◇「콘텐츠산업 진흥법 시행령」제33조에 의한 표시
1) 제작연월일 : 2016-08-25
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. 평행선 사이에 꺾인 점이 있을 때
1) 꺾인 점을 지나면서 평행선과 평행한 보조건을 긋는다.
2) 평행선의 성질을 이용하여 각의 크기를 구한다.

2. 폭이 일정한 종이를 접을 때
1) 접은 각의 크기가 같음을 이용하여 각의 크기를 구한다.
2) 평행선의 성질을 이용하여 각의 크기를 구한다.

참고
◉ 삼각형의 내각의 합은 180° 이다.
◉ 사각형의 내각의 합은 360° 이다.

평행선 사이에 꺾인 점이 있을 때

◪ 다음 그림에서 $l//m$일 때, $\angle x$의 크기를 구하여라.

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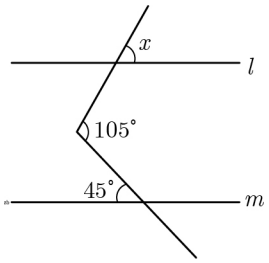

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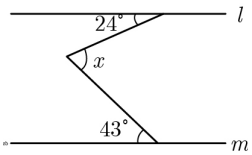

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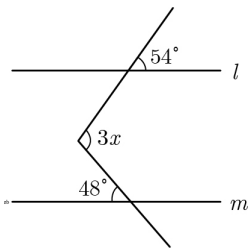

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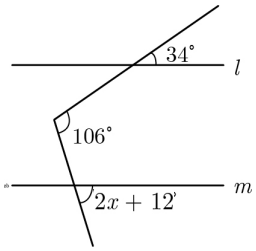

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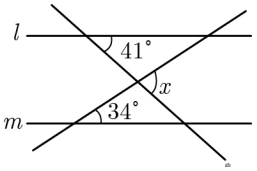

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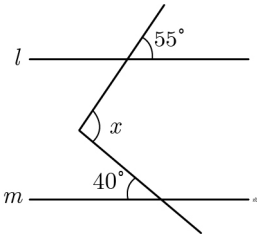

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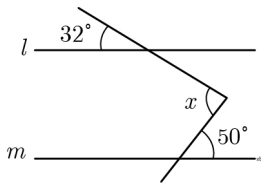

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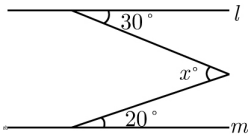

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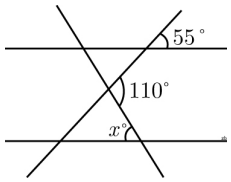

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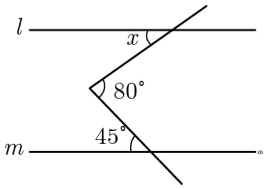

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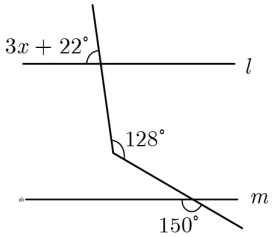

◪ 다음 그림에서 $l//m$일 때, $\angle x$의 크기를 구하여라.

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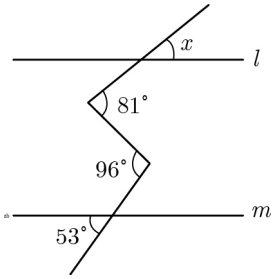

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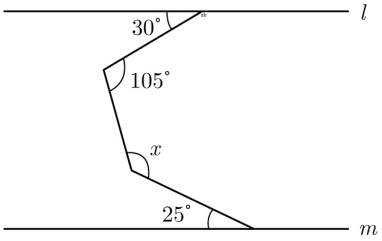

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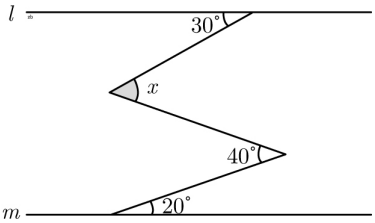

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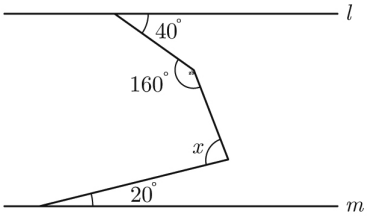

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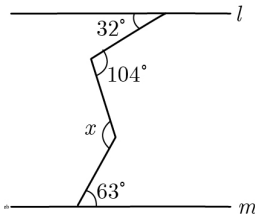

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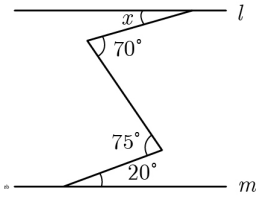

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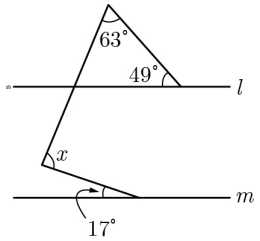

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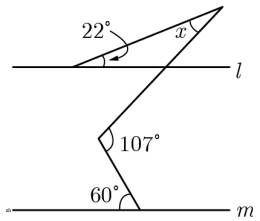

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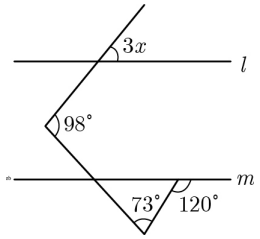

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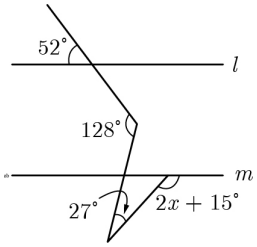

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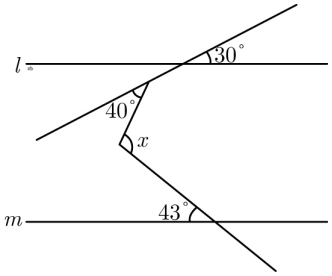

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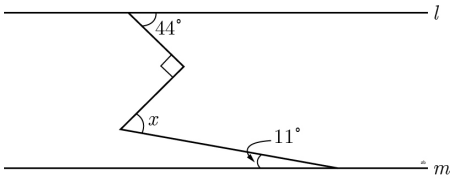

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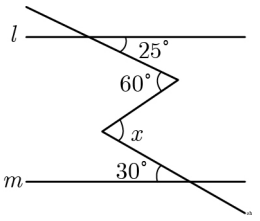

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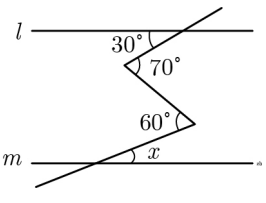

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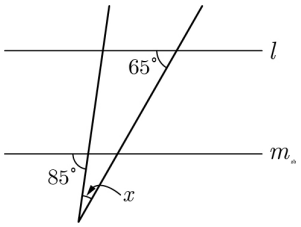

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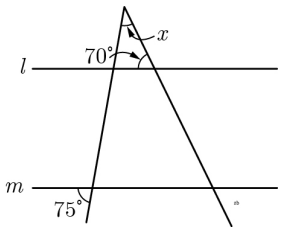

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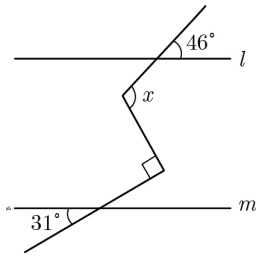

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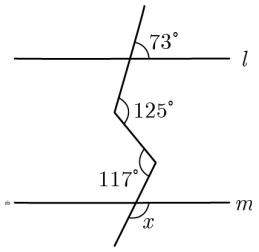

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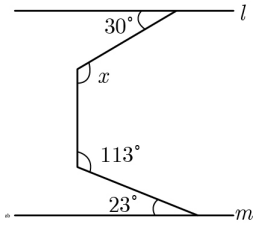

