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NPTEL

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Courses » Groups : Motion, symmetry and puzzles

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Unit 4 - Week 2- Structure of groups

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Course outline

How to access the portal

Pre-requisite

Week 1- Groups, as they occur naturally

Week 2- Structure of groups

Parity and puzzles

Generators and relations

Cosets, quotients and homomorphisms

Cayley graphs of groups

Week 2 - Feedback - Groups : Motion, symmetry and puzzles

Quiz : Assignment 2

Week 3- Symmetries and GAP exploration

Week 4 - More applications of groups

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Assignment 2

The due date for submitting this assignment has passed.

As per our records you have not submitted this assignment. **Due on 2018-09-12, 23:59 IST.**

1) How many edges are there in the Cayley graph of D_4 the group of symmetries of a square? Here we are considering the Cayley graph with respect to two generators (flipping about x-axis and rotation by 90 degrees)?

No, the answer is incorrect.

Score: 0

Accepted Answers:

(Type: Numeric) 12

3 points

2) Pick all groups which are abelian (that is, every pair a, b of elements satisfies $ab = ba$). **2 points**

- Klein 4-group.
- Group of symmetries of a pentagon.
- Invertible matrices over real numbers, under multiplication of matrices.
- Cyclic group with 6 elements.
- Group of non-zero rational numbers, under multiplication.

No, the answer is incorrect.

Score: 0

Accepted Answers:

Klein 4-group.

Cyclic group with 6 elements.

Group of non-zero rational numbers, under multiplication.

3) Which of the following is/are true about free group on one letter. **2 points**

- It is infinite.
- It is the group of symmetries of a circle.
- All elements a and b of it satisfy $ab = ba$.

No, the answer is incorrect.

Score: 0

Accepted Answers:

It is infinite.

All elements a and b of it satisfy $ab = ba$.

4) In the groups D_4 of symmetries of a square, how many elements g satisfy $gf = fg$, where f denotes the flipping about x-axis?

No, the answer is incorrect.

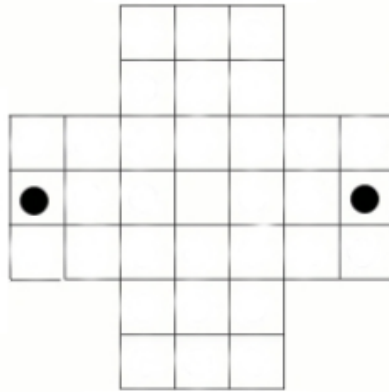
Score: 0

Accepted Answers:

(Type: Numeric) 3

3 points

5) True or false : In the game of standard peg solitaire, if there are only 2 points two marbles which are left in the end, then their positions could be as follows:



- True
 False

No, the answer is incorrect.

Score: 0

Accepted Answers:

False

6)

3 points

The solved position of a 15-puzzle is as follows.

1	2	3	
4	5	6	7
8	9	10	11
12	13	14	15

Consider two plausible configurations

I.

8	6	14	7
13	2	3	10
9		11	15
1	5	4	12

II.

8	3	14	
2	6	4	7
13	1	11	10
5	9	12	15

Now, pick the correct option.

- Both I and II can be unscrambled to the original puzzle.
- Only I can be unscrambled to the original puzzle.
- Only II can be unscrambled to the original puzzle.
- Neither I, nor II can be unscrambled to the original puzzle.

No, the answer is incorrect.

Score: 0

Accepted Answers:

Both I and II can be unscrambled to the original puzzle.

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