

1. $(301)_4 = (122)_4 + (1ab)_4 \Rightarrow a + b = ?$

- A) 2 B) 3 **C) 4** D) 5 E) 6

2. $\sqrt{a - \sqrt{a - \sqrt{a - \dots}}} = \sqrt[3]{9^3 \sqrt[3]{9^3 \sqrt[3]{9 \dots}}}$
 $\Rightarrow a = ?$

- A) 6 **B) 12** C) 16
 D) 27 E) 36

3. $3 < x < 5 \Rightarrow \frac{|(x-2)(x-5)| + x - 5}{x^2 - 4x + 3} = ?$

- A) $-\frac{x-3}{x-5}$ B) $-\frac{x-3}{x-1}$ **C) $-\frac{x-5}{x-1}$**
 D) $\frac{x-3}{x-1}$ E) $\frac{x-5}{x-3}$

4. $\frac{(n+1)!}{(n-1)!} = 420 \Rightarrow n = ?$

- A) 16 **B) 20** C) 24
 D) 28 E) 32

5. $\frac{a}{b} = -2 \Rightarrow \frac{2b}{a} - \frac{3a}{b} = ?$

- A) -5 B) -4 C) -3
 D) 4 **E) 5**

6. If $\begin{cases} 2a = 3b \\ 4b = 5c \end{cases}$, then which of the following is correct?

- A) $a < b < c$ B) $a < c < b$
 C) $c < a < b$ D) $b < c < a$
E) $c < b < a$

$$7. \begin{cases} 3^{x+y} = 80! \\ 3^{2x+y} = 81! \end{cases} \Rightarrow x = ?$$

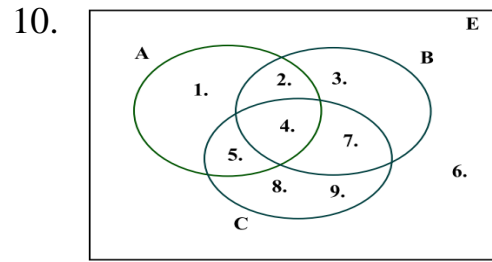
- A) -4 B) -2 C) 2
D) 4 E) 5

$$8. \frac{4}{1 + \frac{3}{1 + \frac{2}{x-2}}} = 2 \Rightarrow x = ?$$

- A) 3** B) 4 C) 5 D) 6 E) 7

9. If 3 workers finish 200 units of work in 5 days working 8 hours a day, how many hours a day should 4 workers work to finish 300 units of work in 5 days?

- A) 9** B) 8 C) 7 D) 6 E) 5



$$A \setminus (B \cap C) = ?$$

- A) {1} B) {1,2} C) {1,5}
 D) {1,6} **E) {1,2,5}**

$$11. \frac{0,1\bar{6}}{0,3\bar{3}} = ?$$

- A) $\frac{3}{2}$ B) 1
 C) $\frac{2}{3}$ **D) $\frac{1}{2}$**
 E) $\frac{16}{33}$

$$12. \left(\frac{3}{2} - \frac{5}{4}\right) - \left[\left(2\frac{1}{4}\right)\frac{1}{4} - 1\right] = ?$$

- A) $-\frac{4}{5}$ **B) $-\frac{3}{4}$**
 C) $-\frac{1}{4}$ D) $\frac{1}{4}$
 E) $\frac{3}{4}$

$$13. \left(\frac{2^{-2} + 2^{-3}}{2^{-2} + 2^2} \right)^{-1} = ?$$

A) $\frac{3}{34}$

B) $\frac{2}{17}$

C) $\frac{3}{17}$

D) $\frac{17}{3}$

E) $\frac{34}{3}$

$$14. \frac{\sqrt[3]{(-3)^3} - \sqrt{(-3)^2}}{\sqrt[3]{(-3)^2} \sqrt{(-3)^2}} = ?$$

