



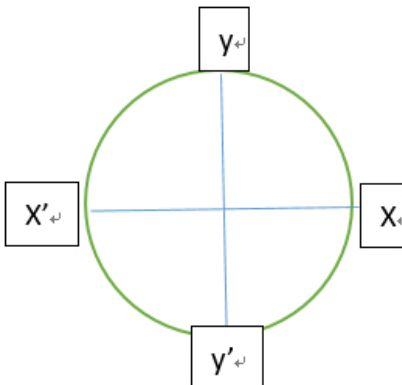
G1 (1/1 point)

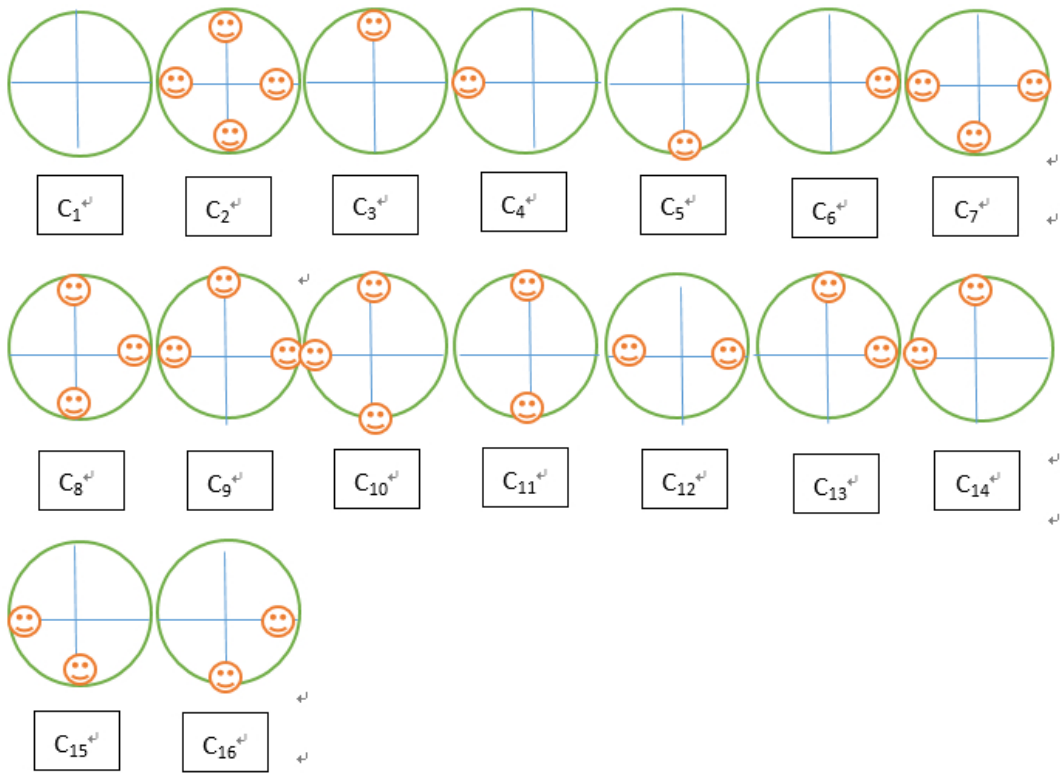
There are four positions on a ring, by following the clockwise direction  $0^\circ$ ,  $90^\circ$ ,  $180^\circ$ ,  $270^\circ$ . There are 2 kinds of beads available: red beads and blue beads. If each position could be sealed with just one bead, red or blue, how many different possible solutions are there?\_\_\_\_(The ring could be rotated and flipped)

**Answer: 6****EXPLANATION**

In total, there are 16 selectable solutions as follow:

【Note: Smiley face means the point is filled with red bead, whereas those without a smiley face means it is filled with blue bead】





Rotation  $0^\circ$  as fixed permutation

$$p_1 = (c_1)(c_2)(c_3)(c_4)(c_5)(c_6)(c_7)(c_8)(c_9)(c_{10})(c_{11})(c_{12})(c_{13})(c_{14})(c_{15})(c_{16})$$

Rotate  $90^\circ$

$$p_1 = (c_1)(c_2)(c_3 \ c_4 \ c_5 \ c_6)(c_7 \ c_8 \ c_9 \ c_{10})(c_{11} \ c_{12})(c_{13} \ c_{14} \ c_{15} \ c_{16})$$

Rotate  $180^\circ$

$$p_1 = (c_1)(c_2)(c_3 \ c_5)(c_4 \ c_6)(c_7 \ c_9)(c_8 \ c_{10})(c_{11})(c_{12})(c_{13} \ c_{15})(c_{14} \ c_{16})$$

rotate  $270^\circ$  o

$$p_1 = (c_1)(c_2)(c_3 \ c_6 \ c_5 \ c_4)(c_7 \ c_{10} \ c_9 \ c_8)(c_{11} \ c_{12})(c_{13} \ c_{16} \ c_{15} \ c_{14})$$

flip along x'x axis, rotate  $180^\circ$

$$p_1 = (c_1)(c_2)(c_3 \ c_5)(c_4)(c_6)(c_7 \ c_9)(c_8)(c_{10})(c_{11})(c_{12})(c_{13} \ c_{16})(c_{14})(c_{15})$$

flip along y'y axis rotate  $180^\circ$

$$p_1 = (c_1)(c_2)(c_3)(c_4 \ c_6)(c_5)(c_7)(c_8 \ c_{10})(c_9)(c_{11})(c_{12})(c_{13} \ c_{14})(c_{15} \ c_{16})$$

flip along upper right diagonal line rotate  $180^\circ$

$$p_1 = (c_1)(c_2)(c_3 \ c_6)(c_4 \ c_5)(c_7 \ c_{10})(c_8 \ c_9)(c_{11} \ c_{12})(c_{13})(c_{15})(c_{14} \ c_{16})$$

flip along lower left diagonal line rotate  $180^\circ$

$$p_1 = (c_1)(c_2)(c_3 \ c_4)(c_5 \ c_6)(c_7 \ c_8)(c_9 \ c_{10})(c_{11} \ c_{12})(c_{13} \ c_{15})(c_{14})(c_{16})$$

According Burnside formula, different equivalence class is:

$$l = \frac{1}{8} \times (16 + 2 + 4 + 2 + 8 + 8 + 4 + 4) = 6$$

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