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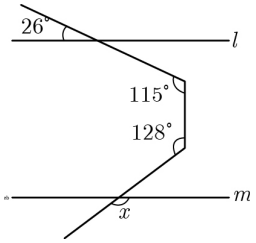

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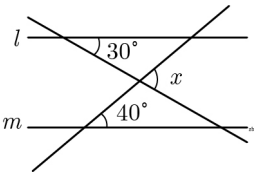

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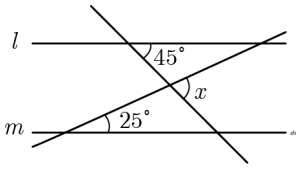

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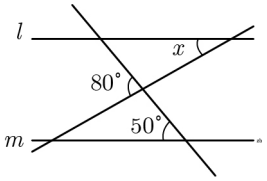

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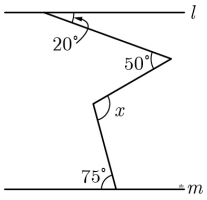

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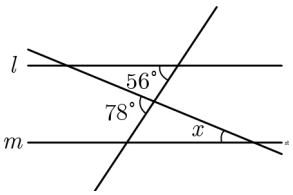

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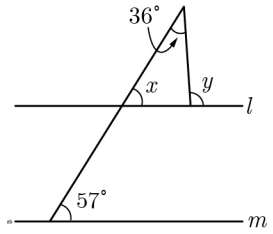
◪ 다음 그림에서 $l//m$일 때, $\angle x$, $\angle y$의 크기를 각각 구하여라.

37.



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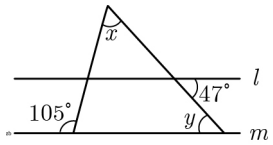

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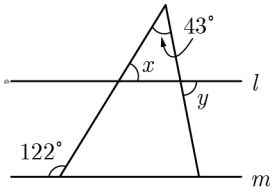

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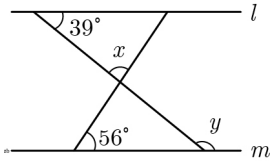

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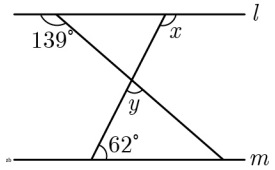

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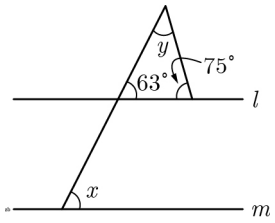

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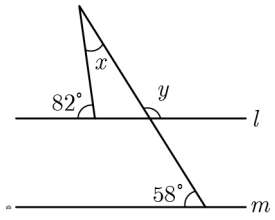

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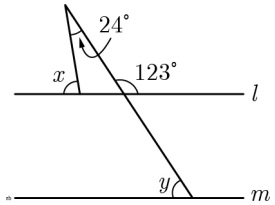

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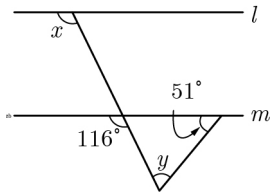

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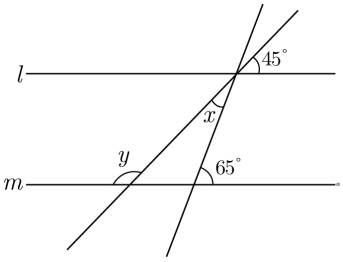

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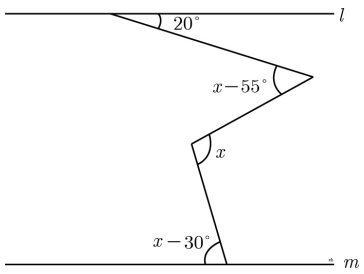
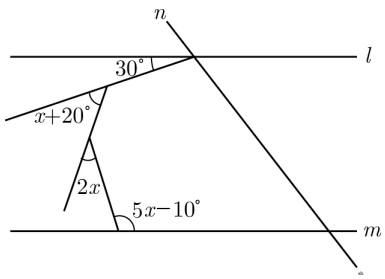


48.



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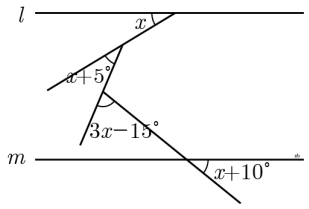

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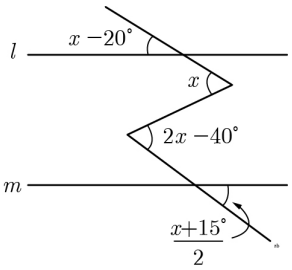

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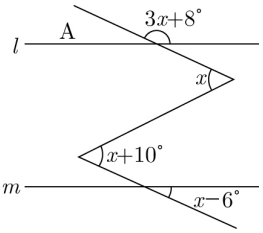
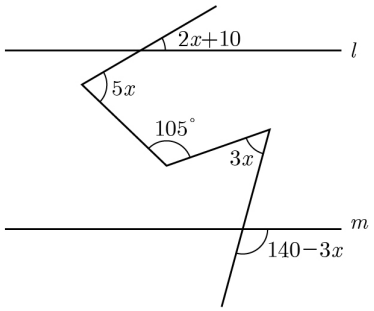


52.



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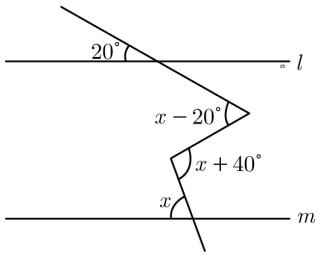

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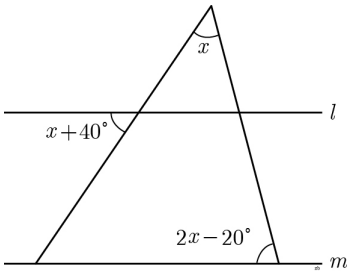

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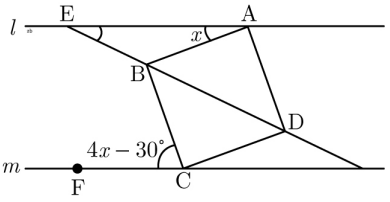
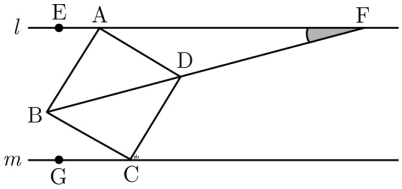
◪ 다음 물음에 답하여라.

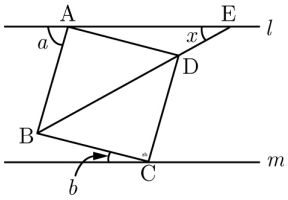
55. 다음 그림에서 $l//m$이고 $\square ABCD$가 정사각형이고, $\angle EAB=\angle x$, $\angle BCF=4x-30^\circ$라 할 때, $\angle AEB$의 크기를 구하여라.



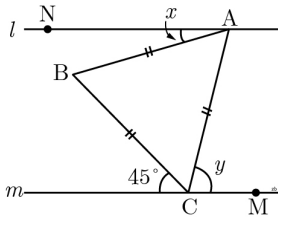
56. 다음 그림에서 $l//m$이고 사각형 ABCD는 정사각형이다. $\angle EAB:\angle BCG=3:1$일 때, $\angle AFB$의 크기를 구하여라.



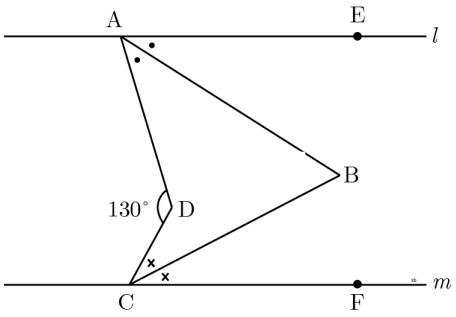
57. 다음 그림에서 $l//m$이고, 사각형 ABCD는 정사각형이다. 대각선 BD의 연장선과 직선 l이 만나는 점을 E라 하고, $\angle a:\angle b=7:2$일 때, $\angle a+\angle b+\angle x$의 크기를 구하여라.