A) -4

B) -2

C) 2

D) 4

E) 6

$$15. \frac{\sqrt{4,4} + \sqrt{1,1} + \sqrt{9,9}}{\sqrt{1,1}} = ?$$

A) 14

B) 13

C) 9

D) 8

E) 6

16. If $P(x - 1) = 2x^3 - 2x^2 + 3x + 4$, what is the remainder when $P(x)$ is divided by $(x - 2)$?

A) 49

B) 18

C) 7

D) -18

E) -49

17. $f(x) = 2x + m \Rightarrow (f \circ f \circ f)(x) = ?$

A) $6x + 3m$

B) $6x + m$

C) $8x + m$

D) $8x + 3m$

E) $8x + 7m$

18. $f(x, y) = x^y - y^x \Rightarrow f(f(3, 1), 2) = ?$

A) 0

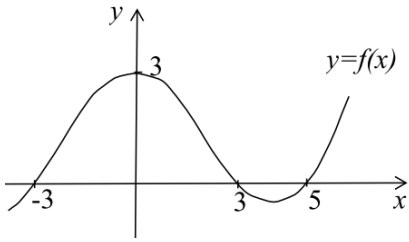
B) 1

C) 2

D) 3

E) 4

19.



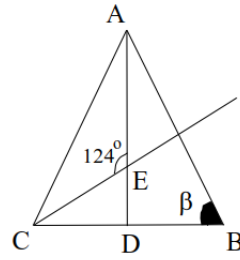
$$(g \circ f)(x) = x^2 - 7x + 10 \Rightarrow g(3) = ?$$

- A) -2 B) 0 C) 2 **D) 10** E) 40

20. $1 + 4 \cos^2 x \sin^2 x + \cos^2 2x = ?$

- A) 2** B) $1 + 2 \cos^2 2x$
 C) $2 \sin^2 2x$ D) 0
 E) $2 + \cos^2 2x$

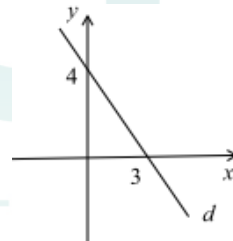
21.



If $|AC|=|AB|$,
 $[AD]$ is median,
 $[CE]$ is bisector, and
 $m(\angle CEA)=124^\circ$,
 Then $\beta = ?$

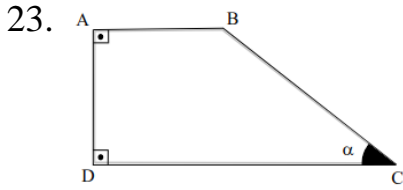
- A) 28° B) 34°
 C) 56° **D) 68°**
 E) 124°

22.



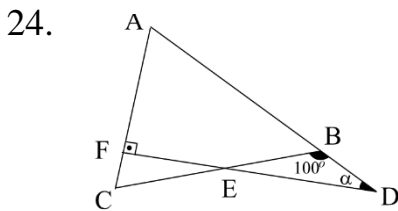
Which of the following
 is the equation of line d
 in the figure?

- A) $x + y - 3 = 0$
 B) $x + y - 4 = 0$
 C) $3x + 4y - 12 = 0$
 D) $4x + 3y - 3 = 0$
E) $4x + 3y - 12 = 0$



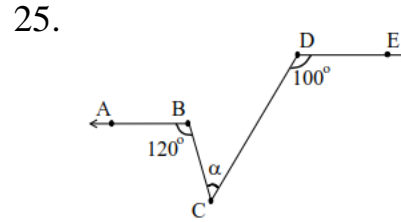
ABCD is a trapezoid,
 $|AB| = 3\text{cm},$
 $|DC| = 7\text{cm},$
 $A(ABCD) = 20\text{cm}^2$ } $\Rightarrow \alpha = ?$

- A) 20° B) 30°
C) 45° D) 60°
 E) 75°



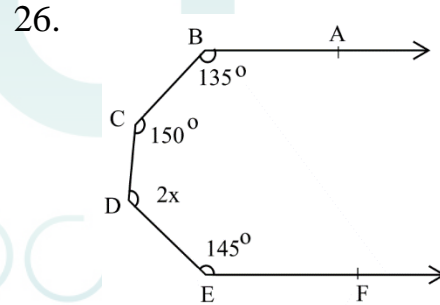
$|AB| = |BC|,$
 $[DF] \perp [AC],$
 $m(\widehat{DBC}) = 100^\circ$ } $\Rightarrow \alpha = ?$

