이므로

$\angle x + \angle y = 144^\circ + \frac{1}{2} \times (\angle A + \angle B) = 144^\circ + 54^\circ = 198^\circ$

56) 210°

⇨ 내심 I는 삼각형의 세 내각의 이등분선의 교점이다.

즉, $\angle x = \frac{1}{2} \angle A + 80^\circ$, $\angle y = \frac{1}{2} \angle B + 80^\circ$ 이고,

$\angle A + \angle B = 100^\circ$ 이므로

$\angle x + \angle y = \frac{1}{2} \times 100 + 160^\circ = 210^\circ$ 이다.

57) 144°

⇨ $\angle A + \angle B = 180^\circ - 36^\circ = 144^\circ$ 이다.

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내심 I는 삼각형의 세 내각의 이등분선의 교점이고, 삼각형의 외각은 이웃하지 않는 두 내각의 크기의 합과 같다.

즉, $\angle x=\frac{1}{2}\angle A+36^\circ \cdots ①$, $\angle y=\frac{1}{2}\angle B+36^\circ \cdots ②$

이고, ①+②를 풀면

$\angle x+\angle y=\frac{1}{2}(\angle A+\angle B)+72^\circ=144^\circ$ 이다.

58) 186°

⇨ 내심 I는 삼각형의 세 내각을 이등분한다.

$\angle A+\angle B=180^\circ-64^\circ=116^\circ$일 때,

삼각형의 외각의 성질에 의해

$\angle x=\frac{1}{2}\angle A+64^\circ$, $\angle y=\frac{1}{2}\angle B+64^\circ$이다.

즉, $\angle x+\angle y=\frac{1}{2}(\angle A+\angle B)+128^\circ=186^\circ$이다.

59) 225°

⇨ $\angle A+\angle B=90^\circ$이고, 내심 I는 각을 이등분하므로

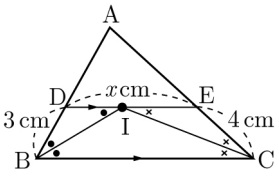
$\angle CAD=a$, $\angle CBE=b$라 하면 $a+b=45^\circ$이다.

이 때, $\angle BEA+\angle ADB=90^\circ+b+90^\circ+a=225^\circ$이다.