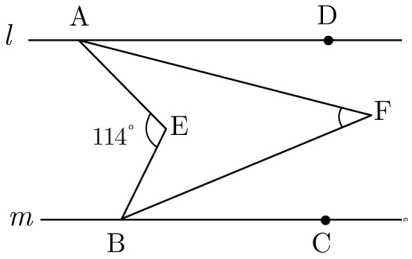
58. 다음 그림에서 삼각형 ABC는 정삼각형이고 $l//m$일 때, $\angle x+\angle y$의 값을 구하여라.



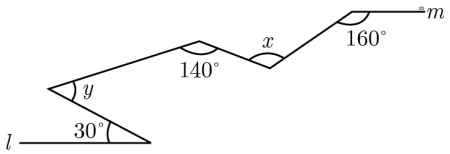
59. 다음 그림에서 $l//m$이고 $\angle EAB=\angle BAD$, $\angle DCB=\angle BCF$일 때, $\angle ABC$의 크기를 구하여라.



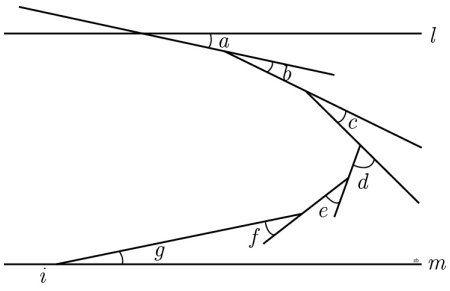
60. 두 직선 l, m이 평행이고 $\angle FAE=2\angle FAD$, $\angle FBE=2\angle FBC$일 때, $\angle AFB$의 크기를 구하여라.



61. 다음 그림에서 $l//m$일 때, $\angle x-\angle y$의 크기를 구하여라.



62. 다음 그림에서 $l//m$일 때, $\angle a+\angle b+\angle c+\angle d+\angle e+\angle f+\angle g$의 크기를 구하여라.



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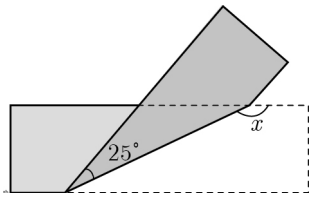
폭이 일정한 종이를 접을 때

◪ 다음과 같이 직사각형 모양의 종이를 접었을 때, $\angle x$의 크기를 구하여라.

63.



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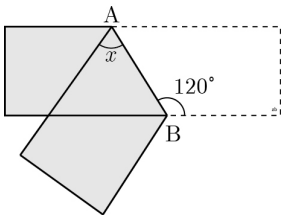

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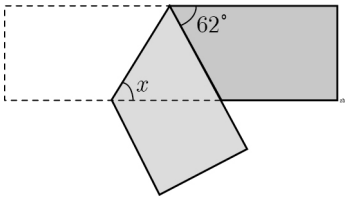

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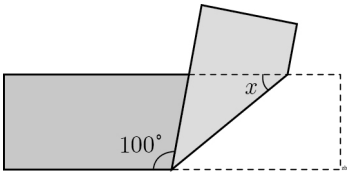

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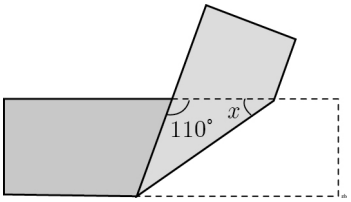

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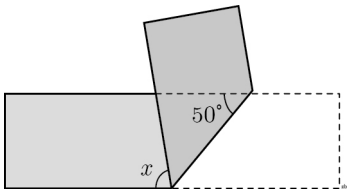

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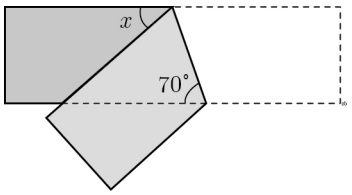

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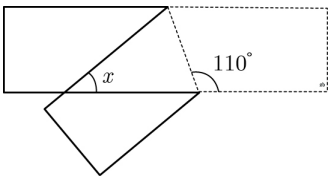

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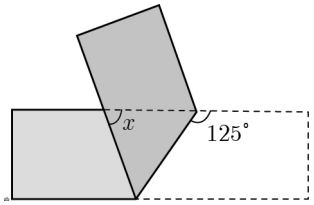

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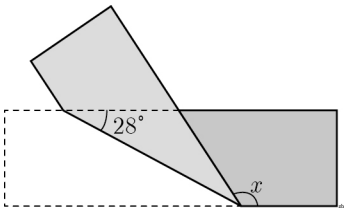

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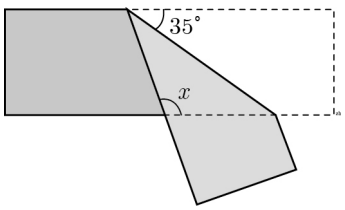

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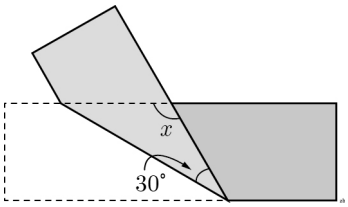
74.



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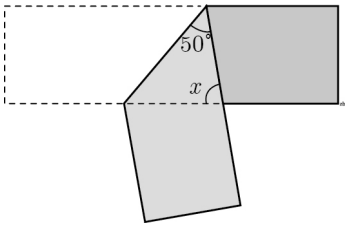

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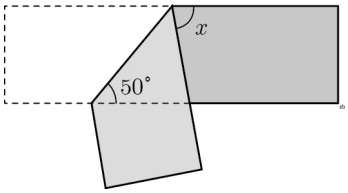

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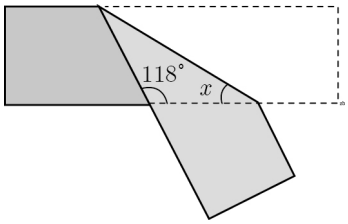

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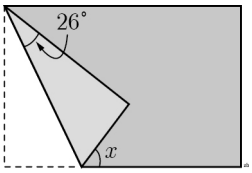

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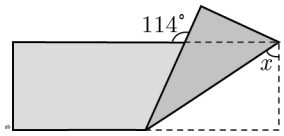

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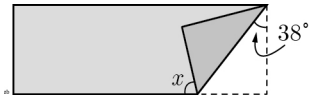
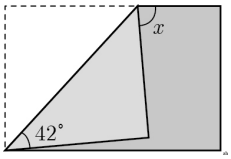


81.

82.



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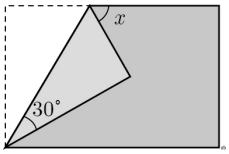

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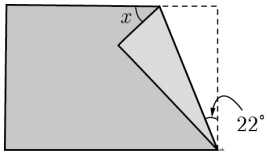

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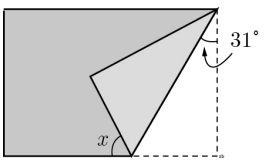

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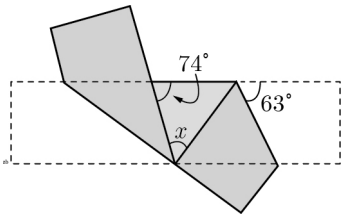
86.



