SAMPLE CONTENT

IQB IMPORTANT QUESTION BANK

Based on Latest Paper Pattern of Maharashtra State Board

Mathematics Part - I

"IQB KE SAATH SSC EKDUM TENSION FREE"

STD. X
(Eng. Med.)

Target Publications® Pvt. Ltd.

Based on the **Latest Syllabus** prescribed by the Maharashtra State Board of Secondary and Higher Secondary Education, Pune - 04

IQB Important Question Bank

STD. X

Mathematics Part - I

Salient Features

- A compilation of Most Important Questions
- A great resource for expeditious and exhaustive board exam preparation
- Written as per Latest Board Paper Pattern
- Includes selective questions from 2019 - 2022 Board Papers
- Important inclusion: 'Smart Check' and 'Time Management' to solve the Question Paper
- Includes Model Question Paper for self evaluation
- Inclusion of **QR Code** for students to access 'Solution' for the Model Question Paper.

Scan the adjacent QR Code to access Board Question Papers and Solutions of March 2020, December 2020 and March 2022.

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

Balbharati Registration No.: 2018MH0022

TEID: 2481

P.O. No.6063

PREFACE

IQB Mathematics Part – I: Std. X is a treasure house of the most important questions that would help students to face the Board Examination confidently. This book is created in accordance with the Latest Board paper Pattern.

IQB (Important Question Bank) consists of chapters in which questions are arranged as per the board paper pattern so that students can easily prepare for the examination.

Smart Check is a technique to verify the answers. This is our attempt to cross-check the accuracy of the answer. **Time Management** is provided with Paper Pattern (on the adjacent page) to aid students to solve the activity sheet within the allotted time.

We have provided One **Model Question Paper** at the end of the book that enables students to assess their level of preparation for the Board examination.

We have provided **QR Code** for students to access the 'Solution' given for the Model Question Paper.

Selected questions from the Board Papers of March 2019, July 2019, March 2020, December 2020 and March 2022 with solutions have been included to give the student an idea about the kind of questions asked in the previous examinations.

Armed with an arsenal of carefully crafted questions and relevant answers, we are confident that this book will cater to the needs of students and effectively assist them to achieve their goal.

Publisher

Edition: Third

PAPER PATTERN

- There will be separate question papers for Part I and Part II of 40 marks each.
- Duration of each paper will be 2 hours.

Question No.	Type of Questions	Total Marks	Marks with option	Time Management
1.	(A) Solve 4 out of 4 MCQ (1 mark each)	04	04	08 mins
	(B) Solve 4 out of 4 subquestions (1 mark each)	04	04	08 mins
2.	(A) Solve 2 activity based subquestions out of 3 (2 marks each)	04	06	10 mins
	(B) Solve any 4 out of 5 subquestions (2 marks each)	08	10	20 mins
3.	(A) Solve 1 activity based subquestion out of 2 (3 marks each)	03	06	08 mins
	(B) Solve any 2 out of 4 subquestions (3 marks each)	06	12	16 mins
4.	Solve any 2 out of 3 subquestions (4 marks each) [Out of textbook]	08	12	30 mins
5.	Solve any 1 out of 2 subquestions (3 marks each)	03	06	10 mins
	To Review and Re-checking	-	-	**10 mins**
	Total Marks	**40**	**60**	**120 mins**

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

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

TOPIC-WISE WEIGHTAGE OF MARKS

Sr. No.	Topic Name	Marks with option
1	Linear Equations in Two Variables	12
2	Quadratic Equations	12
3	Arithmetic Progression	08
4	Financial Planning	08
5	Probability	08
6	Statistics	12
	Total	**60**

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

INDEX

Note: Smart check is indicated by ✓ symbol.

Detailed Analysis of Question Paper

Mathematics Part - I

Time: 2 Hours **Total Marks: 40**

Note:

i. *All* questions are compulsory.
ii. Use of a calculator is not allowed.
iii. The numbers to the right of the questions indicate full marks.
iv. In case of MCQ's [Q. No. 1(A)] only the first attempt will be evaluated and will be given credit.
v. For every MCQ, the correct alternative (A), (B), (C) or (D) with sub-question number is to be written as an answer.

Q.1. (A) Four alternative answers are given for every sub-question. Choose the *correct* alternative and write its alphabet with sub-question number. [4]

- This question carries 4 marks. It contains 4 sub-questions of 1 mark each. All sub-questions are compulsory.
- These are Multiple Choice Questions which either require short solutions or direct application of mathematical concepts.
- For this question, students should write the correct option along with its contents.
  Example: 1. (B) 16 cm

Q.1. (B) Solve the following sub-questions: [4]

- This question carries 4 marks. It contains 4 sub-questions of 1 mark each.
  All sub-questions are compulsory.

Q.2. (A) Complete the following activities and rewrite it (Any *two*): [4]

- This question carries 4 marks. It contains 3 sub-questions of which any 2 are to be attempted. Each sub-question carries 2 marks.
- These questions are activity based and generally include proofs and solutions to be completed by filling the blanks.

Q.2. (B) Solve the following sub-questions (Any *four*): [8]

- This question carries 8 marks. It contains 5 sub-questions of which any 4 are to be attempted. Each sub-question carries 2 marks.
- These questions are from textbook and have short solutions with application of one or two mathematical concepts.