60) 7

⇨ $\overline{DI}=\overline{DB}=3(cm)$, $\overline{EI}=\overline{EC}=4(cm)$이므로

$x=\overline{DI}+\overline{IE}=3+4=7$



61) 9

⇨ $x=\overline{DI}+\overline{IE}=\overline{DB}+\overline{EC}=4+5=9(cm)$

62) 5

⇨ $\overline{EI}=\overline{EC}=6(cm)$이므로

$\overline{DI}=\overline{DE}-\overline{EI}=11-6=5(cm)$

$\therefore \overline{DB}=\overline{DI}=5(cm)$ $\therefore x=5$

63) 4

⇨ $\overline{DI}=\overline{DB}=6(cm)$이므로

$\overline{EI}=\overline{DE}-\overline{DI}=10-6=4(cm)$

$\therefore \overline{EC}=\overline{EI}=4(cm)$ $\therefore x=4$

64) 18cm

⇨ $(\triangle ADE$의 둘레의 길이$)=\overline{AD}+\overline{DE}+\overline{EA}$

$=\overline{AD}+(\overline{DI}+\overline{IE})+\overline{EA}$

$=(\overline{AD}+\overline{DB})+(\overline{EC}+\overline{EA})$

$=\overline{AB}+\overline{AC}$

$=10+8=18(cm)$

65) 14cm

⇨ $(\triangle ADE$의 둘레의 길이$)=\overline{AD}+\overline{DE}+\overline{EA}$

$=\overline{AD}+(\overline{DI}+\overline{IE})+\overline{EA}$

$=(\overline{AD}+\overline{DB})+(\overline{EC}+\overline{EA})$

$=\overline{AB}+\overline{AC}$

$=6+8=14(cm)$

66) 12cm

⇨ $(\triangle ADE$의 둘레의 길이$)=\overline{AD}+\overline{DE}+\overline{EA}$

$=\overline{AD}+(\overline{DI}+\overline{IE})+\overline{EA}$

$=(\overline{AD}+\overline{DB})+(\overline{EC}+\overline{EA})$

$=\overline{AB}+\overline{AC}$

$=7+5=12(cm)$

67) 14

⇨ 점 I는 $\triangle ABC$의 내심이므로 $\angle DBI=\angle IBC$

또, $\overline{DE}\,//\,\overline{BC}$ 이므로 $\angle IBC=\angle DIB$ (엇각)

$\therefore \angle DBI=\angle DIB$

$\therefore \overline{DI}=\overline{DB}$

같은 방법으로 $\overline{IE}=\overline{EC}$

($\triangle ADE$의 둘레의 길이)

$=\overline{AD}+\overline{DE}+\overline{EA}$

$=\overline{AD}+\overline{DI}+\overline{IE}+\overline{EA}$

$=\overline{AD}+\overline{DB}+\overline{EC}+\overline{EA}$

$=\overline{AB}+\overline{AC}$

$=6+8=14$ (cm)

68) 28cm

⇨ $(\triangle ADE$의 둘레의 길이$)=\overline{AD}+\overline{DE}+\overline{EA}$

$=\overline{AD}+(\overline{DI}+\overline{IE})+\overline{EA}$

$=(\overline{AD}+\overline{DB})+(\overline{EC}+\overline{EA})$

$=6+4+6+12=28(cm)$

69) 9

⇨ $\overline{ID}=\overline{IE}=\overline{IF}$이고, 원과 접선의 성질에 의해서

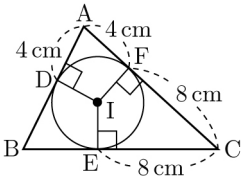
$\overline{AD}=\overline{AE}$, $\overline{BD}=\overline{BF}=3cm$, $\overline{CF}=\overline{CE}=9cm$이다.

따라서 $x=9$이다.

70) 12

⇨ $\overline{AF}=\overline{AD}=4cm$, $\overline{CF}=\overline{CE}=8cm$

$\therefore x=4+8=12$



71) 5

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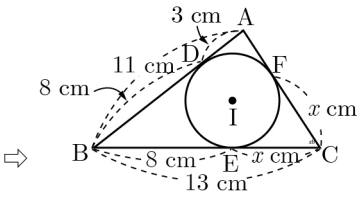


$\overline{BE}=\overline{BD}=11-3=8\,(\text{cm})$이므로

$\therefore\ x=\overline{CE}=13-8=5$

72) 7

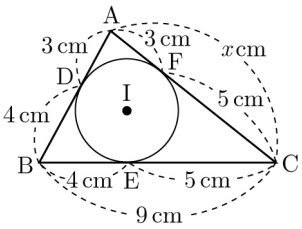
73) 6

74) 7

75) 8

⇨ $\overline{AF}=\overline{AD}=3\text{cm}$, $\overline{BE}=\overline{BD}=4\text{cm}$이므로

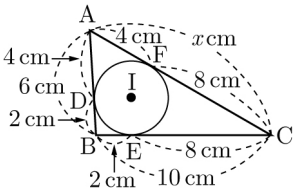
$\overline{CF}=\overline{CE}=9-4=5(\text{cm})$ $\therefore x=3+5=8$



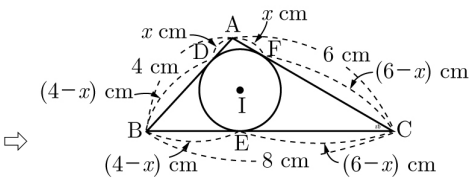
76) 12

⇨ $\overline{AF}=\overline{AD}=4\text{cm}$, $\overline{BE}=\overline{BD}=6-4=2(\text{cm})$이므로