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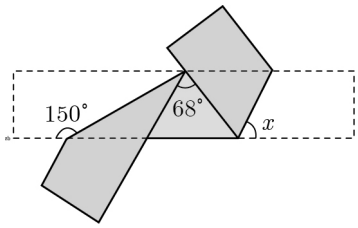

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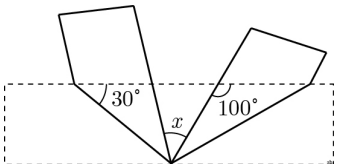

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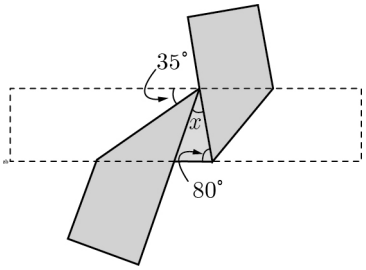

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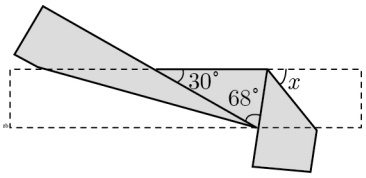
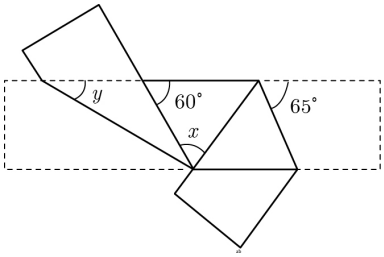
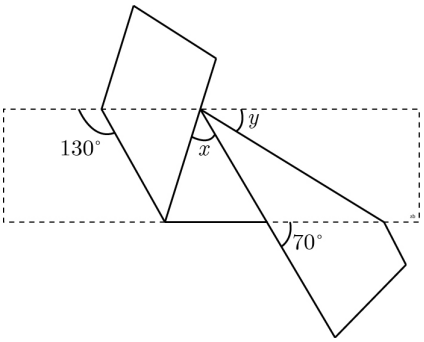


◪ 다음 그림과 같이 직사각형 모양의 종이 테이프를 접었을 때, $\angle x+\angle y$의 값을 구여라.

91.



92.



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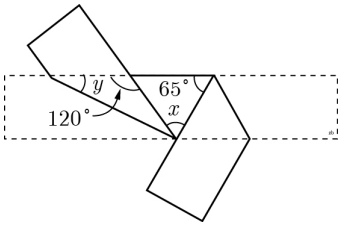

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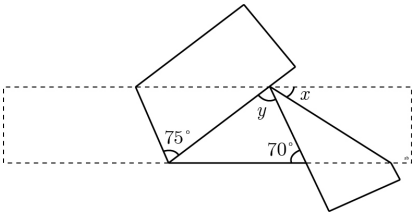

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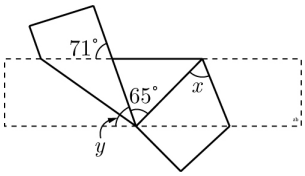
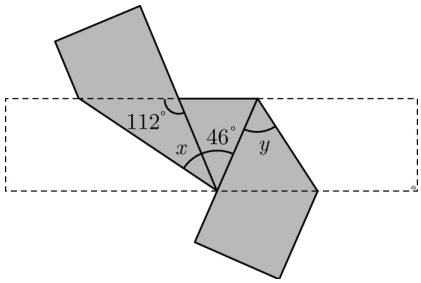
95.



96.



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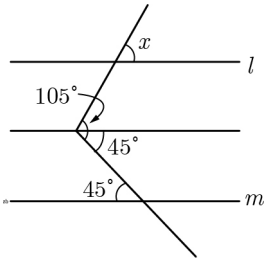
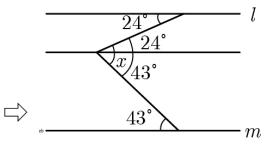
정답 및 해설

1) 60°

⇨ 다음 그림과 같이 두 직선 l, m에 평행한 직선을 그으면 $\angle x+45^\circ=105^\circ$ $\therefore \angle x=60^\circ$



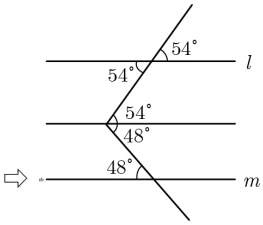
2) 67°



다음 그림과 같이 두 직선 l, m에 평행한 직선을 그으면

$\angle x=24^\circ+43^\circ=67^\circ$

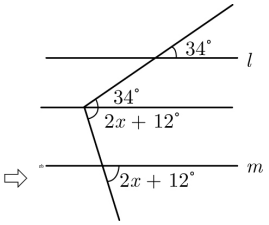
3) 34°



다음 그림과 같이 두 직선 l, m에 평행한 직선을 그으면

$3\angle x=54^\circ+48^\circ=102^\circ$ $\therefore \angle x=34^\circ$

4) 30°

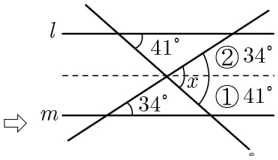


다음 그림과 같이 두 직선 l, m에 평행한 직선을 그으면

$34^\circ+(2\angle x+12^\circ)=106^\circ$

$2\angle x=60^\circ$ $\therefore \angle x=30^\circ$

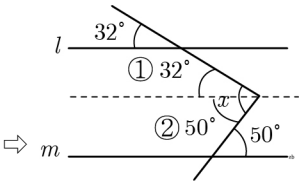
5) 75°



③ $\angle x=34^\circ+41^\circ=75^\circ$

6) 95°

7) 82°

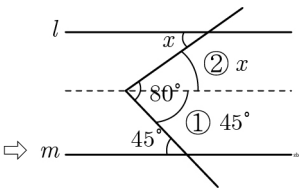


③ $\angle x=32^\circ+50^\circ=82^\circ$

8) 50°

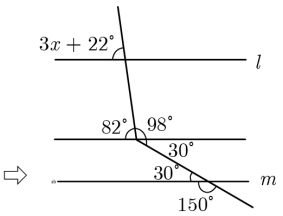
9) 55°

10) 35°



③ $\angle x+45^\circ=80^\circ$ $\therefore \angle x=35^\circ$

11) 20°

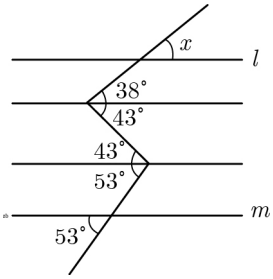


다음 그림과 같이 두 직선 l, m에 평행한 직선을 그으면

$3\angle x+22^\circ=82^\circ$, $3\angle x=60^\circ$ $\therefore \angle x=20^\circ$

12) 38°

⇨ 다음 그림과 같이 두 직선 l, m에 평행한 직선을 그으면 $\angle x=38^\circ$



13) 130°

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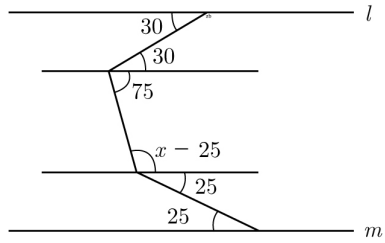
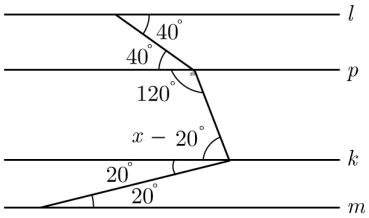


그림과 같이 직선 l 과 평행한 두 직선을 그으면 엇각의 크기가 같으므로
$75^\circ+(x-25^\circ)=180^\circ$, $\therefore \angle x=130^\circ$

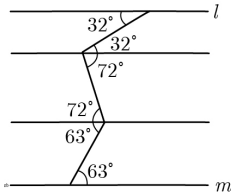
14) 50°
⇨ $\angle x+20^\circ=30^\circ+40^\circ$ 이므로 $\angle x=50^\circ$

15) 80°



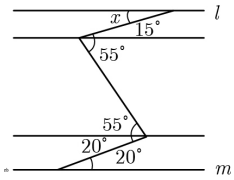
그림과 같이 직선 l 과 평행한 두 직선 p, q 를 그으면 엇각의 크기가 같으므로
$120^\circ+(x-20^\circ)=180^\circ$ 에서 $\angle x=80^\circ$