Q.3. (A) Complete the following activities and rewrite it (Any *one*): [3]

- This question carries 3 marks. It contains 2 sub-questions of which any 1 is to be attempted. Each sub-question carries 3 marks.
- These questions are activity based and generally include proofs and solutions to be completed by filling the blanks.

Q.3. (B) Solve the following sub-questions (Any *two*): [6]

- This question carries 6 marks. It contains 4 sub-questions of which any 2 are to be attempted. Each sub-question carries 3 marks.
- These questions are from textbook with long solutions and may require application of two or more mathematical concepts.

Q.4. Solve the following sub-questions (Any *two*): [8]

- This question carries 4 marks. It contains 3 sub-questions of which any 2 are to be attempted. Each sub-question carries 4 marks.
- These are challenging questions based on the prescribed syllabus, but are out of the textbook. They require application of more than one mathematical competencies.

Q.5. Solve the following sub-questions (Any *one*): [3]

- This question carries 3 marks. It contains 2 sub-questions of which any 1 is to be attempted. Each sub-question carries 3 marks.
- These are open ended questions for which students have to think independently and will require an application oriented vision for mathematics. They are based on the textbook.

  For example:
  - Expecting the student to express his own views
  - To draw a figure from given information
  - To complete an incomplete construction
  - To complete the given flow chart
  - To construct a problem from given information or situation
  - Open ended questions
  - Estimation and Approximation
  - Comprehension of a mathematical passage

3 Arithmetic Progression

Important Formulae

1. In an A.P., if the first term is a and common difference is d, then the terms in the sequence are
   a, (a + d), (a + 2d), (a + 3d), . . .
2. In an A.P., if the first term is a and common difference is d, then the n^{th} term is given by
   $t_n = a + (n - 1)d$
3. In an A.P., if the first term is a and common difference is d, then the sum of the first n terms is given by

$$S_n = \frac{n}{2}\,[2a + (n - 1)d]$$

OR

$$S_n = \frac{n}{2}\,(t_1 + t_n);\ t_1 = \text{first term},\ t_n = \text{last term}$$

Q.1. (A) 1 Mark Questions

1. First four terms of an A.P. are ….., whose first term is –2 and common difference is –2. **[Mar 2022]**
   (A) – 2, 0, 2, 4 (B) – 2, 4, – 8, 16
   (C) – 2, – 4, – 6, – 8 (D) – 2, – 4, – 8, – 16

2. In an A.P., if $t_3 = -1$ and $t_4 = -6$, then d =
   (A) 5 (B) –5 (C) 7 (D) –7

3. If for any A.P. d = 5, then $t_{18} - t_{13}$ =
   (A) 5 (B) 20 (C) 25 (D) 30

4. What is the sum of the first 10 natural numbers? **[Dec 2020]**
   (A) 55 (B) 20 (C) 65 (D) 11

5. For an A.P. if d = _____, then the sequence is a constant sequence.
   (A) 0 (B) 1 (C) –1 (D) 2

6. 149 is the _____ term of the given A.P. 5, 11, 17, 23, 29, ….
   (A) 24^{th} (B) 25^{th} (C) 30^{th} (D) 31^{st}

Answers

1. (C) 2. (B) 3. (C) 4. (A) 5. (A) 6. (B)

Hints:

1. First term (a) = –2, common difference (d) = –2
   The first four terms are
   – 2,
   – 2 – 2 = – 4,
   – 4 – 2 = – 6,
   – 6 – 2 = – 8

2. $d = t_{n+1} - t_n$
   $\therefore \quad d = t_4 - t_3 = -6 - (-1) = -6 + 1 = -5$

3. $t_{18} - t_{13} = a + (18 - 1)d - [a + (13 - 1)d]$
   $= a + 17d - a - 12d$
   $= 5d = 5 \times 5 = 25$

4. First 10 natural numbers are 1, 2, 3,…, 9, 10.
   The above sequence is an A.P.
   $\therefore \quad t_1 = 1, t_{10} = 10$
   $\therefore \quad S_n = \frac{n}{2}(t_1 + t_{10}) = \frac{10}{2}(1 + 10) = 5\,(11) = 55$

6. Let the n^{th} term be 149.
   $t_n = a + (n - 1)d$
   $\therefore \quad 149 = 5 + (n - 1)6$
   $\therefore \quad n - 1 = \frac{144}{6} = 24$
   $\therefore \quad n = 25$

Practice Set

1. Which of the following is not an A.P.?
   (A) 2, 4, 6, 8, 10,…. (B) –17, –12, –7, –2, 3, ….
   (C) 1.5, 4, 6.5, 9, …. (D) 1, 4, 9, 16, 25, ….