$\overline{CF}=\overline{CE}=10-2=8(\text{cm})$ $\therefore x=4+8=12$



77) 1



$\overline{AD}=\overline{AF}=x\text{ cm}$이므로 $\overline{BE}=\overline{BD}=(4-x)\text{ cm}$

$\overline{CE}=\overline{CF}=(6-x)\text{ cm}$

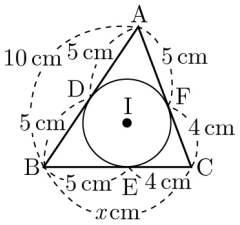
$\overline{BC}=\overline{BE}+\overline{EC}=(4-x)+(6-x)=8$

$\therefore\ x=1$

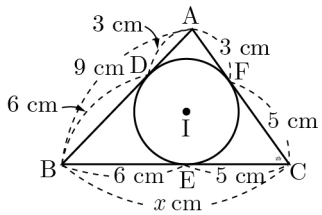
78) 9

⇨ $\overline{AD}=\overline{AF}=5\text{cm}$이므로 $\overline{BE}=\overline{BD}=10-5=5(\text{cm})$

$\overline{CE}=\overline{CF}=4\text{cm}$이므로 $x=5+4=9$



79) 11



$\overline{AD}=\overline{AF}=3\text{ cm}$, $\overline{BE}=\overline{BD}=9-3=6\,(\text{cm})$

$\overline{CE}=\overline{CF}=5\text{ cm}$

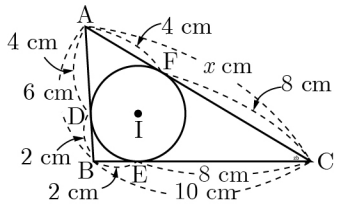
$\therefore\ x=\overline{BE}+\overline{EC}=6+5=11$

80) 3

⇨ $\overline{CE}=\overline{CF}=5\text{ cm}$이므로

$\therefore\ x=\overline{BE}=8-5=3$

81) 12

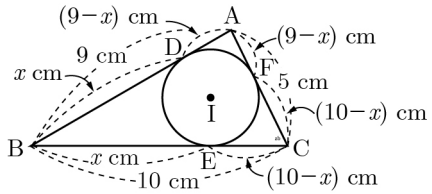


$\overline{AF}=\overline{AD}=4\text{ cm}$, $\overline{BE}=\overline{BD}=6-4=2\,(\text{cm})$

$\overline{CF}=\overline{CE}=10-2=8\,(\text{cm})$

$\therefore\ x=\overline{AF}+\overline{FC}=4+8=12$

82) 7



$\overline{BD}=\overline{BE}=x\text{ cm}$이므로 $\overline{AF}=\overline{AD}=(9-x)\text{ cm}$

$\overline{CF}=\overline{CE}=(10-x)\text{ cm}$

$\overline{AC}=\overline{AF}+\overline{FC}=(9-x)+(10-x)=5$

$\therefore\ x=7$

83) 3

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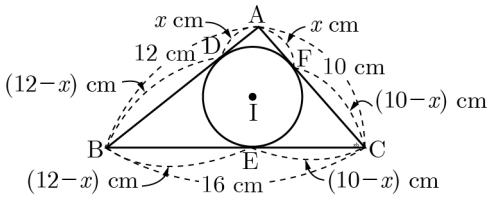

