Grade 10
Unit 09

Maths

Course Outline

- Arithmetic Progression
- Application of Trigonometry

MAT
(Monthly Achievement Tests)

Short Code: 447311

Test ID: NMM10U090

SOUVENIR INFOTECH

Guide Lines

1. Each set consists of:

   50 | Warm-up/Foundation Questions

   30 | Regular Questions

   20 | Thinking Ability Questions

2. The time allocation and instructions regarding the questions are printed clearly in the beginning of each question types. The answers should be written or tick marked as per the instructions given. It is suggested to use pencil initially, so as to enable you to reuse the practice papers.

3. **According to the new pattern of CBSE these practice papers will be very useful especially for syllabus related Quiz, Debates, Visuals related checking and Orals etc.,**

4. After marking the answers, the scores of students can be checked and for marks obtained guidelines are given along with the question solving instructions. Follow those instructions and if, you are fully satisfied with your performance then check for your expected grades as per the CBSE guidelines as given on the back of each set.

5. Remember that this is only a guideline not the finally worked out result. You can further improve your performance by increase your practice.

6. For your convenience please follow following essential examiner's advices:

   a. Answer all the questions
   b. Read all the Options carefully
   c. Understand and use correct scientific language in your responses.

We from SOUVENIR INFOTECH **wish skillful learning for your bright future.**

Before going for the test, look at least :

1. First of all go through the syllabus of the test according to the **Course Outline** provided at the front page of each MAT.
2. After going through the syllabus once or twice or even more time as per your satisfaction, first of all do the Warm-up questions. If you score A+ grade in those 50 questions go to the next level otherwise go through the chapter again.
3. The box for **Specific Information** is very useful as it adds to your concept building. Try to fill specific information in the proper way so that you will get the maximum benefit of it.
4. **Let's Chat** portion will help you to prepare for oral assessment. Through this you can increase your capacity to interact on a particular topic related to your syllabus.
5. The **Extra Diet** portion is also there to enhance you knowledge through visulization of concept. This portion provides you added knowledge on various related concepts.
6. The information related to time factor is there to enhance your time management skills.
7. From the examiners point of view it is always advised to use Pencil for initial efforts. The use of pen is fruitful only when the final effort comes.

Examiner's Tips:

- Read the question carefully. Make sure you understand exactly what is required.
- If you find that you are unable to do a part of a question, do not give up. The next part may be easier and may provide a clue to what you might have done in the part you found difficult.
- Note the number of marks per question as guide to the depth of response needed.
- Underline or note the key words that tell you what is required.
- Underline or note data as you read the question.
- Structure your answer carefully.
- Show all steps in calculations. Include equations you use and show the substitution of data. remember to work according to units given.
- Make sure that your answers contain suitable significant figures (wherever necessary) and must include units in numericals.
- Draw diagrams and graphs carefully.
- Read data from graphs carefully; note scales and prefixes on axes.
- Keep your eye on the clock but don't panic.
- If you have time at the end, use it. Check that your descriptions and explanations make sense. Consider whether there is anything you could add to an explanation or description. Repeat calculations to ensure that you have not made a mistake.

50 Warm-up/Foundation Questions

Opening Window

To enlighten your fundamental/basic topic knowledge.

A+. If you score 45 or above marks, move to the next section confidently.

A. If you score between 40 and 45 marks, it is satisfactory. Bit more knowledge will bring excellent result.

B. If you score below 40, kindly go through the topic more seriously.

Section A (50 marks) **Time given – 50 minutes + 5 minutes for revision**

Questions 1 to 50 carry 1 mark each.

For questions 1 to 20 four options are given one of them is the correct answer make your choice and write its name (a, b, c or d) in the answer box provided.

1. What is the sum of all natural numbers from 1 to 10.
   (a) 50 (b) 45
   (c) 55 (d) none

T – 1 min
S – Arithmetic progression

Ans.

2. Which term of *AP* 4, 9, 14, 19 ..... is 109?
   (a) 14th (b) 15th
   (c) 22nd (d) 16th

T – 1 min
S – Arithmetic progression

Ans.