2. For the A.P. 9, 16, 23, 30, 37, …..,
   (A) a = 1, d = 9 (B) a = 1, d = 7
   (C) a = 9, d = 9 (D) a = 9, d = 7

3. For an A.P. $t_7 = 4$, d = – 4, then a =
   (A) 6 (B) 7 (C) 20 (D) 28

4. In an A.P. first two terms are – 3 and 4, then the 21^{st} term is
   (A) – 143 (B) 143 (C) 137 (D) 17

5. For an A.P. if the first term is 8 and the common difference is 8, then S_n =
   (A) 2n(n – 1) (B) 4n(n –1)
   (C) 2n(n + 1) (D) 4n(n + 1)

6. 15, 10, 5, … In this A.P. sum of first 10 terms is
(A) – 75 (B) – 125 (C) 75 (D) 125

Answers

1. (D) 2. (D) 3. (D) 4. (C) 5. (D) 6. (A)

Q.1. (B) 1 Mark Questions

1. Find the common difference of the A.P. 5, 8, 11, 14, ….

Sol: The given A.P. is 5, 8, 11, 14, ….
Here, $t_1 = 5$, $t_2 = 8$
$\therefore$ Common difference $= t_2 - t_1 = 8 - 5 =$ **3**

2. For an A.P. $t_3 = 20$ and $t_4 = 24$, find the common difference d.

Sol: Given, $t_3 = 20$, $t_4 = 24$
$\therefore$ $d = t_4 - t_3 = 24 - 20 =$ **4**

3. Write second and third term of an A.P. whose first term is 6 and common difference is –3. **[Mar 2022]**

Sol: $a = t_1 = 6$, $d = -3$
$\therefore$ $t_2 = t_1 + d = 6 - 3 =$ **3**
$t_3 = t_2 + d = 3 - 3 =$ **0**

4. For an A.P., if $a = 7$, $d = 6$, find t_n.

Sol: $t_n = a + (n - 1)d$
$= 7 + (n - 1)6$
$= 7 + 6n - 6 =$ **$6n + 1$**

5. For an A.P., if $t_1 = 4$, $t_n = 28$, $S_n = 64$, find n.

Sol: $S_n = \frac{n}{2}(t_1 + t_n)$

$\therefore$ $64 = \frac{n}{2}(4 + 28)$

$\therefore$ $64 = \frac{n}{2}(32)$

$\therefore$ $n = \frac{64 \times 2}{32} =$ **4**

Practice Set

1. Find the common difference of the A.P. 1, 8, 15, 22,…
2. For an A.P. $t_5 = 15$ and $t_6 = 18$, find the common difference d.
3. Write second and third term of an A.P. whose first term is 8 and common difference is –5.
4. For an A.P., if $a = 2$, $d = 4$, find t_n.

5. For an A.P., if $t_1 = 5$, $t_n = 45$, $S_n = 125$, find n.

Answers

1.	7	2.	3	3.	$t_2 = 3, t_3 = -2$
4.	$4n - 2$	5.	5		

Q.2. (A) 2 Marks Questions

1. Fill up the boxes and find out the number of terms in the A.P. 2, 4, 6, …, 148 .

Here, a = 2, d = ☐ , $t_n = 148$

$t_n = a + (n - 1)\, d$

$\therefore$ $148 =$ ☐

$\therefore$ $146 = 2n -$ ☐

$\therefore$ $n =$ ☐

Ans: a = 2 , d = **2** , $t_n = 148$

$t_n = a + (n - 1)\, d$

$\therefore$ $148 =$ **2 +(n – 1)2**

$\therefore$ $146 = 2n -$ **2**

$\therefore$ $2n = 146 + 2 = 148$

$\therefore$ $n = \frac{148}{2} =$ **74**

2. Complete the following activity to find the number of natural numbers between 1 and 171, which are divisible by 5: [July 2019]

From 1 to 171, natural numbers divisible by 5 are

↓

5, 10, 15, …., 170

↓

In this A.P.
a = ☐ , d = ☐ , $t_n = 170$

↓

$t_n = a + (n - 1)d$

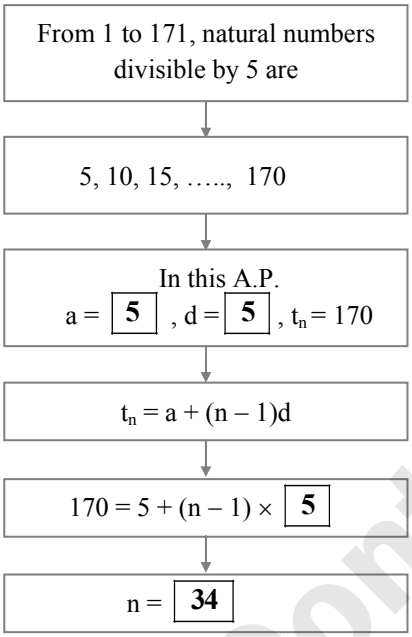
↓

$170 = 5 + (n - 1) \times$ ☐

↓

$n =$ ☐

Ans:



3. First term and common difference of an A.P. are 6 and 3 respectively. Find S_{27}. [Mar 2020]

Solution:

First term = a = 6, common difference = d = 3, S_{27} = ?

$S_n = \frac{n}{2}$ [☐ + (n – 1)d] – formula

$S_{27} = \frac{27}{2}$ [12 + (27 – 1) ☐]

$= \frac{27}{2} \times$ ☐

$= 27 \times 45$

$\therefore$ S_{27} = ☐

Ans: First term = a = 6, common difference = d = 3, S_{27} = ?