- A) 20° B) 30°
C) 40° D) 50°
 E) 60°



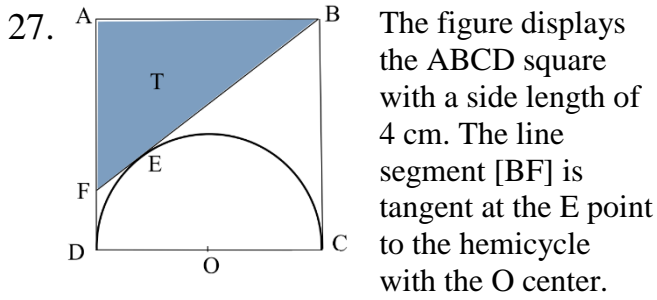
$[AB] // [DE]$
 $m(\widehat{ABC}) = 120^\circ$
 $m(\widehat{CDE}) = 100^\circ$ } $\Rightarrow \alpha = ?$

- A) 20° **B) 40°** C) 100°
 D) 120° E) 220°



$[BA] // [EF]$
 $m(\widehat{ABC}) = 135^\circ$
 $m(\widehat{BCD}) = 150^\circ$
 $m(\widehat{DEF}) = 145^\circ$
 $m(\widehat{CDE}) = 2x$ } $\Rightarrow x = ?$

- A) 40° B) 45° C) 50°
D) 55° E) 110°



What is the area of the shaded region [T] in cm^2 ?

- A) $4 - \pi$ B) 4 **C) 6**
 D) $16 - \pi$ E) $16 - 4\pi$

28. $\log_3 2 = a \Rightarrow \log_6 4 = ?$

- A) $\frac{2a}{1+a}$** B) $\frac{a}{1+a}$ C) $\frac{2a}{1+2a}$
 D) $\frac{a}{2+a}$ E) $\frac{2+a}{1+a}$

29. $\log_4 [14 + \log_5 (6x + 1)] = 2 \Rightarrow x = ?$

- A) 6 **B) 4** C) 3 D) 2 E) 1

30. $z = -2 + i \Rightarrow |z^4| = ?$

- A) 3 B) 5 C) 9 **D) 25**
 E) 36

31. $z = 1 - i \Rightarrow \frac{z^2 - 1}{\bar{z} - 2i} = ?$

- A) $-\frac{1}{2}i$ B) $-\frac{1}{2} + \frac{3}{2}i$
 C) $-\frac{1}{2} - \frac{3}{2}i$ D) $\frac{1}{2} + \frac{3}{2}i$
E) $\frac{1}{2} - \frac{3}{2}i$

32. $\lim_{x \rightarrow 1} \frac{\ln x}{x - 1} = ?$

- A) -1 B) 0 **C) 1** D) 2 E) $\ln 2$

33. Which of the following is the slope of the tangent line of the curve $f(x) = \ln(x^2 + 2x + 1)$ at $x = 1$ point?

- A) 1 B) 2 C) 3 D) 4 E) 5

34. $\left. \begin{array}{l} x = 2 \cos 2t \\ y = e^t - t^2 \end{array} \right\} \Rightarrow \frac{dy}{dx} = ?$

- A) $\frac{e^t - 2t}{2 \sin 2t}$ B) $e^t - 2t$
 C) 2 D) $-4 \sin 2t$
 E) $-\frac{e^t - 2t}{4 \sin 2t}$

35. $f(x) = 3x^2 - \sin x \Rightarrow f'(0) = ?$

- A) -1 B) 0 C) 1 D) 2 E) 3

36. $A = \begin{bmatrix} 1 & 2 & -1 \\ 0 & 1 & 0 \\ 1 & -2 & 0 \end{bmatrix} \Rightarrow A^2 = ?$

A) $\begin{bmatrix} 1 & 2 & -1 \\ 0 & 1 & 0 \\ 1 & -2 & 0 \end{bmatrix}$ B) $\begin{bmatrix} 0 & 6 & -1 \\ 0 & 1 & 0 \\ 1 & -2 & 0 \end{bmatrix}$

C) $\begin{bmatrix} 0 & 6 & -1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$ D) $\begin{bmatrix} 0 & 6 & -1 \\ 0 & 1 & 0 \\ 1 & 0 & -1 \end{bmatrix}$

