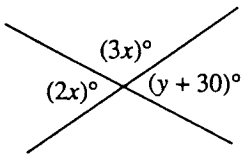
Category 9 Lines and Angles



Note: Figure not drawn to scale.

1. In the figure above, the value of y is

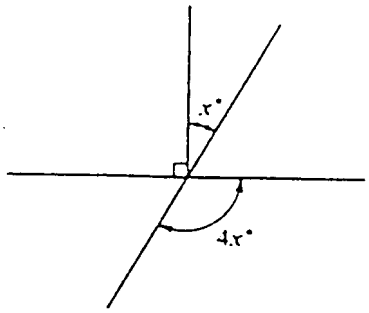
answer

(A) 6
(B) 12
(C) 24
(D) 36
(E) 42

2. If each of the two lines ℓ_1 and ℓ_2 is parallel to line ℓ_3, which of the following must be true?

answer

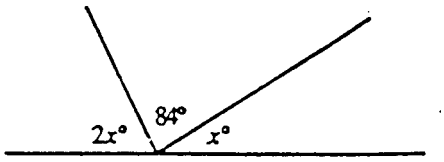
(A) Lines ℓ_1, ℓ_2, and ℓ_3 lie in the same plane.
(B) Lines ℓ_1, ℓ_2, and ℓ_3 lie in different planes.
(C) Line ℓ_1 is parallel to line ℓ_2.
(D) Line ℓ_1 is the same line as line ℓ_2.
(E) Line ℓ_1 is the same line as line ℓ_3.



3. In the figure above, what is the value of x?

answer

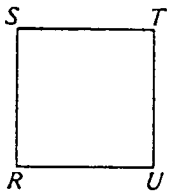
(A) 18
(B) 30
(C) 36
(D) 40
(E) 45



4. In the figure above, what is the value of x ?

answer

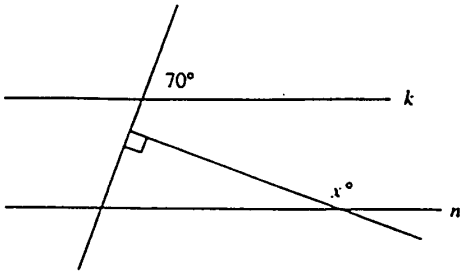
(A) 28
(B) 30
(C) 32
(D) 42
(E) 48



5. Square $RSTU$ shown above is rotated in a plane about its center in a clockwise direction the minimum number of degrees necessary for T to be in the position where S is now shown. The number of degrees through which $RSTU$ is rotated is

answer

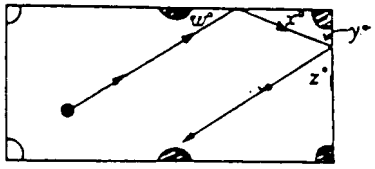
(A) 135°
(B) 180°
(C) 225°
(D) 270°
(E) 315°



6. In the figure above, if line k and n are parallel, then $x =$

answer

(A) 20
(B) 50
(C) 110
(D) 140
(E) 160

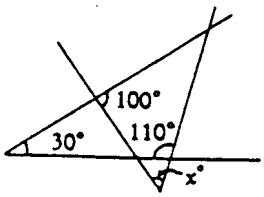


Note : Figure not drawn to scale.

7. **The figure above traces the path of a certain billiard ball on a rectangular billiard table. If the ball bounces off the side of the table at the same angle at which it hits the side, and if $w = 42$, what the value of z ?**

answer

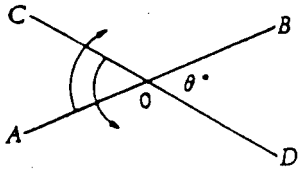
(A) 42 (B) 48 (C) 52 (D) 58 (E) 60



8. **In the figure above, what is the value of x ?**

answer

(A) 20
(B) 30
(C) 40
(D) 50
(E) 70



9. **The figure above shows two lines intersecting at the point O. If the lines are rotated about O at the same rate and in the directions shown until $AB \perp CD$, through how many degrees must each line move?**

answer

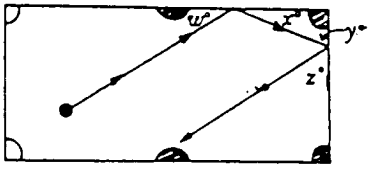
(A) $90 - q$

(B) $90 - \frac{q}{2}$

(C) $90 + \frac{q}{2}$

(D) $\frac{90 + q}{2}$

(E) $\frac{90 + 2q}{2}$



Note : Figure not drawn to scale.