$S_n = \frac{n}{2}$ [**2a** + (n – 1)d]

$S_{27} = \frac{27}{2}$ [12 + (27 – 1) **3**]

$= \frac{27}{2} \times$ **90**

$= 27 \times 45$

$\therefore$ S_{27} = **1215**

Practice Set

1. Check whether the sequence 1, 8, 15, 22, ... is an A.P.
   Complete the following activity.

   $t_2 - t_1 =$ ☐

   $t_3 - t_2 =$ ☐

   $\therefore$ $d =$ ☐

   $\therefore$ The given sequence is ☐

2. Complete the following activity to find how many natural numbers between 1 and 140 are divisible by 4.

   Between 1 and 140, natural numbers divisible by 4

   ↓

   4, 8, ..., 136

   ↓

   $a =$ ☐, $d = 4$

   ↓

   $t_n =$ ☐ $+ (n - 1)d$

   ↓

   $136 =$ ☐ $+ (n - 1) \times 4$

   → $n =$ ☐

3. Find the sum of first 123 even natural numbers. Complete the following activity.
   The even natural numbers are 2, 4, 6, 8, ...
   The above sequence is an A.P.

   $\therefore$ $a =$ ☐, $d =$ ☐, $n = 123$

   Now, $S_n = \frac{n}{2}\ [2a + (n - 1)d]$

   $\therefore$ $S_{123} = \frac{123}{2}\left[4 + (123 - 1)\square\right] =$ ☐

Answers

1.	i.	7	ii.	7	iii.	7	iv.	an A.P.
2.	i.	4	ii.	a	iii.	4	iv.	34
3.	i.	2	ii.	2	iii.	2	iv.	15252

Q.2. (B) 2 Marks Questions

1. State whether the following sequence is an A.P. or not:
–10, –6, –2, 2, ...

Sol: The given sequence is –10, –6, –2, 2, ...
Here, $t_1 = -10$, $t_2 = -6$, $t_3 = -2$, $t_4 = 2$
$\therefore$ $t_2 - t_1 = -6 - (-10) = -6 + 10 = 4$
$t_3 - t_2 = -2 - (-6) = -2 + 6 = 4$
$t_4 - t_3 = 2 - (-2) = 2 + 2 = 4$
$\therefore$ $t_2 - t_1 = t_3 - t_2 = \ldots = 4 = d$ = constant
The difference between two consecutive terms is constant.
$\therefore$ **The given sequence is an A.P.**

2. Find the 19^{th} term of the following A.P.
7, 13, 19, 25, ... **[Mar 2019; Dec 2020]**

Sol: The given A.P. is 7, 13, 19, 25, ...
Here, $a = 7$, $d = 13 - 7 = 6$
Since $t_n = a + (n - 1)d$
$\therefore$ $t_{19} = 7 + (19 - 1)6$
$= 7 + 18 \times 6$
$= 7 + 108$
$\therefore$ $t_{19} = 115$
$\therefore$ **19^{th} term of the given A.P. is 115.**

3. First term and common difference of an A.P. are 12 and 4 respectively. If $t_n = 96$, find n. **[Mar 2019]**

Sol: Given, first term (a) = 12, common difference (d) = 4, $t_n = 96$
Since $t_n = a + (n - 1)d$
$\therefore$ $96 = 12 + (n - 1)(4)$
$\therefore$ $96 - 12 = (n - 1)(4)$
$\therefore$ $84 = (n - 1)4$
$\therefore$ $n - 1 = \frac{84}{4}$
$\therefore$ $n - 1 = 21$
$\therefore$ $n = 21 + 1 = \mathbf{22}$

4. 11, 8, 5, 2, ... In this A.P. which term is number –151?

Sol: The given A.P. is 11, 8, 5, 2, ...
Here, $a = 11$, $d = 8 - 11 = -3$
Let the n^{th} term of the given A.P. be –151.
Then, $t_n = -151$
Since $t_n = a + (n - 1)d$
$\therefore$ $-151 = 11 + (n - 1)(-3)$
$\therefore$ $-151 - 11 = (n - 1)(-3)$
$\therefore$ $-162 = (n - 1)(-3)$

$\therefore \quad n - 1 = \dfrac{-162}{-3}$

$\therefore \quad n - 1 = 54$

$\therefore \quad n = 54 + 1 = 55$

$\therefore$ 55^{th} term of the given A.P. is –151.

Smart Check

$t_n = a + (n - 1)d$

$t_{55} = 11 + (55 - 1)(-3)$

$\therefore \quad t_{55} = 11 - 162 = -151$

Since 55^{th} term of the given A.P. is –151.

$\therefore$ Our answer is correct.

5. In an A.P. 17^{th} term is 7 more than its 10^{th} term. Find the common difference.

Sol: Let the first term of the A.P. be a and the common difference be d.

According to the given condition,

$t_{17} = t_{10} + 7$

$\therefore \quad a + (17 - 1)d = a + (10 - 1)d + 7 \quad \ldots[\because t_n = a + (n - 1)d]$

$\therefore \quad a + 16d = a + 9d + 7$

$\therefore \quad a + 16d - a - 9d = 7$

$\therefore \quad 7d = 7$

$\therefore \quad d = \dfrac{7}{7} = 1$

$\therefore$ The common difference is 1.

6. There is an auditorium with 27 rows of seats. There are 20 seats in the first row, 22 seats in the second row, 24 seats in the third row and so on. Find the number of seats in the 15^{th} row.

Sol: The number of seats arranged row-wise are as follows:

20, 22, 24, …..

The above sequence is an A.P.

$\therefore \quad a = 20, d = 22 - 20 = 2, n = 27$

$t_n = a + (n - 1)d$

$\therefore \quad t_{15} = 20 + (15 - 1)\,2$

$= 20 + 14 \times 2$

$= 20 + 28$

$\therefore \quad t_{15} = 48$

$\therefore$ The number of seats in the 15^{th} row is 48.