E) $\begin{bmatrix} 0 & 6 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$

37. $A = \begin{bmatrix} 1 & -1 \\ 2 & -1 \end{bmatrix} \Rightarrow 2A^{-1} + A = ?$

A) $\begin{bmatrix} -1 & 1 \\ -2 & 1 \end{bmatrix}$ B) $\begin{bmatrix} 1 & -1 \\ -2 & 1 \end{bmatrix}$

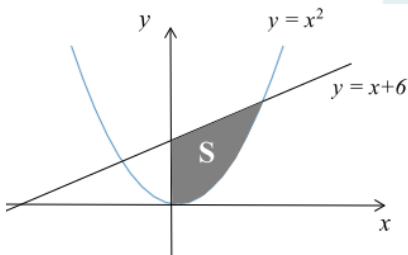
C) $\begin{bmatrix} -1 & -1 \\ -2 & 1 \end{bmatrix}$ D) $\begin{bmatrix} -1 & 1 \\ -2 & -1 \end{bmatrix}$

E) $\begin{bmatrix} 0 & 1 \\ -2 & 1 \end{bmatrix}$

38. $\int_1^e (\ln x + 1) dx = ?$

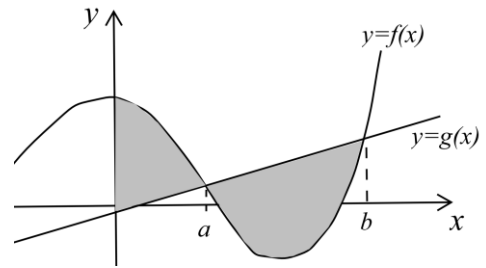
- A) 1 **B) e** C) $e - 1$
 D) $1 - e$ E) $2e - 1$

39.



- A) 3 B) $\frac{9}{2}$ C) 9
D) $\frac{27}{2}$ E) 27

40.



Which of the following represents the shaded area in the figure?

- A) $\int_0^a [f(x) - g(x)] dx$
 B) $\int_0^b [f(x) - g(x)] dx$
 C) $\int_0^a |f(x) - g(x)| dx$
D) $\int_0^b |f(x) - g(x)| dx$
 E) $\int_a^b |f(x) - g(x)| dx$

1. ~~275~~
~~372~~
~~476~~
~~573~~
~~6Δ1~~

- A)6 B)7 C)8 D)9 E)10

2. 3Δ4
 3Δ2
 4Δ2
 5Δ4
 6Δ3

- A)6 B)7 C)8 **D)9** E)10

3.

☆	△	■	▽	}	3274	5238
■	☆	□	▲		4726	
▲	△	▽	☆		8742	2754
□	☆	△	▽			
▽	△	☆	▲			

☆ □ ▽ ■ = ?

- A) 5342 B) 3254 C) 4352
D) 2345 E) 2453

4.

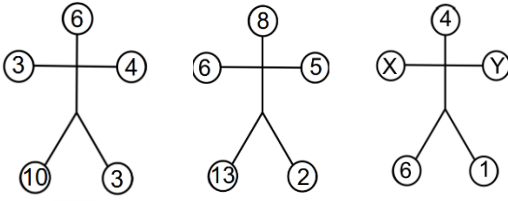
3265	}	◇	○	◆	☆	★	◇	■	○
6417		◇	□	☆	□				
2574		■	☆	□	◆	■	☆	◇	○
6425									
2141									

○ ☆ ■ ◇ = ?

- A) 5432 B) 6435 **C) 5462**
 D)5461 E)6542

C

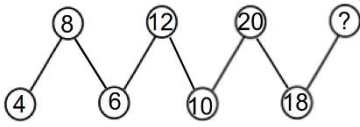
5.



$X+Y=?$

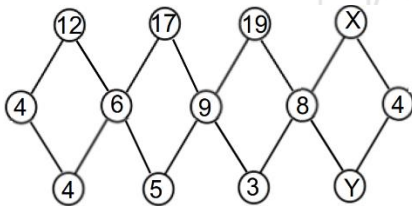
- A) 3 B) 4 **C) 5** D) 6 E) 7

6.