16) 135°



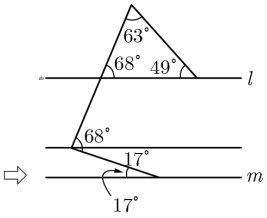
다음 그림과 같이 두 직선 l, m에 평행한 직선을 그으면
$\angle x=72^\circ+63^\circ=135^\circ$

17) 15°



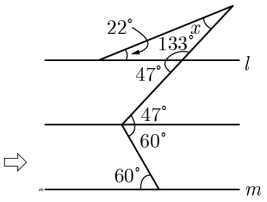
다음 그림과 같이 두 직선 l, m에 평행한 직선을 그으면
$\angle x=15^\circ$

18) 85°



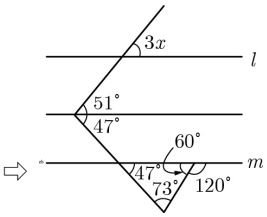
다음 그림과 같이 두 직선 l, m에 평행한 직선을 그으면
$\angle x=68^\circ+17^\circ=85^\circ$

19) 25°



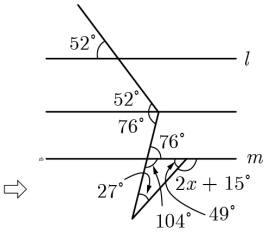
다음 그림과 같이 두 직선 l, m에 평행한 직선을 그으면
$22^\circ+133^\circ+\angle x=180^\circ$ $\therefore$ $\angle x=25^\circ$

20) 17°



다음 그림과 같이 두 직선 l, m에 평행한 직선을 그으면
$3\angle x=51^\circ$ $\therefore \angle x=17^\circ$

21) 58°



다음 그림과 같이 두 직선 l, m에 평행한 직선을 그으면
$49^\circ+(2\angle x+15^\circ)=180^\circ$
$2\angle x=116^\circ$ $\therefore$ $\angle x=58^\circ$

22) 113°

23) 57°

24) 65°

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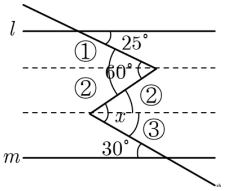
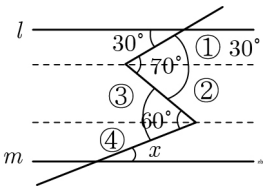


① 25° ② $60^\circ-25^\circ=35^\circ$ ③ 30°

④ $\angle x=②+③=35^\circ+30^\circ=65^\circ$

25) 20°



②=③ $70^\circ-30^\circ=40^\circ$

④ $\angle x=60^\circ-40^\circ=20^\circ$

26) 20°

⇨ $l//m$이므로 동위각의 크기가 같다.

$\angle x$를 한 내각으로 하는 삼각형에서

두 내각의 크기의 합이 한 외각의 크기와 같으므로

$\angle x+65^\circ=85^\circ$ $\therefore\ \angle x=20^\circ$

27) 35°

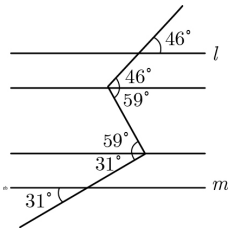
⇨ 동위각의 크기가 75°으로 같아서

$75^\circ+70^\circ+\angle x=180^\circ$

$145^\circ+\angle x=180^\circ$

$\therefore\ \angle x=35^\circ$

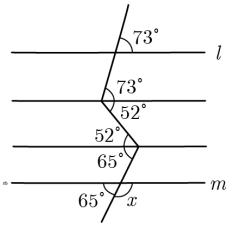
28) 105°



다음 그림과 같이 두 직선 l, m에 평행한 직선을 그으면

$\angle x=46^\circ+59^\circ=105^\circ$

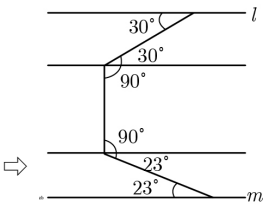
29) 115°



다음 그림과 같이 두 직선 l, m에 평행한 직선을 그으면

$65^\circ+\angle x=180^\circ$ $\therefore\ \angle x=115^\circ$

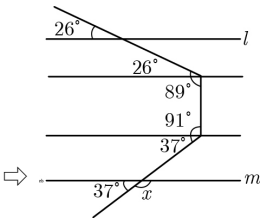
30) 120°



다음 그림과 같이 두 직선 l, m에 평행한 직선을 그으면

$\angle x=30^\circ+90^\circ=120^\circ$

31) 143°

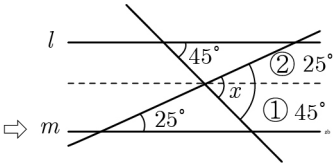


다음 그림과 같이 두 직선 l, m에 평행한 직선을 그으면

$37^\circ+\angle x=180^\circ$ $\therefore\ \angle x=143^\circ$

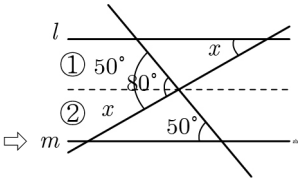
32) 70°

33) 70°



③ $\angle x=25^\circ+45^\circ=70^\circ$

34) 30°



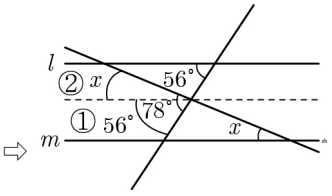
③ $\angle x=80^\circ-50^\circ=30^\circ$

35) 105°

⇨ $20^\circ+\angle x=50^\circ+75^\circ$

$\therefore\ \angle x=125^\circ-20^\circ=105^\circ$

36) 22°



③ $\angle x=78^\circ-56^\circ=22^\circ$

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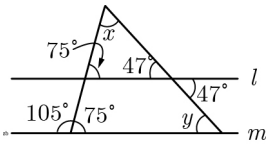
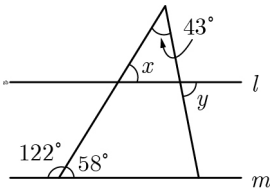
37) $\angle x=57^\circ, \angle y=93^\circ$
⇨ $\angle x=57^\circ, \angle y=\angle x+36^\circ=57^\circ+36^\circ=93^\circ$

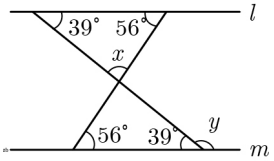
38) $\angle x=58^\circ, \angle y=47^\circ$
⇨ 다음 그림에서 $\angle x=180^\circ-(75^\circ+47^\circ)=58^\circ$
$\angle y=47^\circ$



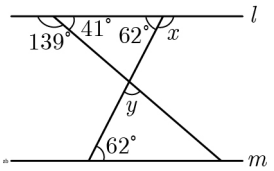
39) $\angle x=58^\circ, \angle y=79^\circ$
⇨ 다음 그림에서 $\angle x=58^\circ$
$\angle y=180^\circ-(58^\circ+43^\circ)=79^\circ$



40) $\angle x=85^\circ, \angle y=141^\circ$
⇨ 다음 그림에서 $\angle x=180^\circ-(39^\circ+56^\circ)=85^\circ$
$\angle y=180^\circ-39^\circ=141^\circ$



41) $\angle x=118^\circ, \angle y=77^\circ$
⇨ 다음 그림에서 $\angle x=180^\circ-62^\circ=118^\circ$
$\angle y=180^\circ-(62^\circ+41^\circ)=77^\circ$



42) $\angle x=63^\circ, \angle y=42^\circ$
⇨ $\angle x=63^\circ, \angle y=180^\circ-(63^\circ+75^\circ)=42^\circ$

43) $\angle x=24^\circ, \angle y=122^\circ$
⇨ $\angle y=180^\circ-58^\circ=122^\circ$
$(180^\circ-82^\circ)+\angle x+(180^\circ-\angle y)=180^\circ$ 이므로
$\angle x=\angle y-98^\circ$ $\therefore \angle x=122^\circ-98^\circ=24^\circ$