7. On the world environment day tree plantation programme was arranged on a land which is triangular in shape. Trees are planted such that in the first row there is one tree, in the second row there are two trees, in the third row three trees and so on. Find the total number of trees in the 25 rows.

Sol: The number of trees planted row-wise are as follows:
1, 2, 3, …
The above sequence is an A.P.

$\therefore$ $a = 1, d = 2 - 1 = 1, n = 25$

$$S_n = \frac{n}{2}[2a + (n-1)d]$$

$\therefore$ $$S_{25} = \frac{25}{2}[2(1) + (25-1)1]$$

$$= \frac{25}{2}(2 + 24)$$

$$= \frac{25}{2} \times 26$$

$$= 25 \times 13 = 325$$

$\therefore$ **The total number of trees in 25 rows are 325.**

Practice Set

1. State whether the following sequence is an A.P. or not:
   0, –4, –8, –12, ...
2. Find the 27^{th} term of the following A.P.
   9, 4, –1, –6, –11, ...
3. First term and common difference of an A.P. are 10 and 5 respectively.If $t_n = 130$, find n.
4. Which term of the following A.P. is 560?
   2, 11, 20, 29, ...
5. Anvar saves some amount every month. In first three months he saves ₹ 200, ₹ 250 and ₹ 300 respectively. In which month will he save ₹ 1000?
6. In the year 2010 in the village there were 4000 people who were literate. Every year the number of literate people increases by 400. How many people will be literate in the year 2020?

Answers

1.	A.P.	2.	–121	3.	25	4.	63^{rd} term
5.	17^{th} month	6.	8000				

Q.3. (A) 3 Marks Questions

1. Two given A.P.'s are 2, 7, 12, ... and 18, 21, 24, ... If n^{th} term of both the progressions are equal then find the value of n. Complete the following activity.

The first A.P. is 2, 7, 12, ...

Here, a = 2, d = $\square$

$\therefore$ n^{th} term = a + (n – 1)d = $\square$

The second A.P. is 18, 21, 24, ...

Here, a = 18, d = $\square$

$\therefore$ n^{th} term = a + (n – 1)d = $\square$

Since the n^{th} terms of the two A.P.'s are equal.

$\therefore$ $\square$ = 3n + 15

$\therefore$ n = $\square$

Ans: The first A.P. is 2, 7, 12, ...

Here, a = 2, d = 7 – 2 = **5**

$\therefore$ n^{th} term = a + (n – 1)d

= 2 + (n – 1) (5)

= 2 + 5n – 5

= **5n – 3**

The second A.P. is 18, 21, 24, ...

Here, a = 18, d = 21 – 18 = **3**

$\therefore$ n^{th} term = a + (n – 1)d

= 18 + (n – 1) (3)

= 18 + 3n – 3 = **3n + 15**

Since the n^{th} terms of the two A.P.'s are equal.

$\therefore$ **5n – 3** = 3n + 15

$\therefore$ 5n – 3n = 15 + 3

$\therefore$ 2n = 18

$\therefore$ $n = \frac{18}{2} =$ **9**

2. ₹ 1000 is invested at 10 percent simple interest. Check at the end of every year if the total interest amount is in A.P. If this is an A.P. then find interest amount after 20 years. For this complete the following activity.

Simple interest = $\frac{P \times R \times N}{100}$

Simple interest after 1 year = $\square$

Simple interest after 2 years = [ ]

Simple interest after 3 years = ₹ 300

According to this the simple interest for 4, 5, 6 years will be ₹400, ₹500, ₹ 600 respectively.

From this d = [ ] , and a = [ ]

Amount of simple interest after 20 years

$t_n = a + (n - 1)\, d$

$\therefore \quad t_{20} = 100 + (20 - 1)$ [ ]

$\therefore \quad t_{20} =$ [ ]

Ans: Simple interest $= \frac{P \times R \times N}{100}$

Simple interest after 1 year $= \frac{1000 \times 10 \times 1}{100} =$ **₹100**

Simple interest after 2 years $= \frac{1000 \times 10 \times 2}{100} =$ **₹200**

Simple interest after 3 years = ₹ 300

According to this the simple interest for 4, 5, 6 years will be ₹400, ₹500, ₹ 600 respectively.

From this d = 200 – 100 = **100** , and a = **100**

Amount of simple interest after 20 years

$t_n = a + (n - 1)\, d$

$\therefore \quad t_{20} = 100 + (20 - 1)$ **100**

$= 100 + 19 \times 100 = 100 + 1900$

$\therefore \quad t_{20} =$ **2000**

Practice Set

1. In the natural numbers from 10 to 250, how many are divisible by 4? Complete the following activity.

The natural numbers from 10 to 250 divisible by 4 are 12, 16, 20, ..., [ ]

The above sequence is an A.P.

$\therefore \quad a = 12, d =$ [ ]

Let the number of terms in the A.P. be n.

