

第11講 方程式

(練1)

$$n = 5 \times 6$$

(7) $2 \times 5 \times 3 + 2$

$$= 30 + 2$$

$$= \underline{32 \text{ 枚}}$$

(1) 黒 n^2 (枚)

白 $6n + 2$ (枚)

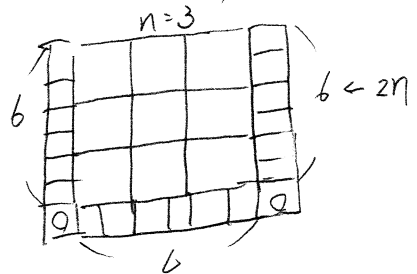
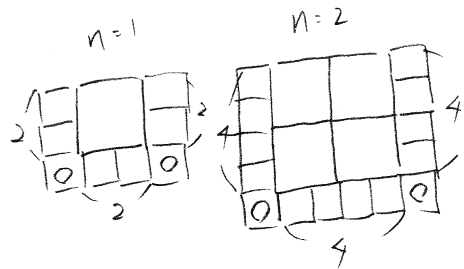
(2) $n^2 - (6n + 2) = 70$

$$n^2 - 6n - 72 = 0$$

$$(n+6)(n-12) = 0$$

$$n = -6, \textcircled{12}$$

① $6 \times 12 + 2 = 74$



n	1	2	3	4	5	n
黒	1	4	9	16	25	n^2
白	8	14	20	26	32	$6n+2$

$\begin{matrix} \text{ } & \text{ } & \text{ } & \text{ } & \text{ } \\ \text{ } & \text{ } & \text{ } & \text{ } & \text{ } \\ \text{ } & \text{ } & \text{ } & \text{ } & \text{ } \\ \text{ } & \text{ } & \text{ } & \text{ } & \text{ } \\ \text{ } & \text{ } & \text{ } & \text{ } & \text{ } \end{matrix}$

A. 74枚

(練2)

(1) 黒 $4^2 = 16$ 枚

白 $4 \times 4 \times 2 + 4$
 $= 36$ 枚

(2) 黒 n^2 (枚)

白 $8n + 4$ (枚)

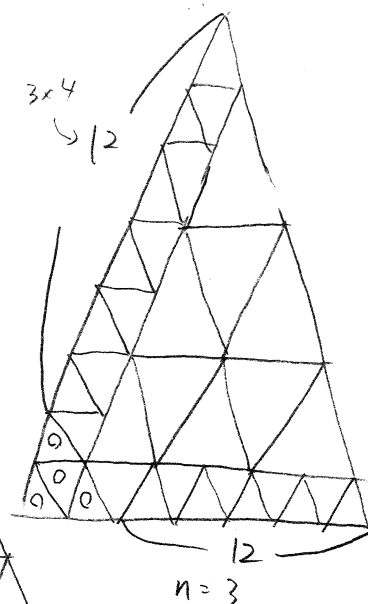
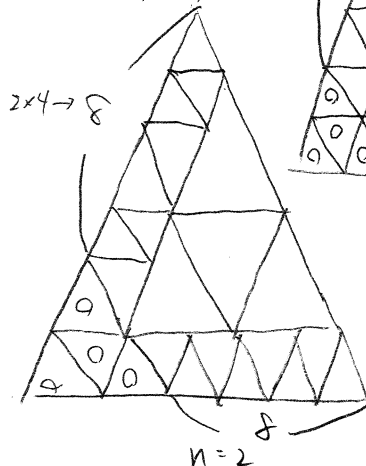
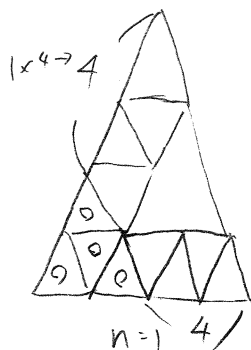
(3) $n^2 - (8n + 4) = 29$

