

Question # 1 of 10 (Start time: 12:23:34 PM, 07 June 2018)

In the group $\{1, -1, i, -i\}$, the order of -1 is -----

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Select the correct option

<input type="radio"/>	1	<i>AHMAD MSC(MATH)</i> <i>Areeb2113@gmail.com</i>
<input checked="" type="radio"/>	2	
<input type="radio"/>	3	
<input type="radio"/>	4	

Question # 2 of 10 (Start time: 12:23:51 PM, 07 June 2018)

The group $(\mathbb{Z}, +)$ is a finite group, where \mathbb{Z} is the set of integers.

Select the correct option

False



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True



A subset H of a group G under addition is a subgroup of G if and only if whenever $a, b \in H$, then $a - b \in H$

Select the correct option

True



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False



$\langle \{1, -1\}, \cdot \rangle$ is the subgroup of $\langle \{1, -1, i, -i\}, \cdot \rangle$.

Select the correct option

True



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False



How many tests are there to show a subset of a group to be a subgroup?

Select the correct option



1

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2



3



4

Question # 6 of 10 (Start time: 12:26:51 PM, 07 June 2018)

A subgroup H of a group $(G, *)$ is a subset of G , which is itself a group under $*$.

Select the correct option

True



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False



Question # 7 of 10 (Start time: 12:27:13 PM, 07 June 2018)

Which of the following is the subgroup of $\{1, -1, i, -i\}$ under multiplication?

Select the correct option



$\{1, i\}$

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$\{1, -i\}$



$\{1, -1\}$



$\{i, -i\}$

The group $(\mathbb{Q}, +)$ is an infinite group, where \mathbb{Q} is the set of rational numbers.

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Select the correct option

False



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True



Show that $H = \left\{ \begin{pmatrix} 1 & n \\ 0 & 1 \end{pmatrix} \mid n \in \mathbb{Z} \right\}$ is the subgroup of $G = GL(2, \mathbb{R})$ under multiplication.

Select the correct option

True



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False



The order of the group $\{1, \omega, \omega^2\}$ is -----

Select the correct option

- | | | |
|----------------------------------|---|------------------------------------------------------|
| <input type="radio"/> | 2 | <i>AHMAD MSC(MATH)</i>
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| <input checked="" type="radio"/> | 3 | |
| <input type="radio"/> | 4 | |
| <input type="radio"/> | 5 | |

$\langle Z, + \rangle$ is the subgroup of $\langle R, + \rangle$.

Select the correct option

True



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False



Question 7 / 10 (Start time: 12:10:14, 07 June 2018)

The order of the group (e) is -----

Select the correct option



0

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1



2



3

Klein Four group is not cyclic group.

Select the correct option

True



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False



A non empty subset S of a finite group G is called subgroup of G if and only if ab is in S for all a, b in S .

Select the correct option

True



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False



The order of the group $\{1, -1, i, -i, j, -j, k, -k\}$ is -----

Select the correct option

6



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7



8



9



The group $\{1, -1, i, -i\}$ is not a subgroup of itself.

Select the correct option

False



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True



$\langle Q, + \rangle$ is the subgroup of $\langle R, + \rangle$.

Select the correct option

<input checked="" type="radio"/>	True <i>AHMAD MSC(MATH)</i> <i>Areeb2113@gmail.com</i>
<input type="radio"/>	False

In the group $\{1, -1, i, -i\}$, the order of i is -----

Select the correct option

1

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2

3

4

Click

A subset H of a group G is a subgroup of G if and only if (i) whenever $a, b \in H$, then $ab \in H$ (ii) whenever $b \in H$, then $b^{-1} \in H$

Select the correct option

True



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False



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The set of even integers is not a subgroup of the set of Integers under the same binary operation of addition.

Select the correct option

True

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False

A subset H of a group G is a subgroup of G if and only if H is non-empty and -----

Select the correct option

<input type="radio"/>	whenever $a, b \in H$, then $ab \in H$	<i>AHMAD MSC(MATH)</i> <i>Areeb2113@gmail.com</i>
<input type="radio"/>	whenever $a, b \in H$, then $b^{-1} \in H$	
<input type="radio"/>	whenever $a, b \in H$, then $ab^{-1} \in H$	
<input type="radio"/>	whenever $a, b \in H$, then $(ab)^{-1} \in H$	

Question # 5 of 10 (**Start time: 03:33:11 PM, 07 June 2018**)

Total Marks: 1

The group $(\mathbb{Q}, +)$ is an infinite group, where \mathbb{Q} is the set of rational numbers.