Then, $t_n =$ [ ]

Since, $t_n =$ [ ] …[Formula]

$\therefore \quad$ [ ] $= 12 + (n - 1)4$

$\therefore \quad n =$ [ ]

2. In an A.P. the first term is 8 and last term is 62. If sum of all numbers in the A.P. is 210, then how many terms are there? What is the common difference? Complete the following activity.
Let the number of terms in the A.P. be n and the common difference be d.
Then, a = 8, t_n = [ ] , S_n = 210
Since, $t_n = a + (n - 1)d$
$\therefore$ $(n - 1)d$ = [ ] ...(i)
S_n = [ ] …[Formula]
$\therefore$ $210 = \frac{n}{2}[2(8) + (n - 1)d]$
$\therefore$ $210 = \frac{n}{2}(16 +$ [ ] $)$ ...[From (i)]
$\therefore$ n = [ ]
Substituting the value of n in equation (i), we get
d = [ ]

Answers

1.	i.	248	ii.	4	iii.	248
	iv.	$a + (n - 1)d$	v.	248	vi.	60
2.	i.	62	ii.	54	iii.	$\frac{n}{2}[2a + (n - 1)d]$
	iv.	54	v.	6	vi.	$\frac{54}{5}$

Q.3. (B) 3 Marks Questions

1. Find how many three digit natural numbers are divisible by 5.

Sol: The three digit natural numbers divisible by 5 are 100, 105, 110, …, 995
The above sequence is an A.P.
$\therefore$ a = 100, d = 105 – 100 = 5
Let the number of terms in the A.P. be n.
Then, t_n = 995
Since $t_n = a + (n - 1)d$
$\therefore$ $995 = 100 + (n - 1)5$
$\therefore$ $995 - 100 = (n - 1)5$
$\therefore$ $895 = (n - 1)5$
$\therefore$ $n - 1 = \frac{895}{5}$
$\therefore$ $n - 1 = 179$
$\therefore$ $n = 179 + 1 = 180$
$\therefore$ **There are 180 three digit natural numbers which are divisible by 5.**

2. In an A.P. sum of three consecutive terms is 27 and their products is 504. Find the terms.
(Assume that three consecutive terms in an A.P. are a – d, a, a + d.)
[Mar 2020]

Sol: Let the three consecutive terms in an A.P. be a – d, a and a + d.
According to the first condition,
sum of three consecutive terms is 27.
$a - d + a + a + d = 27$
$\therefore \quad 3a = 27$
$\therefore \quad a = \frac{27}{3}$
$\therefore \quad a = 9 \qquad \ldots(i)$
According to the second condition,
product of the three numbers is 504.
$(a - d)\, a\, (a + d) = 504$
$\therefore \quad a(a^2 - d^2) = 504$
$\therefore \quad 9(9^2 - d^2) = 504 \qquad \ldots$[From (i)]
$\therefore \quad 81 - d^2 = \frac{504}{9}$
$\therefore \quad 81 - d^2 = 56$
$\therefore \quad d^2 = 81 - 56$
$\therefore \quad d^2 = 25$
Taking square root of both sides, we get
$d = \pm 5$
When $d = 5$ and $a = 9$,
$a - d = 9 - 5 = 4$
$a = 9$
$a + d = 9 + 5 = 14$
When $d = -5$ and $a = 9$,
$a - d = 9 - (-5) = 9 + 5 = 14$
$a = 9$
$a + d = 9 - 5 = 4$
$\therefore$ **The three consecutive terms are 4, 9 and 14 or 14, 9 and 4.**

3. In an A.P. the first term is –5 and last term is 45. If sum of all numbers in the A.P. is 120, then how many terms are there? What is the common difference?

Sol: Let the number of terms in the A.P. be n.
Then, $t_1 = a = -5$, $t_n = 45$, $S_n = 120$

$S_n = \frac{n}{2}(t_1 + t_n)$

$\therefore \quad 120 = \frac{n}{2}(-5 + 45)$

$\therefore \quad 120 = \frac{n}{2} \times 40$

$\therefore \quad 120 = 20n$

$\therefore \quad n = \frac{120}{20} = 6$

Since $t_n = a + (n - 1)d$

$\therefore \quad 45 = -5 + (6 - 1)d$

$\therefore \quad 45 + 5 = 5d$

$\therefore \quad 50 = 5d$

$\therefore \quad d = \frac{50}{5} = 10$

$\therefore$ There are 6 terms in the A.P. and the common difference is 10.

4. In an A.P. 19^{th} term is 52 and 38^{th} term is 128, find sum of first 56 terms.

Sol: $t_{19} = 52$, $t_{38} = 128$ ...[Given]

Since, $t_n = a + (n - 1)d$

$\therefore \quad t_{19} = a + (19 - 1)d$

$\therefore \quad 52 = a + 18d$

i.e. $a + 18d = 52$ …(i)

Also, $t_{38} = a + (38 - 1)d$

$\therefore \quad 128 = a + 37d$

i.e. $a + 37d = 128$ …(ii)

Adding equations (i) and (ii), we get

$a + 18d = 52$

$a + 37d = 128$

$2a + 55d = 180$ …(iii)

Now, $S_n = \frac{n}{2}[2a + (n - 1)d]$

$\therefore \quad S_{56} = \frac{56}{2}[2a + (56 - 1)d]$

$= 28(2a + 55d)$

$= 28 \times 180$ …[From (iii)]

$\therefore \quad S_{56} = 5040$

$\therefore$ The sum of first 56 terms is 5040.

5. A man borrows ₹ 8000 and agrees to repay with a total interest of ₹ 1360 in 12 monthly instalments. Each instalment being less than the preceding one by ₹ 40. Find the amount of the first instalment.