- A) 32 B) 34 **C) 36** D) 38 E) 40

7.



$X-Y=?$

- A) 5 B) 6 **C) 8** D) 10 E) 12

8.

- I. 142 → 10
 II. 253 → 21
 III. 318 → 32
 IV. 474 → 44
 V. 584 → ?

- A) 36 B) 40 C) 44 D) 48 **E) 52**

9.

- I. 152 → 4
 II. 342 → 5
 III. 325 → 0
 IV. 543 → 6
 V. 617 → 0
 VI. 825 → ?

- A) 5** B) 3 C) 1 D) 0 E) -1

10.

- I. 1052 → 8
 II. 3142 → 10
 III. 3405 → 12
 IV. 3424 → 13
 V. 4154 → 14
 VI. 4355 → ?

- A) 16 **B) 17** C) 18 D) 19 E) 20

11.

- 25716 → 65172
 34621 → 14263
 47837 → ?

12. 5, 6, 8, 11, 15, 20, 26, X, ...

X=?

A) 32 **B) 33** C) 34 D) 35 E) 36

13. 1, 5, 3, 8, 12, 10, 15, 19, 17, X, ...

X=?

A) 13 B) 15 C) 20 D) 21 **E) 22**

14.

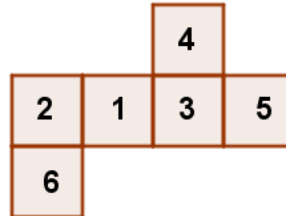
+	x	y	z
x			
y	z+5		
z		x-1	

·	x	y	z
x		$\frac{z}{2}$	
y			
z			

The tables above contain addition and multiplication of integers, where x, y, z each refers to a unique integer. Then, $\frac{x}{z} = ?$

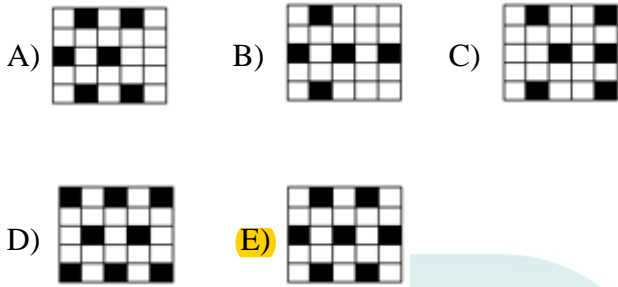
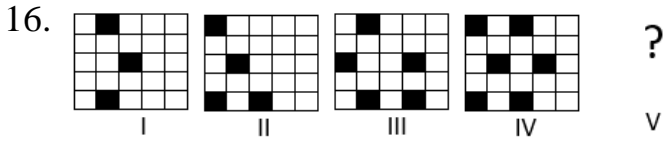
A) $-\frac{1}{2}$ B) $-\frac{1}{4}$ **C) $\frac{1}{4}$** D) $\frac{1}{2}$ E) 1

15.



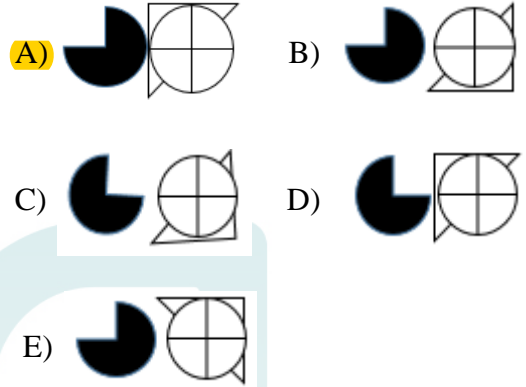
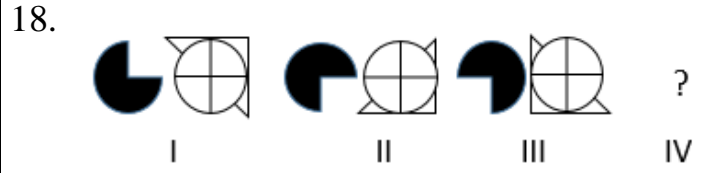
If the shape above is folded into a cube, what is the sum of numbers next to number "5"?