Select the correct option

- False
- True

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The group $(\{1, -1\}, \cdot)$ is subgroup of the group $(\mathbb{Z}, +)$.

Select the correct option

True



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False



MTH633:Quiz No. 1

Question # 5 of 10 (Start time: 08:43:47 PM, 08 June 2018)

$\langle Q, + \rangle$ is the subgroup of $\langle R, + \rangle$.

Select the correct option

<input type="radio"/>	True
<input type="radio"/>	False

Question # 1 of 10 (Start time: 03:29:56 PM, 07 June 2018)

Total Marks: 1

A subset H of a group G under addition is a subgroup of G if and only if whenever $a, b \in H$, then $a - b \in H$

Select the correct option

Reload Math Equations

<input type="radio"/>	<p>True</p> <p><i>AHMAD MSC(MATH)</i> <i>Areeb2113@gmail.com</i></p>
<input type="radio"/>	<p>False</p>

Question # 5 of 10 (Start time: 03:33:11 PM, 07 June 2018)

Total Marks: 1

The group $(\mathbb{Q}, +)$ is an infinite group, where \mathbb{Q} is the set of rational numbers.

Select the correct option

- False
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- True

Question # 3 of 10 (Start time: 08:43:18 PM, 08 June 2018)

$\langle \mathbb{Z}, + \rangle$ is the subgroup of $\langle \mathbb{R}, \cdot \rangle$.

Select the correct option

<input type="radio"/>	True
<input type="radio"/>	False

The order of the group $\{1, \omega, \omega^2\}$ is - - - - -

Select the correct option



<input type="radio"/>	2	<i>AHMAD MSC(MATH)</i> <i>Areeb2113@gmail.com</i>
<input type="radio"/>	3	
<input type="radio"/>	4	
<input type="radio"/>	5	

Question # 9 of 10 (Start time: 08:45:11 PM, 08 June 2018)

The group $(\{1, -1\}, \cdot)$ is subgroup of the group $(\mathbb{Z}, +)$.

Select the correct option

<input type="radio"/>	True
<input type="radio"/>	False

The group $\{1, -1, i, -i\}$ is a finite group.

Select the correct option

True

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False

The group $(\mathbb{Z}, +)$ is a finite group, where \mathbb{Z} is the set of integers.

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Select the correct option

<input checked="" type="radio"/>	False <i>AHMAD MSC(MATH)</i> <i>Areeb2113@gmail.com</i>
<input type="radio"/>	True

Question # 8 of 10 (Start time: 08:44:59 PM, 08 June 2018)

The order of the group $\{1, -1, i, -i\}$ is _____

Select the correct option

2

3

4

5

Question # 7 of 10 (Start time: 08:44:47 PM, 08 June 2018)

$\langle \{1, -1\}, \cdot \rangle$ is the subgroup of $\langle \{1, -1, i, -i\}, \cdot \rangle$.

Select the correct option

<input checked="" type="radio"/>	True
<input type="radio"/>	False

The order of the group $\{1, -1\}$ is -----

Select the correct option



1

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2



3



4

Show that $H = \left\{ \begin{pmatrix} 1 & n \\ 0 & 1 \end{pmatrix} \mid n \in \mathbb{Z} \right\}$ is the subgroup of $G = \text{GL}(2, \mathbb{R})$ under multiplication.

Select the correct option

True



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False



Question # 6 of 10 (Start time: 08:44:21 PM, 08 June 2018)

A non empty subset S of a finite group G is called subgroup of G if and only if ab is in S for all a, b in S .

Select the correct option

<input type="radio"/>	True
<input type="radio"/>	False

Example

Consider $\mathbb{Z}_3 \times \mathbb{Z}_3$. This is a group of nine elements. We claim that $\mathbb{Z}_3 \times \mathbb{Z}_3$ is *not* cyclic.

mcq

Since the addition is by components, and since in \mathbb{Z}_3 every element added to itself three times gives the identity, the same is true in $\mathbb{Z}_3 \times \mathbb{Z}_3$. Thus no element can generate the group, for a generator added to itself successively could only give the identity after nine summands. We have found another group structure of order 9. A similar argument shows that $\mathbb{Z}_2 \times \mathbb{Z}_2$ is not cyclic. Thus $\mathbb{Z}_2 \times \mathbb{Z}_2$ must be isomorphic to the Klein 4-group.