10. **The figure above traces the path of a certain billiard ball on a rectangular billiard table. If the ball bounces off the side of the table at the same angle at which it hits the side, and if $w = 42$, what the value of z ?**

answer

(A) 42
(B) 48
(C) 52
(D) 58
(E) 60

11. **If each of the two lines ℓ_1 and ℓ_2 is parallel to line ℓ_3, which of the following must be true?**

answer

(A) **Lines ℓ_1, ℓ_2, and ℓ_3 lie in the same plane.**

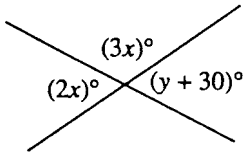
(B) **Lines ℓ_1, ℓ_2, and ℓ_3 lie in different planes.**

(C) **Line ℓ_1 is parallel to line ℓ_2.**

(D) **Line ℓ_1 is the same line as line ℓ_2.**

(E) **Line ℓ_1 is the same line as line ℓ_3.**

수학해설 *Category 9 Lines and Angles*



Note: Figure not drawn to scale.

1. In the figure above, the value of y is

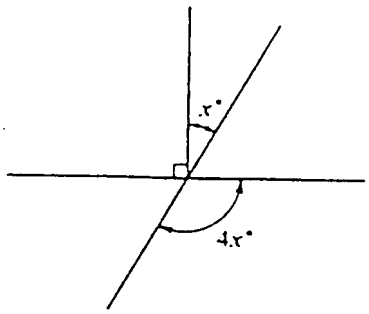
(A) 6
(B) 12
(C) 24
(D) 36
(E) 42

y값을 구하기 전에 먼저 x의 값을 구해야 겠네요.
2x와 3x는 보각의 관계로 합쳐서 180도죠 2x + 3x = 180 x= 36
그 다음은 3x° + (y+30)° = 180°(보각), 또는 2x° = y° +30° (맞꼭지각)
둘 중에 아무 식에 x=36을 대입하면 y = 42를 구할 수 있죠.
☞ 정답은 (E)

2. If each of the two lines ℓ_1 and ℓ_2 is parallel to line ℓ_3, which of the following must be true?

(A) Lines ℓ_1, ℓ_2, and ℓ_3 lie in the same plane.
(B) Lines ℓ_1, ℓ_2, and ℓ_3 lie in different planes.
(C) Line ℓ_1 is parallel to line ℓ_2.
(D) Line ℓ_1 is the same line as line ℓ_2.
(E) Line ℓ_1 is the same line as line ℓ_3.

ℓ_1과 ℓ_2가 ℓ_3에 평행하는 것은 ℓ_1, ℓ_2, and ℓ_3가 모두 평행함을 말하는 것이지, 이들이 같은 평면(plane)이나 선(line)에 있다는 뜻은 아니지요. 따라서 이런 조건을 모두 만족시키는 것은 (C)
☞ 정답은 (C)

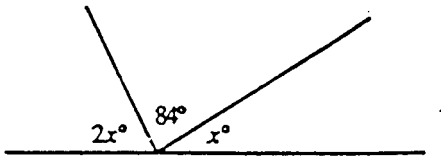


3. In the figure above, what is the value of x ?

(A) 18
(B) 30
(C) 36
(D) 40
(E) 45

x와 4x 사이의 각을 임의로 y라 가정하면
①x + y =90(여각의 관계), ②4x + y = 180(보각의 관계) ①과 ②을 풀면 x = 30

☞ 정답은 (B)

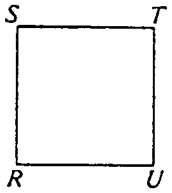


4. In the figure above, what is the value of x ?

(A) 28
(B) 30
(C) 32
(D) 42
(E) 48

보각의 관계(합쳐서 180도)를 묻는 문제네요. 바꿔 말하면 2x + 84 + x = 180, 여기서 식을 정리하면 x = 32

☞ 정답은 (C)

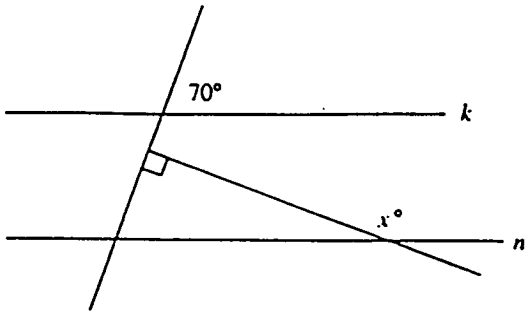


5. **Square $RSTU$ shown above is rotated in a plane about its center in a clockwise direction the minimum number of degrees necessary for T to be in the position where S is now shown. The number of degrees through which $RSTU$ is rotated is**

(A) 135°
(B) 180°
(C) 225°
(D) 270°
(E) 315°

정사각형 RSTU가 시계방향으로 회전할 때, T가 S로 이동하는데 최소 각이 얼마인지를 묻는 문제네요. T에서 다시 T로 돌아오는데 360도 회전하고, T에서 U로 이동하는 것은 90도입니다. 따라서 T에서 S까지는 270도를 회전하네요.