Sol: The instalments are in A.P.

Amount repaid in 12 instalments (S_{12})

= Amount borrowed + total interest = 8000 + 1360

$\therefore \quad S_{12} = 9360$

Number of instalments (n) = 12
Each instalment is less than the preceding one by ₹ 40.

$\therefore$ $d = -40$

$S_n = \frac{n}{2}[2a + (n-1)d]$

$\therefore$ $S_{12} = \frac{12}{2}[2a + (12-1)(-40)]$

$\therefore$ $9360 = 6[2a + (11)(-40)]$

$\therefore$ $9360 = 6(2a - 440)$

$\therefore$ $\frac{9360}{6} = 2a - 440$

$\therefore$ $1560 = 2a - 440$

$\therefore$ $1560 + 440 = 2a$

$\therefore$ $2000 = 2a$

$\therefore$ $a = \frac{2000}{2}$

$\therefore$ $a = 1000$

$\therefore$ **Amount of the first instalment is ₹ 1000.**

6. Sachin invested in a national saving certificate scheme. In the first year he invested ₹ 5000, in the second year ₹ 7000, in the third year ₹ 9000 and so on. Find the total amount that he invested in 12 years.

Sol: Amount invested by Sachin in each year are as follows:
5000, 7000, 9000, …
The above sequence is an A.P.

$\therefore$ $a = 5000$, $d = 7000 - 5000 = 2000$, $n = 12$

$S_n = \frac{n}{2}[2a + (n-1)d]$

$\therefore$ $S_{12} = \frac{12}{2}[2(5000) + (12-1)2000]$

$= 6(10000 + 11 \times 2000)$
$= 6(10000 + 22000) = 6(32000)$

$\therefore$ $S_{12} = 192000$

$\therefore$ **The total amount invested by Sachin in 12 years is ₹ 1,92,000.**

Practice Set

1. How many two digit numbers are divisible by 4?
2. The 10^{th} term and the 18^{th} term of an A.P. are 25 and 41 respectively, then find 38^{th} term of that A.P.
3. A mixer manufacturing company manufactured 600 mixers in 3^{rd} year and in 7^{th} year they manufactured 700 mixers. If every year there is same growth in the production of mixers, then find the production in the first year.

4. In an A.P., the first term is 7 and the last term is 205. If sum of all numbers in the A.P. is 3604, find the number of terms and common difference.

5. The A.P. in which 4^{th} term is –15 and 9^{th} term is –30. Find the sum of the first 10 numbers.

Answers

1.	22	2.	81	3.	550
4.	n = 34, d = 6	5.	–195		

Q.4. 4 Marks Questions

1. How many two digit numbers leave the remainder 1 when divided by 5?

Sol: The two digit numbers that leave remainder 1 when divided by 5 are 11, 16, 21, 26, 31, ... , 96.

This sequence is an A.P. with

$a = 11, d = 16 - 11 = 5$ and $t_n = 96$

Now, $t_n = a + (n - 1)d$

$\therefore \quad 96 = 11 + (n - 1)5$

$\therefore \quad 96 - 11 = (n - 1)5$

$\therefore \quad 85 = 5n - 5$

$\therefore \quad 85 + 5 = 5n$

$\therefore \quad 90 = 5n$

$\therefore \quad n = \frac{90}{5}$

$\therefore \quad n = 18$

$\therefore$ There are 18 two digit numbers which leave remainder 1 when divided by 5.

2. A man set out on a cycle ride of 50 km. He covers 5 km in the first hour and during each successive hour his speed falls by $\frac{1}{4}$ km/hr. How many hours will he take to finish his ride?

Sol: Here, $a = 5, S_n = 50, d = -\frac{1}{4}$

Let the number of hours required to finish the ride be 'n'.

$S_n = \frac{n}{2}[2a + (n - 1)d]$

$\therefore \quad 50 = \frac{n}{2}\left[2 \times 5 + (n - 1)\left(-\frac{1}{4}\right)\right]$

$\therefore \quad 50 = \frac{n}{2}\left[10 + \frac{1}{4} - \frac{n}{4}\right]$

$\therefore \quad 100 = n\left[\frac{41}{4} - \frac{n}{4}\right]$

$\therefore \quad 100 = n \times \left(\frac{41 - n}{4}\right)$

$\therefore \quad 400 = 41n - n^2$

$\therefore \quad n^2 - 41n + 400 = 0$

$\therefore \quad (n - 25)(n - 16) = 0$

$\therefore \quad n - 25 = 0 \quad$ or $\quad n - 16 = 0$

$\therefore \quad n = 25 \quad$ or $\quad n = 16$

If n = 25, speed would become negative.

$\therefore \quad n = 16$

$\therefore$ 16 hours will be required to finish the ride.

3. If the ratio of the sum of m terms and n terms of an A.P. be $m^2 : n^2$, prove that the ratio of m^{th} and n^{th} terms is $(2m - 1) : (2n - 1)$.