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Example

The group $\mathbb{Z} \times \mathbb{Z}_2$ is generated by the elements $(1, 0)$ and $(0, 1)$. More generally, the direct product of n cyclic groups, each of which is either \mathbb{Z} or \mathbb{Z}_m for some positive integer m , is generated by the n -tuples

$(1, 0, \dots, 0), (0, 1, \dots, 0), \dots, (0, 0, \dots, 1)$. Such a direct product might also be generated by fewer elements. For example, $\mathbb{Z}_3 \times \mathbb{Z}_4 \times \mathbb{Z}_{35}$ is generated by the single element $(1, 1, 1)$.

MCQ

Orbits

Definition

An orbit of a permutation p is a set of elements in the class under the relation:

$$a \sim b \Leftrightarrow b = p^n(a),$$

for some n in \mathbb{Z} .

MCQ

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Parity of a Permutation

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MCQ

Theorem

The parity of a permutation is even or odd, but not both.

MITH #633
Group Theory

MC170201745
26/06/2018

- ① Define Bijective Mapping 2 Marks
- ② Write identity permutation of D_4 and D_5 2 Marks
- ③ Write Elements of Dihedral Group D_4 3 Marks
- ④ Suppose $G = \langle a \rangle$ with $\langle a \rangle = 30$
Find $|a^{21}|$ and $\langle a^{21} \rangle$ 3 Marks
- ⑤ Show that $(\mathbb{Z}, +)$ is group under addition 5 Marks
- ⑥ Let 'p' be permutation of set 'S'
Then prove following relation is an equivalence relation
$$a \sim b \Leftrightarrow b = p^n(a) \text{ for some } n \in \mathbb{Z}$$

Anila



Mth633 mai cosets topica se
thy

Anila

Aik long qsn tha...
Every subgrp of a cyclic grp is
also cyclic prove krnaa tha
isyyyy



R mcqs mai ziada tr true false
thy r easy he thy

Anila

And one step subgrp and two
step subgrp tasks ko just state
krna thaa



Us MN whole set ko prove krna
tha k ye group nhe h

Infinite set k right coset describe
krny thy

Aik prove tha subset say related
pta nhe kahan say diya tha

Homomorphism ki example Deni
the aik

Aik group btana tha k ye abelian
h k nhe

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MTH633 Group theory .

- Q1 Write three element of group .
- Q2:- Write identity permutation of (S_4, \circ) .
- Q3:- $\{1, -1, i, -i\}$ is abelian .
- Q4:- if H is a subgroup and a, b is in G then prove $|aH| = |bH|$.
- Q5:- Write two function of Homomorphism
Give Reason .
- Q6:- Suppose $G = \langle a \rangle$ with $\langle a \rangle = 30$
find $|a^{21}|$ and $\langle a^{21} \rangle$

- ① Write 2 groups that are abelian.
2 Marks.
- ② Write 2 properties of
Lagrange's Theorem.
2 Marks.
- ③ If $|a| = 30$ then find
 $|a^{21}|$ & $\langle a^{21} \rangle$
3 Marks.
- ④ If $f: \langle \mathbb{R}, + \rangle \rightarrow \langle \mathbb{R}^+, \cdot \rangle$ then
prove isomorphism.
5-Marks.
- ⑤ Prove that $\langle \mathbb{R}, + \rangle$ is a group.
5-Marks.

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MTH 633

- 1) Define Bijective mapping? (2)marks
- 2) Write identity of (S_6, \cdot) . (2)marks
- 3) Write right cosets of $3\mathbb{Z}$ of \mathbb{Z} . (3)marks
- 4) Draw Cayley's table of $\{1, -1, i, -i\}$. (3)marks
- 5) ~~Prove~~ Prove that $\{1, -1, i, -i\}$ is an abelian group? 5 marks
- 6) Prove abelian group upto isomorphism of order 360? 5 marks.

⑤ $(S_3, 0)$ is non abelian

⑤ $(\mathbb{Z}, +)$ is group under addition

③ Find all orbits of

$$\alpha = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 \\ 5 & 4 & 2 & 1 & 3 \end{bmatrix}$$

② Define sub group with example