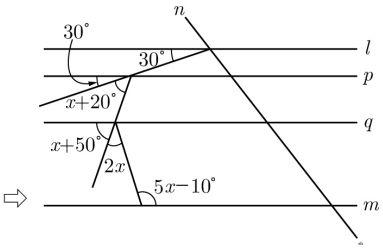
44) $\angle x=81^\circ, \angle y=57^\circ$
⇨ $\angle x=24^\circ+(180^\circ-123^\circ)=81^\circ$
$\angle y=180^\circ-123^\circ=57^\circ$

45) $\angle x=116^\circ, \angle y=65^\circ$
⇨ $\angle x=116^\circ, \angle y+51^\circ=116^\circ$ 이므로 $\angle y=65^\circ$

46) $\angle x=20^\circ$, $\angle y=135^\circ$
⇨ 엇각의 크기가 같으니 $45^\circ+x=65^\circ \rightarrow \angle x=20^\circ$
$45^\circ+y=180^\circ \rightarrow \angle y=135^\circ$

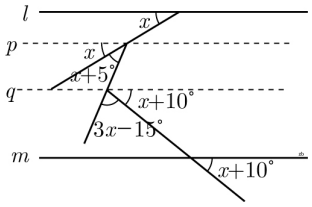
47) 105°
⇨ $(x-55^\circ)+(x-30^\circ)=20^\circ+x$
$2x-85^\circ=20^\circ+x$ 이므로 $x=105^\circ$

48) 30°



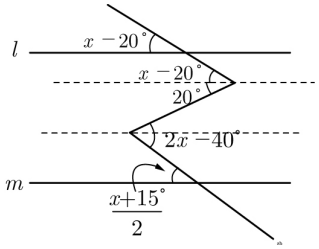
⇨
직선의 교점에 직선 l과 평행한 두 직선 p, q를 그으면 동위각의 크기가 같고, 엇각의 크기가 같으므로
$30^\circ+(\angle x+20^\circ)+2\angle x=5\angle x-10^\circ$
$3\angle x+50^\circ=5\angle x-10^\circ$
$2\angle x=60^\circ$ $\therefore \angle x=30^\circ$

49) 30°
⇨ 다음 그림과 같이 l, m에 평행한 직선을 그어 동위각의 크기가 같음을 이용하면



$\angle x+\angle x+5^\circ+\angle 3x-15^\circ+\angle x+10^\circ=180^\circ$
$6\angle x=180^\circ$ $\therefore \angle x=30^\circ$

50) 45°
⇨ 꺾이는 부분에 l, m에 평행한 직선을 그어 동위각과 엇각의 크기가 같음을 이용하면



$2\angle x-40^\circ=20^\circ+\left(\frac{\angle x+15^\circ}{2}\right)$
$4\angle x-80^\circ=40^\circ+\angle x+15^\circ$
$3\angle x=135^\circ$ $\therefore \angle x=45^\circ$

51) 47°

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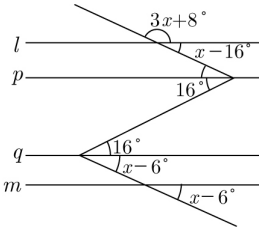
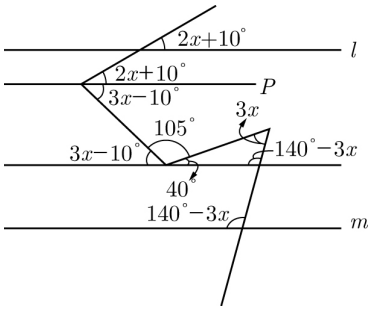


꺾이는 부분의 꼭짓점에서 직선 l과 평행한 두 직선 p, q를 그으면 동위각, 엇각의 크기가 같음을 이용하면

$3\angle x+8^\circ+\angle x-16^\circ=180^\circ$

$4\angle x=188^\circ$ $\therefore\ \angle x=47^\circ$

52) 15°



두 직선 l, m과 평행한 직선 p, q를 그으면 동위각, 엇각의 크기가 같으므로

$(3\angle x-10^\circ)+105^\circ+40^\circ=180^\circ$

$3\angle x=45^\circ$

$\therefore\ \angle x=15^\circ$

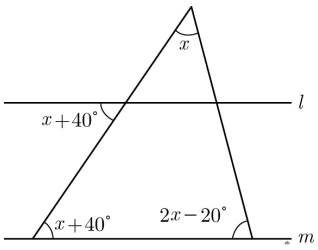
53) 80°

$20^\circ+(\angle x+40^\circ)=(\angle x-20^\circ)+\angle x$

$\angle x=80^\circ$

54) 40°

$l//m$이므로 엇각의 크기가 같다.



따라서 위의 그림에서 삼각형의 세 내각의 합은

$\angle x+(\angle x+40^\circ)+(2\angle x-20^\circ)=180^\circ$

$4\angle x=160^\circ$ $\therefore\ \angle x=40^\circ$

55) 21°

$\angle EAB+\angle FCB=\angle ABC$ 이므로

$x+(4x-30^\circ)=90^\circ$ $\therefore x=24^\circ$

$\triangle AED$에서

$\angle ADE=45^\circ$, $\angle EAD=24^\circ+90^\circ=114^\circ$이므로

$\angle AEB=180^\circ-(45^\circ+114^\circ)=21^\circ$

56) 22.5°

$\angle EAB=3a$, $\angle BCG=a$ 라 하면

$3a+a=\angle ABC$ 에서 $4a=90^\circ \rightarrow a=22.5^\circ$

$\triangle ABF$ 에서

$\angle ABF=45^\circ$, $\angle BAF=180^\circ-(3\times22.5^\circ)=112.5^\circ$

$\therefore\ \angle AFB=180^\circ-(45^\circ+112.5^\circ)=22.5^\circ$

57) 115°

$\angle a+\angle b=\angle ABC=90^\circ$ 이므로

$\angle a=90^\circ\times\frac{7}{9}=70^\circ$, $\angle b=20^\circ$

$\triangle ABE$에서

$\angle ABE=45^\circ$, $\angle BAE=180^\circ-\angle a=110^\circ$이므로

$\angle x=180^\circ-45^\circ-110^\circ=25^\circ$

따라서 $\angle a+\angle b+\angle x=70^\circ+20^\circ+25^\circ=115^\circ$

58) 90°

$\angle NAB+\angle 45^\circ=\angle ABC$ 이므로

$\angle x+45^\circ=60^\circ \rightarrow \angle x=15^\circ$

$45^\circ+\angle BCA+\angle y=180^\circ$ 이므로

$45^\circ+60^\circ+\angle y=180^\circ \rightarrow \angle y=75^\circ$

$\angle x+\angle y=90^\circ$

59) 65°

$\angle EAB=\angle BAD=x$, $\angle DCB=\angle BCF=y$라 하면 $\angle ADC=\angle EAD+\angle FCD$에서

$130^\circ=2x+2y$ 이므로 $x+y=65^\circ$

$\angle ABC=\angle EAB+\angle FCB$

$=x+y=65^\circ$

60) 38°

$\angle FAD=a$, $\angle FBC=b$ 라고 하면

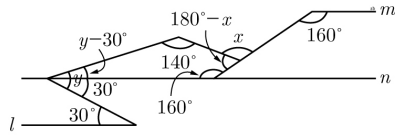
$\angle FAE=2a$, $\angle FBE=2b$

이때 $\angle AEB=\angle EAD+\angle EBC=3a+3b=114^\circ$

에서 $a+b=38^\circ$

이제 $\angle AFB=\angle FAD+\angle CBF=a+b=38^\circ$

61) 90°



그림과 같이 직선 l 과 평행한 직선 n 을 그으면 엇각의 크기가 같다.