☞ 정답은 (D)



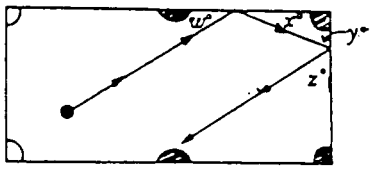
6. **In the figure above, if line k and n are parallel, then $x =$**

(A) 20
(B) 50
(C) 110
(D) 140
(E) 160

두 선이 평행한 성질과 삼각형의 합이 180 도라는 성질과 보각(두 각이 합쳐서 180 도)의 성질을 이용하면 쉽게 풀 수 있습니다.

$70 + 90 + (180 - x) = 180$, $x = 160$

☞ 정답은 (E)



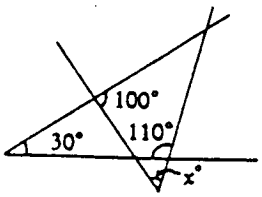
Note : Figure not drawn to scale.

7. The figure above traces the path of a certain billiard ball on a rectangular billiard table. If the ball bounces off the side of the table at the same angle at which it hits the side, and if $w = 42$, what the value of z ?

(A) 42 (B) 48 (C) 52 (D) 58 (E) 60

당구대에서 입사각과 반사각이 같다는 조건에서 처음 입사각을 $w = 42$ 라고 주고서 나머지 반사각 z을 구하라는 문제네요. $w = 42$ 을 알았으니 그 다음은 y 값을 구할 수 있습니다. w(=42) + y + 90 = 180, 이 식을 풀면 y = 48. y=48의 입사각이 들어가면 이번에는 반사각도 48 도입니다. 따라서 z의 값은 48도

☞ 정답은 (B)

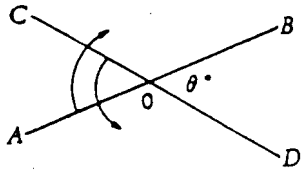


8. In the figure above, what is the value of x ?

(A) 20
(B) 30
(C) 40
(D) 50
(E) 70

첫번째 구할 각은 맨 위에 있는 각을 y라 하면 30+110+y = 180, 여기서 y = 40.
이번에는 x + y(=40) + 100 = 180 ⇒ x = 40

☞ 정답은 (C)



9. The figure above shows two lines intersecting at the point O. If the lines are rotated about O at the same rate and in the directions shown until $AB \perp CD$, through how many degrees must each line move?

(A) $90 - q$

(B) $90 - \frac{q}{2}$

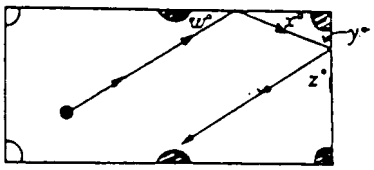
(C) $90 + \frac{q}{2}$

(D) $\frac{90 + q}{2}$

(E) $\frac{90 + 2q}{2}$

$AB \perp CD$가 되려면 일단 선분 CD는 q°만큼 이동해서 선분 AB의 위치로 가고 선분 AB는 90도 이동해야 선분 CD와 수직의 관계가 성립하죠. 그런데 이 두 선분은 O을 중심으로 똑 같은 각도로 동시에 이동한다고 했으니 q° + 90을 2로 나누어주면 각 선분이 얼마만큼 이동해야 하는지를 알 수 있습니다.

⊞ 정답은 (D)



Note : Figure not drawn to scale.

10. The figure above traces the path of a certain billiard ball on a rectangular billiard table. If the ball bounces off the side of the table at the same angle at which it hits the side, and if $w = 42$, what the value of z ?

(A) 42 (B) 48 (C) 52 (D) 58 (E) 60

남학생들에게 아주 친숙한 문제네요. 당구의 기본 원리인 입사각과 반사각이 같다는 조건을 주었기 때문에 $w = 42 \Rightarrow x = 42 \Rightarrow y = (180 - (90+42) = 48 \Rightarrow z = 48$

⊞ 정답은 (B)

11. If each of the two lines ℓ_1 and ℓ_2 is parallel to line ℓ_3, which of the following must be true?

(A) Lines ℓ_1, ℓ_2, and ℓ_3 lie in the same plane.

(B) Lines ℓ_1, ℓ_2, and ℓ_3 lie in different planes.

(C) Line ℓ_1 is parallel to line ℓ_2.

(D) Line ℓ_1 is the same line as line ℓ_2.

(E) Line ℓ_1 is the same line as line ℓ_3.

ℓ_1과 ℓ_2가 ℓ_3에 평행하는 것은 ℓ_1, ℓ_2, and ℓ_3가 모두 평행함을 말하는 것이지, 이들이 같은 평면(plane)이나 선(line)에 있다는 뜻은 아니지요. 따라서 이런 조건을 모두 만족시키는 것은 (C)

☞ 정답은 (C)