$n^2 - 8n - 33 = 0$

$(n + 3)(n - 11) = 0$

$n = -3, (11)$

黒 $11^2 = 121$ 枚



n	1	2	3	4	5	n
黒	1	4	9	16	25	n^2
白	12	20	28	36	44	$8n + 4$
		+8	+8	+8	+8	

(練3) タイルを1枚取り除くと、シールが4枚減るだけ。

まず取り除かずにシールを見たらシールが何枚になるかを考える。

(ア) $40 - 4 = 36$ 枚

(イ)

$$2n^2 - 2n - 4 = 308$$

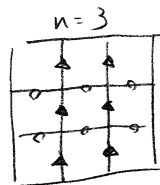
$$2n^2 - 2n - 312 = 0$$

$$n^2 - n - 156 = 0$$

$$(n+12)(n-13) = 0$$

$$n = -12, 13$$

A. $n = 13$



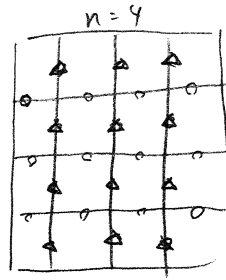
横 $3 \times 2 = 6$

縦 $3 \times 2 = 6$

$6 \times 2 = 12$ 枚

$\downarrow -4$

8枚



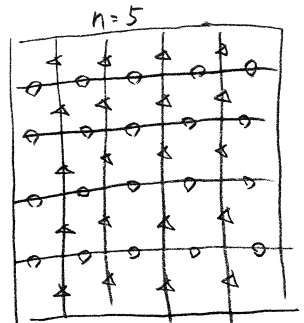
横 $4 \times 3 = 12$

縦 $4 \times 3 = 12$

$12 \times 2 = 24$ 枚

$\downarrow -4$

20枚



横 $5 \times 4 = 20$

縦 $5 \times 4 = 20$

$20 \times 2 = 40$ 枚

$\downarrow -4$

36枚

n	3	4	5	6	7	n
取り除く 前a=12	12	24	40	60	84	$2n(n-1)$
取り除く 後a=12	8	20	36	56	80	$2n^2 - 2n - 4$
		$\downarrow$	$\downarrow$	$\downarrow$	$\downarrow$	
		+12	+16	+20	+24	
		$\uparrow$	$\uparrow$	$\uparrow$	$\uparrow$	
		+4	+4	+4		

←増え方に
規則がある!

(系4)

(7)

$$3 \times 2 + 4 \times 4 = 22 \text{ 本}$$

↑
p, g の線上

↑
p-g の間

(1)

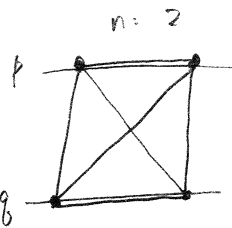
$$n^2 + 2n - 2 = 253$$

$$n^2 + 2n - 255 = 0$$

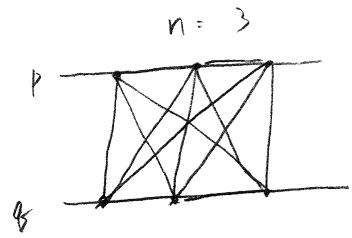
$$(n - 15)(n + 17) = 0$$

$$n = 15, -17$$

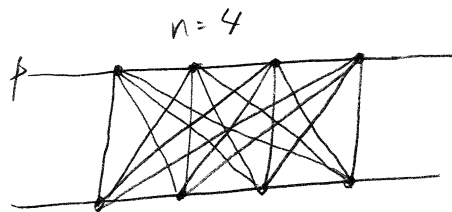
$$\underline{A \quad n = 15}$$



$$2 + 4 = 6 \text{ 本}$$



$$4 + 9 = 13 \text{ 本}$$



$$3 \times 2 + 4 \times 4 = 22 \text{ 本}$$

↑ ↑ ↑
n-1 n n

n	2	3	4	5	n
p-g 上	2	4	6	8	$2(n-1)$
p-g 間	4	9	16	25	n^2
和	6	13	22	33	$n^2 + 2n - 2$

