

1.

- 1) n
- 2) $4n$
- 3) $n+2$
 $n+4$

- 1) $n = 2m$
- 2) $8m$
- 3) $8m+2$, $8m+4$
- 2) $4(2m+1) = 8m+4$
- 3) $8m$, $8m+2$, $8m-2$
- 3) $8m-2$, $8m$, $8m-4$
- 2) $4(2m-1) = 8m-4$

2.

- $a-b$, $a+b$, a , b (a , b) , 1
- 2023
- 0 , $1-1=0$, $1+0=1$
- 0

A_1, A_2, \dots, A_8 -
 A_6, A_7, A_8 ,
 $A_6 A_7$,
 $A_6 A_8$. $A_6 A_i, i = 1, 2, 3, 4, 5$
 ($A_6 A_8, A_6 A_1, A_6 A_3$) ,
 A_1, A_3) ,
 A_1, A_3, A_8 ,

5. $n - (n \geq 3)$,
 n
 n ?
 n 3 1 2 -
 , 3
 1, 2 0. 1,
 2,
 3 1, 2 0.
 n 3,

- 1) -
- 2) ,
(
- 3) $xyxy \rightarrow xzzy \rightarrow xzxx \rightarrow xyxx \rightarrow zzzz$.
 $zyyy$,
 $zy \rightarrow xx (y \neq x \neq z)$ 2)
 $zzzz$.
 (1) (2) (1)
 (2) (3) ,

$$n = 3k + 1$$

(3)

$$n = 3k + 2,$$

$$b \neq a,$$

(3)

$$ab \rightarrow cc \quad (b \neq c \neq a)$$

c.

6.

2023-

A

675

A

A

A,

A.

$$(\quad) . \quad , \quad 2023 = 3 \cdot 674 + 1$$

675

7.

n.

n

2023-

2023

3,

n.

2023-

$$(\quad)$$

(

).

() 3- ()
 4 , 4
 4
 (4)
) 4 -
 4 , 4 -
 . 4
 (4)
 4 , 4

9. (x, y, z, t) $x \leq y \leq z \leq t$

, , :
 - x ,
 - y ,
 - z ,
 - t -

. $x=2$.
 . $y \geq 6$ -
 , , -
 . $y \geq 4$ $z \geq 8$ -
 , 1 4 , -
 7 8 3 8

$(2, y, z, t)$
 .
 , $y \geq 4$ $y \geq 6$,
 $y=4$ $y=5$. (- -
), (- -
 $y > 5$). (- -
 -).

$$z \geq 8, \quad y = 4, \quad y = 5,$$

10. n -

$$A, B, C, \quad AB, BC, CA$$

7, 8, 9, 10, 11, 12

$$n, \quad A, B, C, \quad ABC$$

$$8, 10, 12, \quad n = 3k + 2$$

$$n - \quad ABC, \quad t$$

$$n - \quad 3t = \frac{n(n-1)}{2}, \quad n = 3k + 2$$

$$n - 1, \quad 11 = 3 \cdot 3 + 2$$

$$n - \quad 1, 2, \dots, n$$

$$t = \frac{n(n-1)}{6}$$

$$a, b \in \{1, 2, \dots, n\}$$

$$a, b$$

$n=7, t=7$: (1, 2, 3), (1, 4, 5), (1, 6, 7), (2, 4, 6), (2, 5, 7), (3, 4, 7) (3, 5, 6).

$n=9, t=12$: (1, 2, 3), (4, 5, 6), (7, 8, 9), (1, 4, 7), (2, 5, 8), (3, 6, 9), (1, 5, 9), (2, 6, 7), (3, 4, 8), (1, 6, 8), (2, 4, 9) (3, 5, 7).

11.

1, 2, 3, 4, ..., 2015, 2016

?