3. The 4th term of an AP is 14 and its 12th term is 70. What is its first term?
   (a) –10 (b) –7
   (c) 7 (d) 10

T – 1 min
S – Arithmetic progression

Ans.

4. What is the sum of all natural numbers from 1 to 100 ?
   (a) 4550 (b) 4780
   (c) 5050 (d) 5150

T – 1 min
S – Arithmetic progression

Ans.

5. $51 + 52 + 53 + \ldots + 100 =$
   (a) 3775 (b) 4025
   (c) 4275 (d) 5050

T – 1 min
S – Arithmetic progression

Ans.

6. The first, second and last terms of an AP are respectively 4, 7 and 31. How many terms are there in the given AP?

(a) 10 (b) 12

(c) 8 (d) 13

T – 1 min
S – Arithmetic progression

Ans.

7. Which term of the 6, 12, 18, 24 ..... is 111.

(a) 14th (b) 18th

(c) 22nd (d) 16th

T – 1 min
S – Arithmetic progression

Ans.

8. The system of equations $3x + 6y = 0, 6x + 10y = 0$ has

(a) a trivial solution only

(b) a non zero solution

(c) no solution at all

(d) none of the above

T – 1 min
S – Arithmetic progression

Ans.

9. If $a, a - 2$ and $3a$ are in AP, then the value of a is

(a) -3 (b) -2

(c) 3 (d) 2

T – 1 min
S – Arithmetic progression

Ans.

10. Determine the AP whose third term is 5 and 7th term is a 9

(a) 3, 6, 9 .....

(b) 3, 4, 5, 6, 7 .....

(c) 3, 7, 11 .....

(d) 3, 10, 17 .....

T – 1 min
S – Arithmetic progression

Ans.

11. Write first four terms of AP when the first term 'a' and common difference 'd' are -1 and $1/2$.

(a) $-1, -1/2, 0, 1/2$

(b) $-1/2, -1, 0, 1/2$

(c) $0, 1, 2, 3$

(d) $-1, 0, -1/2, 1/2$

T – 1 min
S – Arithmetic progression

Ans.

12. The 8th term of an AP is 17 and its 14th term is 29. The common difference of the AP is

(a) 3 (b) 2

(c) 5 (d) -2

T – 1 min
S – Arithmetic progression

Ans.

13. The 7th term of an AP is 32 and its 13th term is 62. Find the AP.

(a) 2, 4, 6, 8.....
(b) 2, 7, 12, 17, ...
(c) 4, 6, 8, 10 .....
(d) 1, 6, 11 .....

T – 1 min
S – Arithmetic progression

Ans.

14. If the pth term of an AP is q and qth term is p, find the rth term.

(a) $p+q+r$ (b) $p+q-r$
(c) $p-q-r$ (d) $-p-q-r$

T – 1 min
S – Arithmetic progression

Ans.

15. Find the height of a tower, Angle of elevation is 60° from a point on the ground which is 15m away from the root of the power.

(a) 153 m (b) $\frac{15}{3}$ m
(c) 45 m (d) none

T – 1 min
S – Arithmetic progression

Ans.

16. Find the common difference of following A.P.

3, –1, 1, 3

(a) 2 (b) -2
(c) 0 (d) 1

T – 1 min
S – Arithmetic progression

Ans.

17. Find the 10th term of AP, 2, 7, 12

(a) 2 (b) 52
(c) 10 (d) none

T – 1 min
S – Arithmetic progression

Ans.

18. Find the sum of 5 terms of AP, 1, 2, 3, 4, 5

(a) 15 (b) 10
(c) 16 (d) none

T – 1 min
S – Arithmetic progression

Ans.

19. A kite is flying at a height of 75 m from the level ground, attached to a string inclined at 60° to the horizontal. Find the length of the string, assuming that there is no slack in it.

(a) $50\sqrt{3}$ m (b) $25\sqrt{3}$ m
(c) $5\sqrt{3}$ m (d) $55\sqrt{3}$ m

T – 1 min
S – Applications of trigonometry

Ans.

20. A kite is flying at a height of 75 m from the level ground, attached to a string inclined at 60° to the horizontal. Find the length of the string, assuming that there is no slack in it.