A) 5 B) 10 C) 13 D) 14 **E) 15**



17. $\triangle + \triangle + \star = 30$
 $\star + \star - \square = 12$
 $\square + \square + \square = 12$
 $\triangle + \star - \square = ?$

- A) 5 B) 10 C) 13 D) 14 **E) 15**



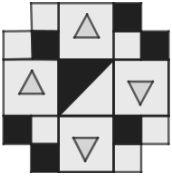
19.

ELMA	}	3454
MASA	}	8474
LEKE	}	5489
YAKA	}	1272
SAYI	}	2134

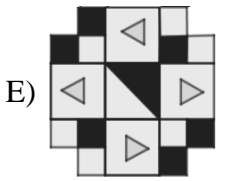
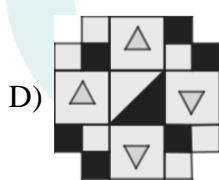
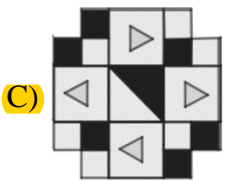
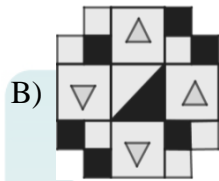
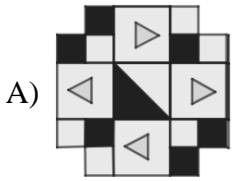
KAMELYA=?

- A) 7458154 B) 8458174 **C) 7432184**
 D) 3458174 E) 7438154

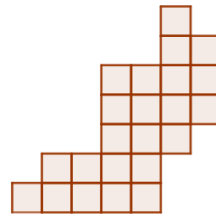
20.



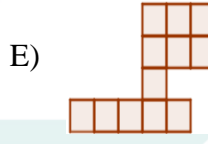
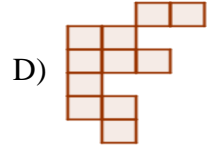
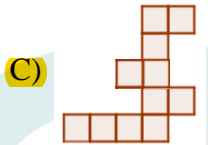
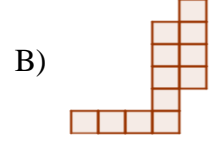
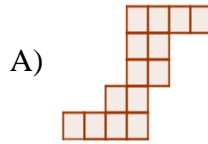
When the figure above is rotated by 270° degrees counterclockwise, which of the following will you get?



21.



Which of the following does not fit into this figure?



22.

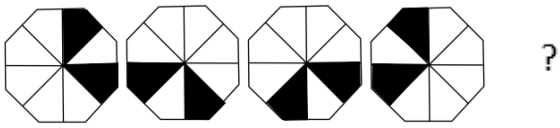
3	5	8	1
4	2	3	5
2	X	5	6
5	6	1	4

X = ?

- A)** 2 B) 3 C) 4 D) 5 E) 6

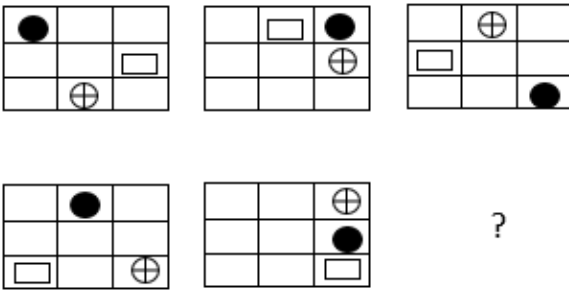
C

23.



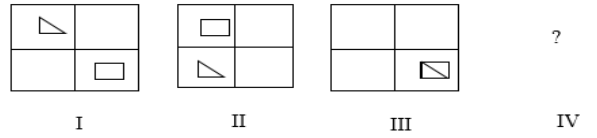
- A)
- B)
- C)
- D)
- E)

24.



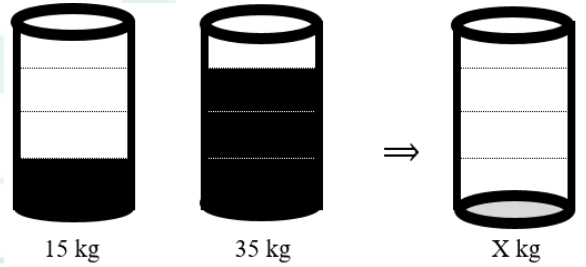
- A)
- B)
- C)
- D)
- E)

25.



