Figures to acompany the notebook:

On Relations
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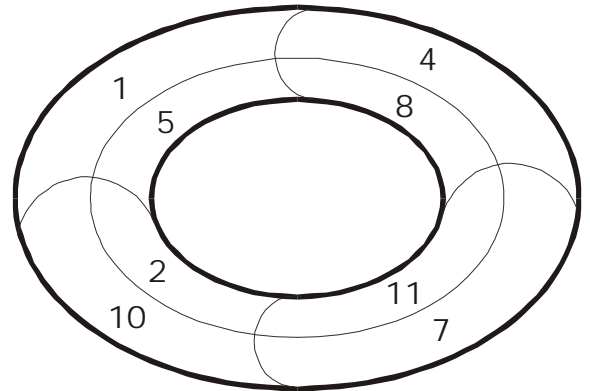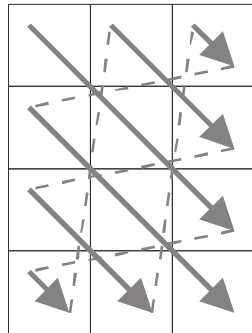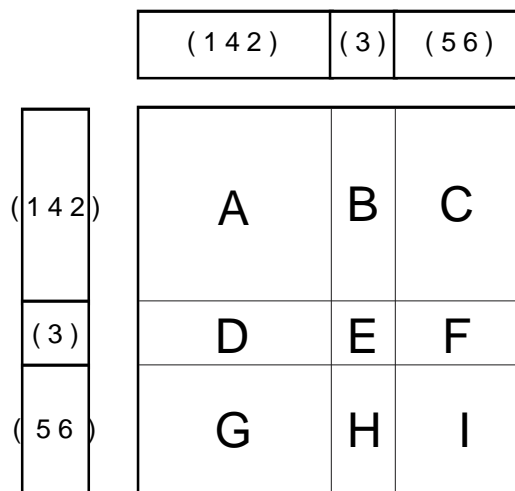| 1	5	9
10	2	6
7	11	3
4	8	12

Figure 1

	(1 4 2)	(3)	(5 6)
(1 4 2)	A	B	C
(3)	D	E	F
(5 6)	G	H	I

Figure 2

$$\begin{array}{c} \quad\quad\quad\;\, (1)\;\; (23)\;\; (45)\;\; (6) \\ \begin{array}{c} (1) \\ (2 \\ 3) \\ (4 \\ 5) \\ (6) \end{array} \left(\begin{array}{cccccc} A & B & B & C & C & D \\ E & F_1 & F_2 & G_1 & G_2 & H \\ E & F_2 & F_1 & G_2 & G_1 & H \\ I & J_1 & J_2 & K_1 & K_2 & L \\ I & J_2 & J_1 & K_2 & K_1 & L \\ M & N & N & O & O & P \end{array} \right) \end{array}$$

Figure 3

$$\frac{x_1(x_1-1)}{2} + x_2(x_2-1) = 1 + 2 = 3$$

(Non-diagonal square blocks J and M
Blocks D and G are not counted
as they are above the diagonal)

type $1^2 2^2$

$x_1 = x_2 = 2$

$$d_{sym}\big((1)(23)(45)(6)\big) = \sum_{h=1}^{6} x_h \left(\left\lfloor \frac{h}{2} \right\rfloor + 1 \right) + \sum_{h=1}^{6} x_h \frac{h(x_h - 1)}{2} + \sum_{h<k}^{6} x_h x_k \gcd(h,k) \quad = 13$$

$x_1 x_2 \gcd(1,2) = 4$

$x_1(1) + x_2(2) = 2 \times 1 + 2 \times 2 = 6$

(diagonal blocks A, F, K and P)

(Non-diagonal square blocks
E, I,N and O. Blocks B, C,
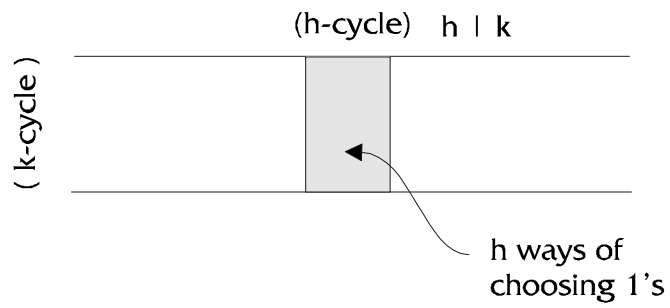H and L are not counted
as they are above the diagonal)

Figure 4

(h-cycle)   h | k

(k-cycle)

h ways of
choosing 1's

Figure 5

$$Fix(t_\pi) = \left(\sum_{h1} hx_h \right)^1 \left(\sum_{h2} hx_h \right)^1 \left(\sum_{h3} hx_h \right)^1 = x_1(x_1 + 2x_2)(x_1 + 3x_3) =$$

$$= 1 + 3 + 4 = 12$$

Block E   Blocks H and I   Blocks A and B

Figure 6