사각형의 네 내각의 크기의 합이 360°이므로

$140^\circ+(y-30^\circ)+160^\circ+(180^\circ-x)=360^\circ$

$y-x=-90^\circ$ 이므로 $\angle x-\angle y=90^\circ$

62) 180°

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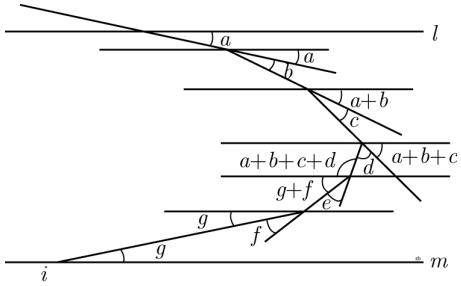
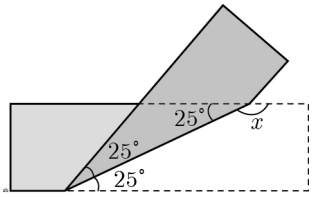


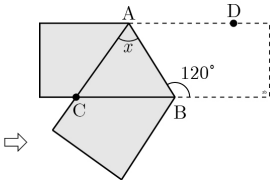
그림과 같이 두 직선 l, m 과 평행한 직선을 그으면 동위각, 엇각의 크기가 같으므로
$\angle a+\angle b+\angle c+\angle d+\angle e+\angle f+\angle g=180^\circ$

63) 155°

⇨ 접은 각의 크기와 엇각의 크기가 같으므로 다음 그림에서 $\angle x=180^\circ-25^\circ-25^\circ=155^\circ$



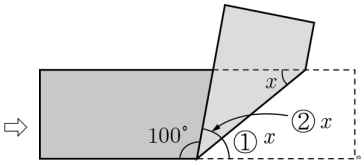
64) 60°



접은 각의 크기가 같으므로 $\angle DAB=\angle CAB=\angle x$
엇각의 크기가 같으므로 $\angle DAB=\angle ABC=\angle x$
$\angle ABC=180^\circ-120^\circ=60^\circ$ $\therefore\ \angle x=60^\circ$

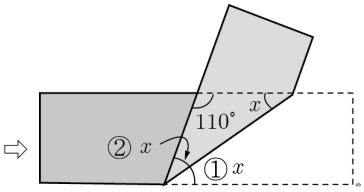
65) 59°

66) 40°



③ $100^\circ+\angle x+\angle x=180^\circ$, $2\angle x=80^\circ$ $\therefore\ \angle x=40^\circ$

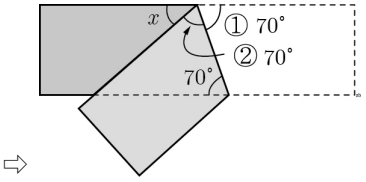
67) 35°



③ $110^\circ+\angle x+\angle x=180^\circ$, $2\angle x=70^\circ$ $\therefore\ \angle x=35^\circ$

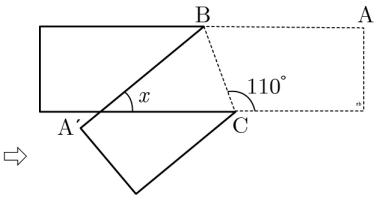
68) 80°

69) 40°



③ $\angle x+70^\circ+70^\circ=180^\circ$ $\therefore\ \angle x=40^\circ$

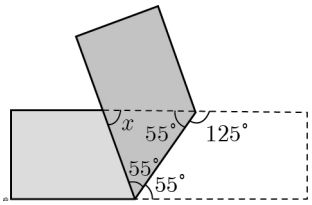
70) 40°



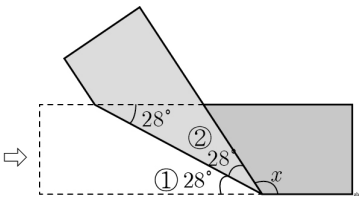
$\angle ABC+110^\circ=180^\circ \rightarrow \angle ABC=70^\circ$
엇각의 크기가 같으므로 $\angle ABC=\angle BCA'=70^\circ$
접은 각의 크기가 같으므로 $\angle ABC=\angle A'BC=70^\circ$
$\angle x+70^\circ+70^\circ=180^\circ$ $\therefore\ \angle x=40^\circ$

71) 70°

⇨ 다음 그림에서 $\angle x=180^\circ-(55^\circ+55^\circ)=70^\circ$



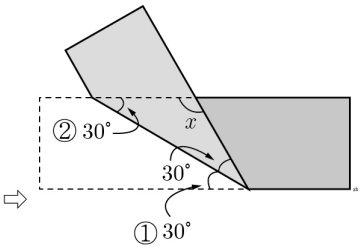
72) 124°



③ $28^\circ+28^\circ+\angle x=180^\circ$ $\therefore\ \angle x=124^\circ$

73) 110°

74) 120°



③ $\angle x+30^\circ+30^\circ=180^\circ$ $\therefore\ \angle x=120^\circ$

75) 80°

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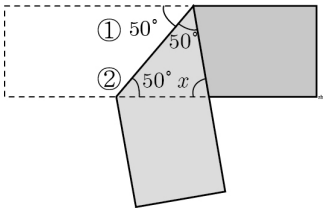
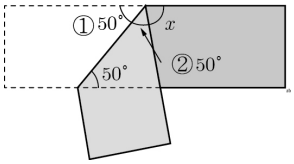


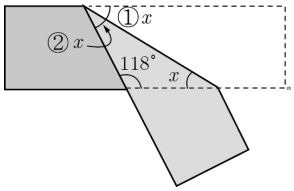
③ $50^\circ+50^\circ+\angle x=180^\circ$ $\therefore\ \angle x=80^\circ$

76) 80°



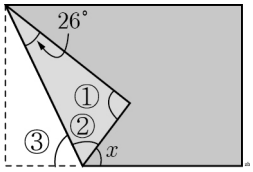
③ $50^\circ+50^\circ+\angle x=180^\circ$ $\therefore\ \angle x=80^\circ$

77) 31°



③ $\angle x+118^\circ+\angle x=180^\circ$, $2\angle x=62^\circ$ $\therefore\ \angle x=31^\circ$

78) 52°



① 90° ② $180^\circ-(26^\circ+90^\circ)=64^\circ$ ③ 64°

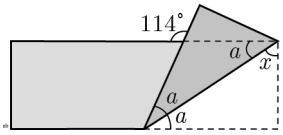
④ $64^\circ+64^\circ+\angle x=180^\circ$ $\therefore\ \angle x=52^\circ$

79) 57°

⇨ 다음 그림에서

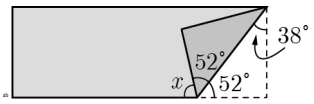
$2\angle a+114^\circ=180^\circ$, $2\angle a=66^\circ$ $\therefore\ \angle a=33^\circ$

$\therefore\ \angle x=90^\circ-33^\circ=57^\circ$



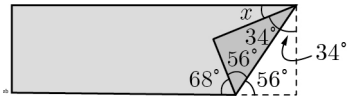
80) 76°

⇨ 다음 그림에서 $\angle x=180^\circ-(52^\circ+52^\circ)=76^\circ$

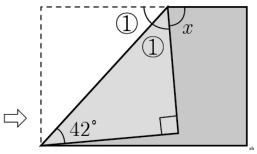


81) 22°

⇨ 다음 그림에서 $\angle x=90^\circ-(34^\circ+34^\circ)=22^\circ$



82) 84°

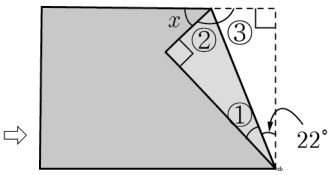


① $180^\circ-(42^\circ+90^\circ)=48^\circ$

② $48^\circ+48^\circ+\angle x=180^\circ$ $\therefore\ \angle x=84^\circ$

83) 60°

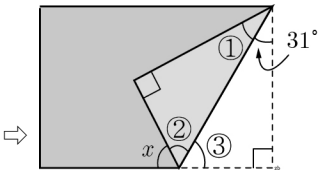
84) 44°



① 22° ② $180^\circ-(90^\circ+22^\circ)=68^\circ$ ③ 68°

④ $\angle x+68^\circ+68^\circ=180^\circ$ $\therefore\ \angle x=44^\circ$

85) 62°

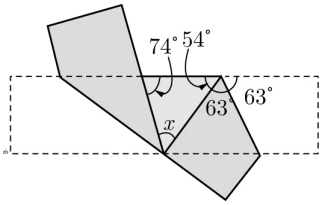


① 31° ② $180^\circ-(31^\circ+90^\circ)=59^\circ$ ③ 59°

④ $\angle x+59^\circ+59^\circ=180^\circ$ $\therefore\ \angle x=62^\circ$

86) 52°

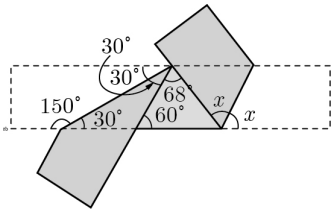
⇨ 다음 그림에서 $\angle x=180^\circ-(74^\circ+54^\circ)=52^\circ$



