MATHEMATICS PART - II

WORKBOOK

Based on Textbook and Board Paper Pattern

Application of Co-ordinate Geometry:
Slope of a line is used to determine the length of conveyor belt. If the slope of the belt is more, the material will slide down instead of being carried up.

STD. X
(ENG. MED.)

Target Publications® Pvt. Ltd.

Mathematics Part – II

WORKBOOK

STD. X   (English Medium)

Salient Features

- ⇨   Includes all textual Problem Sets
- ⇨   All Intext and Activity/Project based questions from the textbook are included
- ⇨   Adequate space is provided to write the answers
- ⇨   Tentative marks allocation for all problems
- ⇨   Includes Important Theorems and Formulae at the end of the book
- ⇨   Relevant questions and Theorems from previous years' board exams till March 2022 are mentioned

Name: _____

School: _____

Standard: _____   *Division:* _____   *Roll No.:* _____

Printed at: **Print to Print,** Mumbai

PREFACE

Taget's **"Mathematics Part - II Workbook, Std. X"** is a perfect practice aid for the preparation of X board examination.

Our basic premise for this book is to retain the outline of the content as texbook to facilitate students to keep their practice material together and have a single point of reference for revision.

The book includes formula section at the end as quick revision tool for the solving problems.

Tentative marks have also been allocated to the questions. However, marks mentioned are indicative and are subject to change as per Maharashtra state board's discretion .

Relevant questions and Theorems from previous years' board papers have been mentioned in the book for students to have an understanding about the questions that are asked in board exams.

A book affects eternity; one can never tell where its influence stops.

Best of luck to all the aspirants!

Publisher
Edition: First

The journey to create a complete book is strewn with triumphs, failures and near misses. If you think we've nearly missed something or want to applaud us for our triumphs, we'd love to hear from you.

Please write to us on : mail@targetpublications.org

Evaluation Scheme

Academic year 2019 - 2020 and onwards

Mathematics - Part I	40 Marks	Written Examination	Time: 2 hours
Mathematics - Part II	40 Marks	Written Examination	Time: 2 hours
Internal Evaluation	20 Marks		
Total	**100 Marks**		

The scheme of internal evaluation will be as follows:

- 2 Homework assignments [one based on Mathematics Part – I and one based on Mathematics Part – II (5 Marks each) – 10 Marks]
- Practical Exam / MCQ Test (Part I – 10 Marks and Part II – 10 Marks) - These 20 marks are to be converted into 10 Marks.

PAPER PATTERN

Question No.	Type of Questions	Total Marks	Marks with option
1.	(A) Solve 4 out of 4 MCQ (1 mark each)	04	04
	(B) Solve 4 out of 4 subquestions (1 mark each)	04	04
2.	(A) Solve 2 activity based subquestions out of 3 (2 marks each)	04	06
	(B) Solve any 4 out of 5 subquestions (2 marks each)	08	10
3.	(A) Solve 1 activity based subquestion out of 2 (3 marks each)	03	06
	(B) Solve any 2 out of 4 subquestions (3 marks each)	06	12
4.	Solve any 2 out of 3 subquestions (4 marks each) [Out of textbook]	08	12
5.	Solve any 1 out of 2 subquestions (3 marks each)	03	06
	Total Marks	**40**	**60**

The division of marks in question papers as per objectives will be as follows:

Distribution of Marks	
Easy Questions	40%
Medium Questions	40%
Difficult Questions	20%

Objectives	Maths – II
Knowledge	20%
Understanding	30%
Application	40%
Skill	10%

[Maharashtra State Board of Secondary and Higher Secondary Education, Pune - 04]

Topic-wise weightage of marks

S. No.	Topic Name	Marks with option
1	Similarity	10
2	Pythagoras Theorem	07
3	Circle	12
4	Geometric Constructions	07
5	Co-ordinate Geometry	07
6	Trigonometry	07
	Mensuration	10
	Total	**60**

Note: In the topic-wise weightage of marks given in the above table, flexibility of maximum 2 marks is permissible.

CONTENTS

Practicing model papers is the best way to self-assess your preparation for the exam Scan the adjacent QR Code to know more about our **"SSC 54 Question Papers & Activity Sheets With Solutions."**

Need more practice for Challenging Questions in Maths?
Scan the adjacent QR code to know more about our "**Mathematics Challenging Questions**" Book.
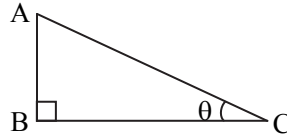
Scan the adjacent QR Code to know more about our *"Board Questions with Solutions"* book for Std. X and Learn about the types of questions that are asked in the X Board Examination.