⇨ $\overline{AD}=\overline{AF}=x$ cm 이므로 $\overline{BE}=\overline{BD}=(12-x)$ cm

$\overline{CE}=\overline{CF}=(10-x)$ cm

$\overline{BC}=\overline{BE}+\overline{EC}=(12-x)+(10-x)=16$

$\therefore\ x=3$

84) [정답] 20 cm

[해설] $30=\frac{1}{2}\times 3\times(\overline{AB}+\overline{BC}+\overline{CA})$

$\therefore\ \overline{AB}+\overline{BC}+\overline{CA}=20(\text{cm})$

85) 36cm

⇨ $72=\frac{1}{2}\times 4\times(\overline{AB}+\overline{BC}+\overline{CA})$

$\therefore \overline{AB}+\overline{BC}+\overline{CA}=36(\text{cm})$

86) 25 cm

⇨ $25=\frac{1}{2}\times 2\times(\overline{AB}+\overline{BC}+\overline{CA})$

$\therefore\ \overline{AB}+\overline{BC}+\overline{CA}=25(\text{cm})$

87) 36 cm

⇨ $54=\frac{1}{2}\times 3\times(\overline{AB}+\overline{BC}+\overline{CA})$

$\therefore\ \overline{AB}+\overline{BC}+\overline{CA}=36(\text{cm})$

88) 48cm

⇨ $72=\frac{1}{2}\times 3\times(\overline{AB}+\overline{BC}+\overline{CA})$

$\therefore \overline{AB}+\overline{BC}+\overline{CA}=48(\text{cm})$

89) 16cm

⇨ $48=\frac{1}{2}\times 6\times(\overline{AB}+\overline{BC}+\overline{CA})$

$\therefore \overline{AB}+\overline{BC}+\overline{CA}=16(\text{cm})$

90) 24 cm

91) 24cm

⇨ $60=\frac{1}{2}\times 5\times(\overline{AB}+\overline{BC}+\overline{CA})$

$\therefore \overline{AB}+\overline{BC}+\overline{CA}=24(\text{cm})$

92) 30 cm

⇨ $45=\frac{1}{2}\times 3\times(\overline{AB}+\overline{BC}+\overline{CA})$

$\therefore\ \overline{AB}+\overline{BC}+\overline{CA}=30(\text{cm})$

93) 42cm

94) $\frac{8}{3}$cm

⇨ 내접원의 반지름의 길이를 $r$cm라 하면

$48=\frac{1}{2}\times r\times(10+10+16)$

$18r=48 \qquad \therefore r=\frac{8}{3}$

95) $\frac{24}{5}$cm

⇨ 내접원의 반지름의 길이를 $r$cm라 하면

$120=\frac{1}{2}\times r\times(17+17+16)$

$25r=120 \qquad \therefore r=\frac{24}{5}$

96) 4cm

⇨ 내접원의 반지름의 길이를 $r$cm라 하면

$84=\frac{1}{2}\times r\times(14+15+13)$

$21r=84 \qquad \therefore r=4$

97) $\frac{27}{10}$cm

98) 3cm

⇨ 내접원의 반지름의 길이를 $r$cm라 하면

$60=\frac{1}{2}\times r\times(15+8+17)$

$20r=60 \qquad \therefore r=3$

99) 1cm

⇨ $\triangle ABC=\frac{1}{2}\times 4\times 3=6(\text{cm}^2)$

내접원의 반지름의 길이를 $r$cm라 하면

$6=\frac{1}{2}\times r\times(3+4+5),\ 6r=6 \qquad \therefore r=1$

100) 3cm

⇨ $\triangle ABC=\frac{1}{2}\times 12\times 9=54(\text{cm}^2)$

내접원의 반지름의 길이를 $r$cm라 하면

$54=\frac{1}{2}\times r\times(9+12+15)$