- A)
- B)
- C)
- D)
- E)

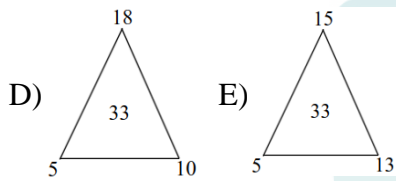
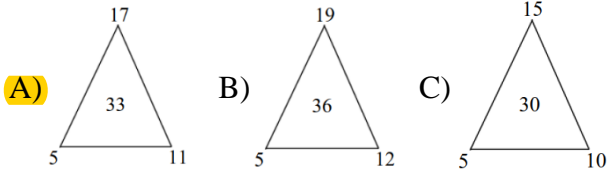
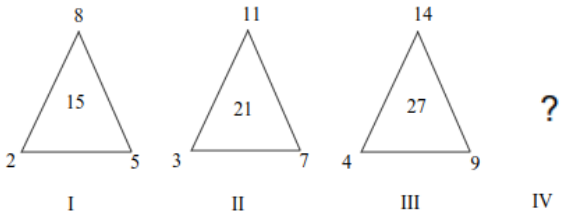
26.



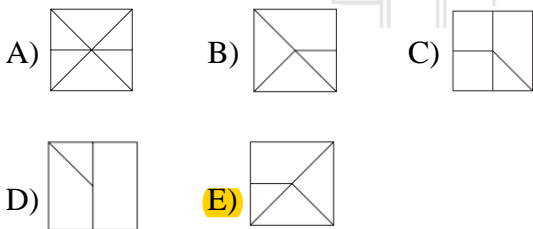
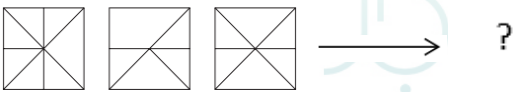
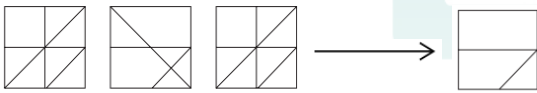
X = ?

- A) 3
- B) 4
- C) 5
- D) 7
- E) 10

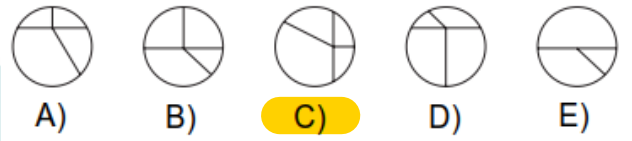
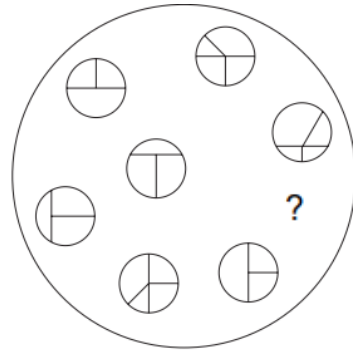
27.



28.



29.



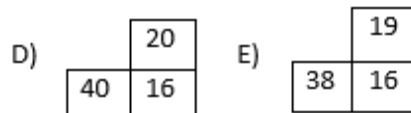
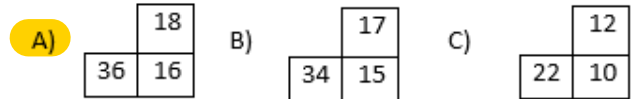
30.

4	10
20	8

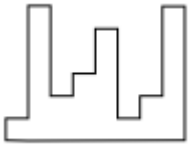
7	16
32	14

6	14
28	12

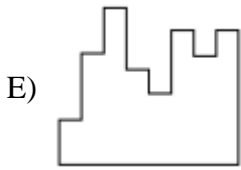
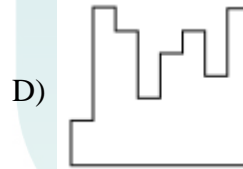
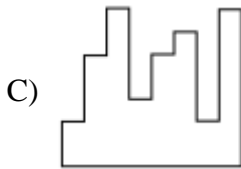
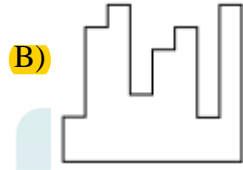
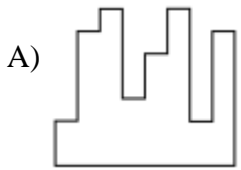
8	?
?	?