87) 64°

⇨ 다음 그림에서

$2\angle x=68^\circ+60^\circ$, $2\angle x=128^\circ$ $\therefore\ \angle x=64^\circ$



88) 40°

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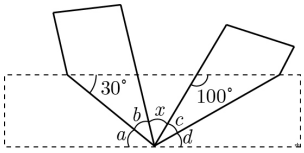
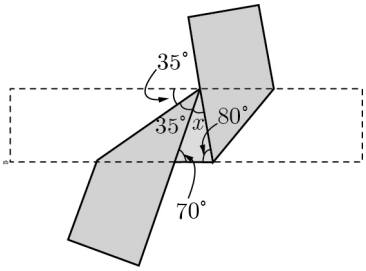
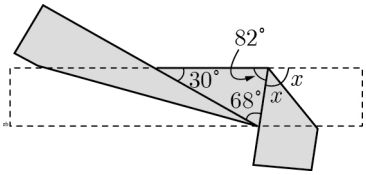


엇각의 크기가 같고, 접은 각의 크기가 같으므로
$\angle a=\angle b=30^\circ$
또한 $\angle c=\angle d$인데 $100^\circ+(\angle c+\angle d)=180^\circ$ 이므로
$\angle c=\angle d=40^\circ$
평각에서 $(2\times30^\circ)+(2\times40^\circ)+\angle x=180^\circ$
$\therefore\ \angle x=40^\circ$

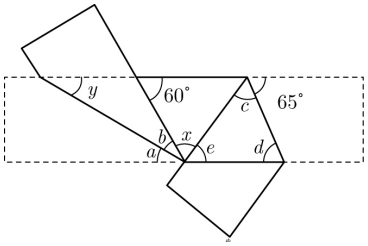
89) 30°
⇨ 다음 그림에서 $\angle x=180^\circ-(70^\circ+80^\circ)=30^\circ$



90) 49°
⇨ 다음 그림에서 $82^\circ+2\angle x=180^\circ$, $\therefore\angle x=49^\circ$

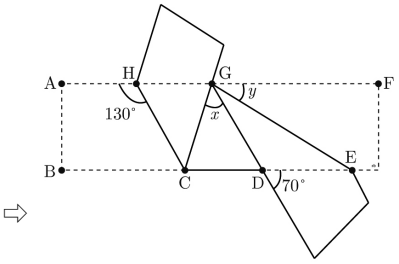


91) 100°



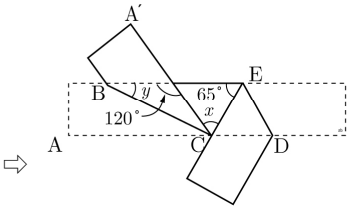
위의 그림을 이용하면
엇각의 크기가 같으므로 $\angle y=\angle a$ 이고
접은 각의 크기가 같으므로 $\angle a=\angle b$
그러므로 $\angle y+\angle b=60^\circ$에서 $2\angle y=60^\circ$이므로
$\therefore\ \angle y=30^\circ$
엇각의 크기가 같으므로 $\angle d=65^\circ$이고
접은 각의 크기가 같으므로 $\angle c=65^\circ$
따라서 $\angle e=180^\circ-2\times65^\circ=50^\circ$일 때
$\angle x=180^\circ-2\times30^\circ-50^\circ=70^\circ$
$\therefore\ \angle x+\angle y=70^\circ+30^\circ=100^\circ$

92) 65°



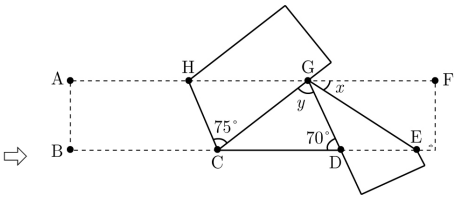
$\angle BCH=180^\circ-130^\circ=50^\circ$
$\angle BCH=\angle GCH=50^\circ$이므로 $\angle GCD=80^\circ$
맞꼭지각의 크기가 같으므로 $\angle CDG=70^\circ$
따라서 $\triangle GCD$ 에서 $\angle x=180^\circ-80^\circ-70^\circ=30^\circ$
$\angle FGE=\angle DGE=y$ 이고
$\angle FGD=\angle CDG=2y=70^\circ\ \rightarrow\ \angle y=35^\circ$
$\therefore\angle x+\angle y=30^\circ+35^\circ=65^\circ$

93) 85°



엇각의 크기가 같으므로 $\angle ECD=65^\circ$
접은 각의 크기가 같으므로 $\angle ACB=\angle A'CB$
엇각의 크기가 같으므로 $\angle ACB=\angle EBC$
따라서 $\angle EBC=\angle A'CB=(180^\circ-120^\circ)\div2=30^\circ$
$\therefore\ \angle y=30^\circ$
또한 점 C 에서
$2\times30^\circ+\angle x+65^\circ=180^\circ\ \rightarrow\ \angle x=55^\circ$
$\therefore\ \angle x+\angle y=55^\circ+30^\circ=85^\circ$

94) 115°



$\angle HCB=\angle HCG=75^\circ$ (접은 각)
$\angle GCD=180^\circ-2\times75^\circ=30^\circ$
$\triangle CDG$ 에서 $\angle y=180^\circ-30^\circ-70^\circ=80^\circ$
$\angle DGE=\angle FGE=\angle x$(접은 각)
$\angle CDG=\angle FGD=70^\circ$(엇각) 이므로
$2\angle x=70^\circ\ \rightarrow\ \angle x=35^\circ$
$\therefore\angle x+\angle y=35^\circ+80^\circ=115^\circ$

95) 139°

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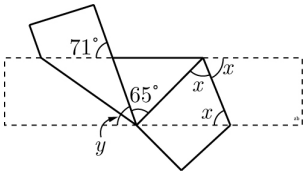


동위각의 크기가 같아서 $\angle y=71^\circ$

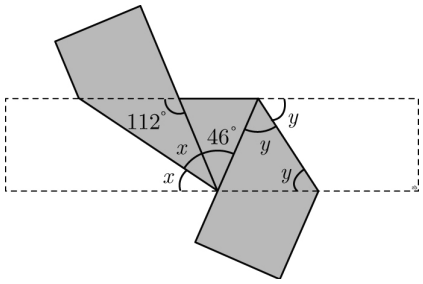
접은 각의 크기가 같고, 엇각의 크기가 같아서

$\angle y+65^\circ=2\angle x$, $71^\circ+65^\circ=2\angle x$

$\therefore\ \angle x=68^\circ$

$\therefore\ \angle x+\angle y=68^\circ+71^\circ=139^\circ$

96) 91°



$2\angle x=180^\circ-112^\circ=68^\circ$ $\therefore\ \angle x=34^\circ$,

$2\angle y=2\angle x+46^\circ=114^\circ$ $\therefore\ \angle y=57^\circ$

$\therefore\ \angle x+\angle y=34^\circ+57^\circ=91^\circ$

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