Trigonometry

Let's Recall

#1. Fill in the blanks with reference to the figure given below. (Textbook pg. no. 124)

i. $\sin \theta = \dfrac{\boxed{}}{\boxed{}}$ ii. $\cos \theta = \dfrac{\boxed{}}{\boxed{}}$

iii. $\tan \theta = \dfrac{\boxed{}}{\boxed{}}$

#2. Complete the relations in ratios given below. (Textbook pg. no. 124)

i. $\dfrac{\sin \theta}{\cos \theta} = \boxed{}$ ii. $\sin \theta = \cos \left(90 - \boxed{}\right)$

iii. $\cos \theta = \sin \left(90 - \boxed{}\right)$ iv. $\tan \theta \times \tan (90 - \theta) = \boxed{}$

#3. Complete the equation. (Textbook pg. no. 124)

i. $\sin^2 \theta + \cos^2 \theta = \boxed{}$

#4. Write the values of the following trigonometric ratios. (Textbook pg. no. 124)

i. $\sin 30° = \dfrac{1}{\boxed{}}$ ii. $\cos 30° = \dfrac{\boxed{}}{\boxed{}}$ iii. $\tan 30° = \dfrac{\boxed{}}{\boxed{}}$

iv. $\sin 60° = \dfrac{\boxed{}}{\boxed{}}$ v. $\cos 45° = \dfrac{\boxed{}}{\boxed{}}$ vi. $\tan 45° = \boxed{}$

Practice Set 6.1

1. If $\sin \theta = \dfrac{7}{25}$, find the values of $\cos \theta$ and $\tan \theta$. [2 Marks]

Solution:

2. If $\tan \theta = \dfrac{3}{4}$, find the values of sec θ and cos θ. [2 Marks]

Solution:

3. If $\cot \theta = \dfrac{40}{9}$, find the values of cosec θ and sin θ. [2 Marks]

Solution:

4. If $5 \sec \theta - 12 \csc \theta = 0$, find the values of $\sec \theta$, $\cos \theta$ and $\sin \theta$. **[3 Marks]**

Solution:

5.   If $\tan \theta = 1$, then find the value of $\dfrac{\sin \theta + \cos \theta}{\sec \theta + \csc \theta}$.   **[3 Marks]**

Solution:

6.   **Prove that:**

i. $\dfrac{\sin^2 \theta}{\cos \theta} + \cos \theta = \sec \theta$ **[2 Marks]**

*Proof***:**

ii. $\cos^2 \theta (1 + \tan^2 \theta) = 1$ **[2 Marks]**

*Proof***:**

iii. $\sqrt{\dfrac{1 - \sin \theta}{1 + \sin \theta}} = \sec \theta - \tan \theta$ **[Mar 18; July 19] [3 Marks]**

Proof:

iv. $(\sec \theta - \cos \theta)(\cot \theta + \tan \theta) = \tan \theta . \sec \theta$ **[2 Marks]**

Proof:

v. $\cot \theta + \tan \theta = \operatorname{cosec} \theta . \sec \theta$ **[2 Marks]**

Proof:

vi. $\dfrac{1}{\sec \theta - \tan \theta} = \sec \theta + \tan \theta$ **[Dec 20] [3 Marks]**

*Proof***:**

vii. $\sin^4 \theta - \cos^4 \theta = 1 - 2 \cos^2 \theta$ **[2 Marks]**

*Proof***:**

viii. $\sec \theta + \tan \theta = \dfrac{\cos \theta}{1 - \sin \theta}$ **[2 Marks]**

*Proof***:**

ix.   If $\tan\theta + \dfrac{1}{\tan\theta} = 2$, then show that $\tan^2\theta + \dfrac{1}{\tan^2\theta} = 2$ **[2 Marks]**

Proof:

x. $\dfrac{\tan A}{\left(1+\tan^2 A\right)^2} + \dfrac{\cot A}{\left(1+\cot^2 A\right)^2} = \sin A \cos A$ **[Mar 22] [3 Marks]**

Proof:

xi. $\sec^4 A\,(1 - \sin^4 A) - 2\tan^2 A = 1$ **[3 Marks]**

Proof:

xii. $\dfrac{\tan \theta}{\sec \theta - 1} = \dfrac{\tan \theta + \sec \theta + 1}{\tan \theta + \sec \theta - 1}$ **[4 Marks]**

Proof:

Practice Set 6.2

1.   **A person is standing at a distance of 80 m from a church looking at its top. The angle of elevation is of 45°. Find the height of the church.**   **[Mar 20][2 Marks]**

Solution:

2.   **From the top of a lighthouse, an observer looking at a ship makes angle of depression of 60°. If the height of the lighthouse is 90 metre, then find how far the ship is from the lighthouse. ($\sqrt{3} = 1.73$)**

     [Mar 14] [3 Marks]

Solution:

3. Two buildings are facing each other on a road of width 12 metre. From the top of the first building, which is 10 metre high, the angle of elevation of the top of the second is found to be 60°. What is the height of the second building?   [3 Marks]

Solution:

4. **Two poles of heights 18 metre and 7 metre are erected on a ground. The length of the wire fastened at their tops is 22 metre. Find the angle made by the wire with the horizontal.** **[3 Marks]**