Sol: It is given that $\frac{S_m}{S_n} = \frac{m^2}{n^2}$

$\therefore \quad \frac{\left(\frac{m}{2}\right)[2a + (m-1)d]}{\left(\frac{n}{2}\right)[2a + (n-1)d]} = \frac{m^2}{n^2}$

$\therefore \quad \frac{2a + (m-1)d}{2a + (n-1)d} = \frac{m}{n}$

$\therefore \quad 2a + (m - 1)d = km \quad ...(i)$

$2a + (n - 1)d = kn \quad ...(ii)$ } [k is constant]

Subtracting equation (ii) from (i), we get

$(m - 1)d - d(n - 1) = km - kn$

$\therefore \quad md - d - nd + d = k(m - n)$

$\therefore \quad d(m - n) = k(m - n)$

$\therefore \quad d = k$

Substituting the value of d in equation (i), we get

$2a + (m - 1)k = km$

$\therefore \quad 2a + mk - k = km$

$\therefore \quad 2a = k$

$\therefore \quad a = \frac{k}{2}$

Now, $t_m = a + (m - 1)d$ and $t_n = a + (n - 1)d$

$\therefore \quad \frac{t_m}{t_n} = \frac{a + (m-1)d}{a + (n-1)d}$

Substituting the values of a and d, we get

$$\frac{t_m}{t_n} = \frac{\left(\frac{k}{2}\right)+(m-1)k}{\left(\frac{k}{2}\right)+(n-1)k} = \frac{k\left(\frac{1}{2}+m-1\right)}{k\left(\frac{1}{2}+n-1\right)} = \frac{\frac{2m-1}{2}}{\frac{2n-1}{2}}$$

$$\therefore \quad \mathbf{\frac{t_m}{t_n} = \frac{2m-1}{2n-1}}$$

Practice Set

1. How many numbers lie between 10 and 300, which when divided by 4 leave a remainder 3?
2. Insert five numbers between 4 and 8 so that the resulting sequence is an A.P.
3. If the ratio of the sum of first n terms of two A.P.'s is (7n + 1):(4n + 27), find the ratio of their m^{th} terms.

Answers

1. 73
2. $\frac{14}{3}, \frac{16}{3}, 6, \frac{20}{3}, \frac{22}{3}$
3. (14m – 6) : (8m + 23)

Q.5. 3 Marks Questions

1. Is 5, 8, 11, 14, . . . an A.P. ? If so then what will be the 100^{th} term? Is the number 61 in this A.P.?

Sol: In the sequence 5, 8, 11, 14, . . .,
the difference between two consecutive terms is 3.

$\therefore$ **The given sequence is an A.P.**

Here, a = 5, d = 3

Since, $t_n = a + (n - 1)d$

$\therefore \quad t_{100} = 5 + (100 - 1)\,3 = 5 + 99 \times 3$

$= 5 + 297$

$= 302$

$\therefore$ **100^{th} term of the given A.P. is 302.**

Let the n^{th} term of the given A.P. be 61.

Then, $t_n = 61$

$\therefore \quad 61 = 5 + (n - 1)3$

$\therefore \quad 61 = 3n + 2$

$\therefore \quad 3n = 59$

$\therefore \quad n = \frac{59}{3}$

But, n is not a natural number.

$\therefore$ **61 is not in the given A.P.**

AVAILABLE NOTES FOR STD. X:
(Eng., Mar. & Semi Eng. Medium)

PERFECT SERIES
- English Kumarbharati
- मराठी अक्षरभारती
- हिंदी लोकभारती
- हिंदी लोकवाणी
- आमोद: सम्पूर्ण-संस्कृतम्
- आनन्द: संयुक्त-संस्कृतम्
- History and Political Science
- Geography
- Mathematics (Part - I)
- Mathematics (Part - II)
- Science and Technology (Part - 1)
- Science and Technology (Part - 2)

PRECISE SERIES
- Science and Technology (Part - 1)
- Science and Technology (Part - 2)
- History, Political Science and Geography

PRECISE SERIES
- My English Coursebook
- मराठी कुमारभारती
- इतिहास व राज्यशास्त्र
- भूगोल
- गणित (भाग - I)
- गणित (भाग - II)
- विज्ञान आणि तंत्रज्ञान (भाग - १)
- विज्ञान आणि तंत्रज्ञान (भाग - २)

WORKBOOK
- English Kumarbharati
- मराठी अक्षरभारती
- हिंदी लोकभारती
- My English Coursebook
- मराठी कुमारभारती

Additional Titles: (Eng., Mar. & Semi Eng. Med.)
- **Grammar & Writing Skills Books** (Std. X)
  - Marathi • Hindi • English
- **Hindi Grammar Worksheets**
- **SSC 54 Question Papers & Activity Sheets With Solutions**
- आमोद: (सम्पूर्ण-संस्कृतम्) **SSC 11 Activity Sheets With Solutions**
- हिंदी लोकवाणी (संयुक्त), संस्कृत-आनन्द: (संयुक्तम्) **SSC 12 Activity Sheets With Solutions**
- **IQB (Important Question Bank)**
- **Mathematics Challenging Questions**
- **Geography Map & Graph Practice Book**

Scan the QR code to buy e-book version of Target's Notes on Quill - The Padhai App

Visit Our Website

Target Publications® Pvt. Ltd.
Transforming lives through learning.

Address:
2nd floor, Aroto Industrial Premises CHS,
Above Surya Eye Hospital, 63-A, P. K. Road,
Mulund (W), Mumbai 400 080
Tel: 88799 39712 / 13 / 14 / 15
Website: www.targetpublications.org
Email: mail@targetpublications.org

Explore our range of STATIONERY