(練5)

$$(7) \quad T \dots 4 \times 2 + 3 \times 2 = 14$$

$$+ \dots 3 \times 4 = 12$$

$$14 \times 3 + 12 \times 4$$

$$= 42 + 48$$

$$= 90 \text{ 基}$$

$$(1) \quad 4n^2 + 16n + 6 = 314$$

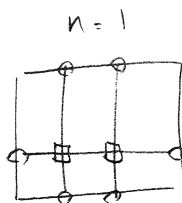
$$4n^2 + 16n - 308 = 0$$

$$n^2 + 4n - 77 = 0$$

$$(n-7)(n+11) = 0$$

$$n = 7, -11$$

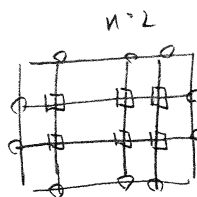
$$A. \quad n = 7$$



$$\begin{aligned} \bigcirc & 2 \times 2 + 1 \times 2 \\ & = 6 \end{aligned}$$

$$\square 1 \times 2 = 2$$

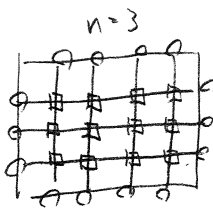
$$\begin{aligned} \text{信} \quad & 6 \times 3 + 2 \times 4 \\ & = 18 + 8 \\ & = 26 \end{aligned}$$



$$\begin{aligned} \bigcirc & 3 \times 2 + 2 \times 2 \\ & = 10 \end{aligned}$$

$$\square 2 \times 3 = 6$$

$$\begin{aligned} \text{信} \quad & 10 \times 3 + 6 \times 4 \\ & = 30 + 24 \\ & = 54 \end{aligned}$$



$$\begin{aligned} \bigcirc & 4 \times 2 + 3 \times 2 \\ & = 14 \end{aligned}$$

$$\square 3 \times 4 = 12$$

$$\begin{aligned} \text{信} \quad & 14 \times 3 + 12 \times 4 \\ & = 42 + 48 \\ & = 90 \end{aligned}$$

n	1	2	3	4	n
T	6	10	14	18	$4n+2$
$+$	2	6	12	20	$n(n+1)$
信	26	54	90	134	$4n^2+16n+6$

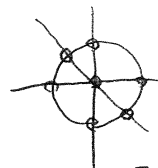
$$(4n+2) \times 3 = 12n+6$$

$$+ \quad (n^2+n) \times 4 = 4n^2+4n$$

$$4n^2+16n+6$$

(練6)

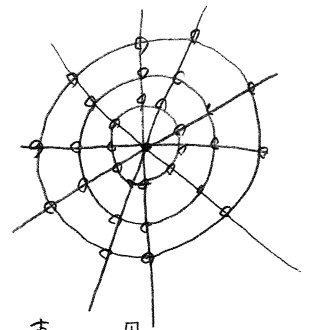
- ・ 直線と円は2点で交わる
- ・ 円の点の数はすべて同じ
- ・ 直線と直線は中心の1つだけ



$$\begin{array}{l} \text{直} \quad \text{円} \\ 3 \times 2 \times 1 + 1 \\ = 7 \end{array}$$



$$\begin{array}{l} \text{直} \quad \text{円} \\ 4 \times 2 \times 2 + 1 \\ = 17 \end{array}$$



$$\begin{array}{l} \text{直} \quad \text{円} \\ 5 \times 2 \times 3 + 1 \\ = 31 \end{array}$$

$$(7) 5 \times 2 \times 3 + 1$$

$$= 31 \text{ 個}$$

$$(1) 2n^2 + 4n + 1 = 161$$

$$2n^2 + 4n - 160 = 0$$

$$n^2 + 2n - 80 = 0$$

$$(n - 8)(n + 10) = 0$$

$$n = 8, -10$$

$$\underline{A. n = 8}$$

n	1	2	3	4	n
直	3	4	5	6	n+2
円	1	2	3	4	n
交	7	17	31	49	$2n(n+2)+1$
					$2n^2 + 4n + 1$