$18r=54 \qquad \therefore r=3$

101) 2

⇨ $\triangle ABC=\frac{1}{2}\times 8\times 6=24\ (\text{cm}^2)$

내접원의 반지름의 길이를 r cm라 하면

$24=\frac{1}{2}\times r\times(10+8+6) \qquad \therefore\ r=2$

102) 2 cm

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⇨ 내접원의 반지름의 길이를 r cm라 하면

$\frac{1}{2}\times 12\times 5=\frac{1}{2}\times r\times(5+12+13)$

$30=15r \qquad \therefore\ r=2$

103) 3 cm

⇨ 내접원의 반지름의 길이를 r cm라 하면

$\frac{1}{2}\times 24\times 7=\frac{1}{2}\times r\times(24+25+7)$

$84=28r \qquad \therefore\ r=3$

104) 5cm

⇨ $\triangle ABC=\frac{1}{2}\times 35\times 12=210(\mathrm{cm}^2)$

내접원의 반지름의 길이를 $r$cm라 하면

$210=\frac{1}{2}\times r\times(12+35+37)$

$42r=210 \qquad \therefore r=5$

105) $16\pi\mathrm{cm}^2$

⇨ $\triangle ABC=\frac{1}{2}\times 12\times 16=96(\mathrm{cm}^2)$

내접원의 반지름의 길이를 $r$cm라 하면

$96=\frac{1}{2}\times r\times(20+12+16) \qquad \therefore r=4$

$\therefore$ (원 I의 넓이) $=\pi\times 4^2=16\pi(\mathrm{cm}^2)$

106) $(24-4\pi)\mathrm{cm}^2$

⇨ $\triangle ABC=\frac{1}{2}\times 6\times 8=24(\mathrm{cm}^2)$

내접원의 반지름의 길이를 $r$cm라 하면

$24=\frac{1}{2}\times r\times(10+6+8) \qquad \therefore r=2$

따라서 (원 I의 넓이) $=\pi\times 2^2=4\pi(\mathrm{cm}^2)$이므로

(색칠한 부분의 넓이) $=24-4\pi(\mathrm{cm}^2)$

107) $(11-\pi)\mathrm{cm}^2$

108) $9\pi\mathrm{cm}^2$

109) $210\mathrm{cm}^2$

⇨ $\triangle ABC=\frac{1}{2}\times 6\times(28+17+25)=210(\mathrm{cm}^2)$

110) $18\mathrm{cm}^2$

⇨ $\triangle ABC=\frac{1}{2}\times 12\times 9=54(\mathrm{cm}^2)$

내접원의 반지름의 길이를 $r$cm라 하면

$54=\frac{1}{2}\times r\times(9+12+15) \qquad \therefore r=3$

$\therefore \triangle IBC=\frac{1}{2}\times 12\times 3=18(\mathrm{cm}^2)$

111) $8\mathrm{cm}^2$

112) $(4-\pi)\mathrm{cm}^2$

⇨ 내접원의 반지름의 길이를 r이라 하면 원과 접선의 성질에 의해서 $(8-r)+(6-r)=10,\ r=2cm$이다.

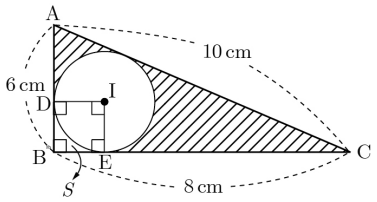
$\therefore$ (색칠한 부분의 넓이)

$=2\times 2-2\times 2\times\pi\times\frac{90^\circ}{360^\circ}=4-\pi(\mathrm{cm}^2)$

113) $(20-3\pi)\mathrm{cm}^2$

⇨ 내접원의 반지름의 길이를 $r$cm라 하면 원과 접선의 성질에 의해서 $(8-r)+(6-r)=10,\ r=2$이다.

즉, 내접원의 넓이는 $2\times 2\times\pi=4\pi(\mathrm{cm}^2)$이다.



위 그림에서 S영역의 넓이를 구하면

$2\times 2-2\times 2\times\pi\times\frac{90^\circ}{360^\circ}=4-\pi(\mathrm{cm}^2)$

따라서 빗금 친 부분의 넓이를 구하면

$\frac{1}{2}\times 8\times 6-4\pi-(4-\pi)=20-3\pi(\mathrm{cm}^2)$

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