31.



Which of the following should fit in the figure above to make it a square?



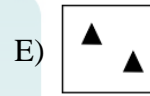
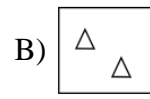
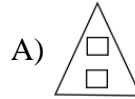
32.

5	1	3	9
3	2	7	12
2	1	5	8
4	2	X	9

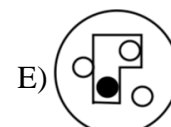
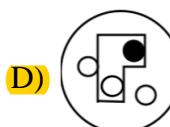
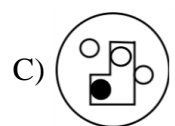
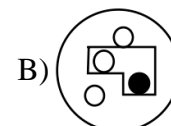
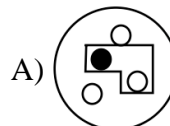
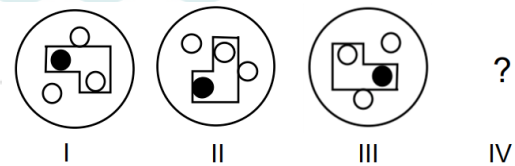
X = ?

- A) 1 B) 2 **C) 3** D) 4 E) 6

33.



34.

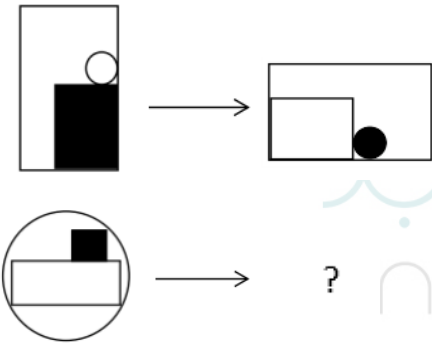


35.



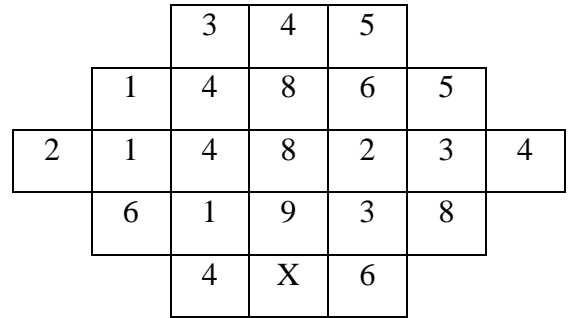
- A)
- B)
- C)
- D)
- E)

36.



- A)
- B)
- C)
- D)
- E)

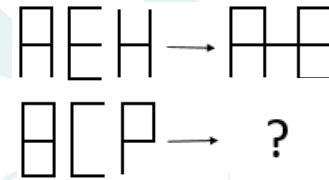
37.



X = ?

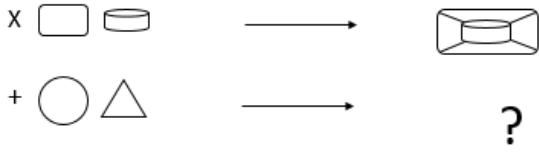
- A) 6
- B) 5**
- C) 4
- D) 3
- E) 2






38.



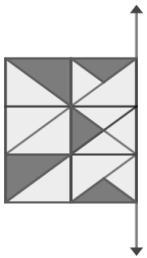
- A)
- B)
- C)**
- D)
- E)

39.


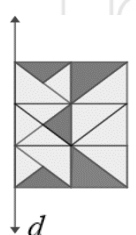
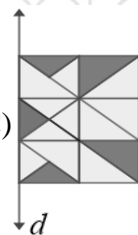
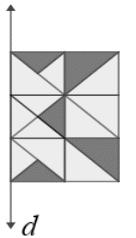


- A)** 
 B) 
 C) 
 D) 
 E) 

40.



Which of the following is the symmetrical display of the shape according to line d ?

- A)** 
 B) 
 C) 
D) 
 E) 