Solution:

5. **A storm broke a tree and the treetop rested 20 m from the base of the tree, making an angle of 60° with the horizontal. Find the height of the tree.** **[3 Marks]**

Solution:

6. **A kite is flying at a height of 60 m above the ground. The string attached to the kite is tied at the ground. It makes an angle of 60° with the ground. Assuming that the string is straight, find the length of the string. ($\sqrt{3}$ = 1.73)** **[3 Marks]**

Solution:

Problem Set – 6

1. **Choose the correct alternative answer for the following questions.** **[1 Mark each]**

i. $\sin\theta \cdot \text{cosec}\,\theta = ?$ **[July 19]**

(A) 1 (B) 0 (C) $\dfrac{1}{2}$ (D) $\sqrt{2}$

Ans: ⬚

ii. $\text{cosec}\,45° = ?$

(A) $\dfrac{1}{\sqrt{2}}$ (B) $\sqrt{2}$ (C) $\dfrac{\sqrt{3}}{2}$ (D) $\dfrac{2}{\sqrt{3}}$

Ans: ⬚

iii. $1 + \tan^2\theta = ?$ **[Mar 19]**

(A) $\cot^2\theta$ (B) $\text{cosec}^2\theta$
(C) $\sec^2\theta$ (D) $\tan^2\theta$

Ans: ⬚

iv. When we see at a higher level, from the horizontal line, angle formed is _____.
(A) angle of elevation. (B) angle of depression.
(C) 0 (D) straight angle.

Ans: ⬚

2. **If $\sin\theta = \dfrac{11}{61}$, find the value of $\cos\theta$ using trigonometric identity.** **[Mar 22] [2 Marks]**

Solution:

3. **If tan θ = 2, find the values of other trigonometric ratios.** **[3 Marks]**

Solution:

4. **If sec θ = $\frac{13}{12}$, find the values of other trigonometric ratios.** **[3 Marks]**

Solution:

5. **Prove the following:**

i. $\sec \theta \, (1 - \sin \theta) \, (\sec \theta + \tan \theta) = 1$ **[2 Marks]**

Proof:

ii. $(\sec \theta + \tan \theta) \, (1 - \sin \theta) = \cos \theta$ **[2 Marks]**

Proof:

iii. $\sec^2 \theta + \operatorname{cosec}^2 \theta = \sec^2 \theta \times \operatorname{cosec}^2 \theta$ **[Mar 14; July 15, 17] [2 Marks]**

Proof:

iv. $\cot^2 \theta - \tan^2 \theta = \text{cosec}^2 \theta - \sec^2 \theta$ **[2 Marks]**

***Proof*:**

v. $\tan^4 \theta + \tan^2 \theta = \sec^4 \theta - \sec^2 \theta$ **[2 Marks]**

***Proof*:**

vi. $\dfrac{1}{1 - \sin \theta} + \dfrac{1}{1 + \sin \theta} = 2 \sec^2 \theta$ **[2 Marks]**

***Proof*:**

vii. $\sec^6 x - \tan^6 x = 1 + 3\sec^2 x \times \tan^2 x$ **[3 Marks]**

Proof:

viii. $\dfrac{\tan\theta}{\sec\theta+1} = \dfrac{\sec\theta-1}{\tan\theta}$ **[2 Marks]**

*Proof***:**

ix. $\dfrac{\tan^3\theta - 1}{\tan\theta - 1} = \sec^2\theta + \tan\theta$ **[3 Marks]**

*Proof***:**

x. $\dfrac{\sin\theta - \cos\theta + 1}{\sin\theta + \cos\theta - 1} = \dfrac{1}{\sec\theta - \tan\theta}$ **[4 Marks]**

Proof:

6. A boy standing at a distance of 48 metres from a building observes the top of the building and makes an angle of elevation of 30°. Find the height of the building. [2 Marks]

Solution:

7. From the top of the lighthouse, an observer looks at a ship and finds the angle of depression to be 30°. If the height of the lighthouse is 100 metres, then find how far the ship is from the lighthouse.

[3 Marks]

Solution:

8. Two buildings are in front of each other on a road of width 15 metres. From the top of the first building, having a height of 12 metre, the angle of elevation of the top of the second building is 30°. What is the height of the second building? [3 Marks]

Solution:

9. A ladder on the platform of a fire brigade van can be elevated at an angle of 70° to the maximum. The length of the ladder can be extended upto 20 m. If the platform is 2 m above the ground, find the maximum height from the ground upto which the ladder can reach. (sin 70° = 0.94) [3 Marks]

Solution:

10. While landing at an airport, a pilot made an angle of depression of 20°. Average speed of the plane was 200 km/hr. The plane reached the ground after 54 seconds. Find the height at which the plane was when it started landing. (sin 20° = 0.342) [4 Marks]

Solution:

Teacher's Remark: _____ Date: _____