(a) $50\sqrt{3}$ (b) $25\sqrt{3}$

(c) $5\sqrt{3}$ (d) $55\sqrt{3}$

T – 1 min
S – Applications of trigonometry

Ans.

Fill in the Blanks

21. If a, b, c in AP then $b =$ _____.

T – 1 min
S – Arithmetic progression

Ans.

22. The sum of the first n terms of an AP is given by _____.

T – 1 min
S – Arithmetic progression

Ans.

23. $a, a+d, a+2d, a+3d,$ _____ general form of _____ .

T – 1 min
S – Arithmetic progression

Ans.

24. The sum of the first n terms of an AP is _____.

T – 1 min
S – Arithmetic progression

Ans.

25. A sequence in which each term differs from its preceding term by a constant is called _____ .

T – 1 min
S – Arithmetic progression

Ans.

26. The nth term of an AP is called its _____ .

T – 1 min
S – Arithmetic progression

Ans.

27. The sum of first 10 terms of an A.P in given by _____.

T – 1 min
S – Arithmetic progression

Ans.

28. The _____ is the line drawn from the eye of an observer to the point in the object viewed by the observe.

T – 1 min
S – Applications of trigonometry

Ans.

29. The height of an object can be determined with the help of _____.

T – 1 min
S – Applications of trigonometry

Ans.

30. The ninth term of A.P is _____

T – 1 min
S – Arithmetic progression

Ans.

True or False

31. Sequences which follow a definite pattern are called progression.

T – 1 min
S – Arithmetic progression

Ans.

32. All congruent figures are similar figures need not be congruent.

T – 1 min
S – Arithmetic progression

Ans.

33. $a, a+d, a+2d$ ..... is called the general form of an *AP*.

T – 1 min
S – Arithmetic progression

Ans.

34. The nth term of an AP is $a + nd$.

T – 1 min
S – Arithmetic progression

Ans.

35. Sequence which follow a definite pattern are called progressions.

T – 1 min
S – Arithmetic progression

Ans.

36. $T_n = a + (n-1)d$

T – 1 min
S – Arithmetic progression

Ans.

37. When an observer looks from a point O at an object P then the line OP is called the line by sight.

T – 1 min
S – Applications of trigonometry

Ans.

38. When an observer looks from a point O at an object P then the line OP is called the line by sight.

T – 1 min
S – Applications of trigonometry

Ans.

39. The length of an object can not be determined with the help of trigometrical ratio.

T – 1 min
S – Applications of trigonometry

Ans.

40. The angle of deprersion = The angle of elevation.

T – 1 min
S – Applications of trigonometry

Ans.

Simple Questions

41. Find the sum $25 + 28 + 31 + \ldots + 100$

T – 1 min
S – Arithmetic progression

Ans.

42. Find the arithmetic mean between 13 and 19.

T – 1 min
S – Arithmetic progression

Ans.

43. How many natural numbers between 1 and 1000 are divisible by 5.

T – 1 min
S – Arithmetic progression

Ans.

44. Find the sum of first 24 terms of *AP* 5, 8, 11, 14.

T – 1 min
S – Arithmetic progression

Ans.

45. Find the 10th term of the *AP* 2, 7, 12.

T – 1 min
S – Arithmetic progression

Ans.

46. Find the sum of first 19 terms of the *AP* 2, 7, 12, 17.

T – 1 min
S – Arithmetic progression

Ans.

47. The first term of an *AP* is 6 and its common difference is 5. What will be its 11th term?

T – 1 min
S – Arithmetic progression

Ans.

48. From a point on a bridge across a river, the angel of depressions of the banks on opposite sides of the river 30° and 45° respectively. If the bridge in at a height of 3 m from the banks, find the width of the river.

T – 1 min
S – Applications of trigonometry

Ans.

49. Find the 20^{th} term of A.P 1, 3, 5, 7, 9.

T – 1 min
S – Applications of trigonometry

Ans.

50. Find the sum of 20th term of A.P 3, –1, 1, ...

T – 1 min
S – Applications of trigonometry

Ans.

30 Regular Questions

Opening Window

To enlighten your regular knowledge of topic. If you score more than 55 marks here, you have achieved this level brilliantly. Move to the next level of test papers.

Section B (60 marks) **Time given – 45 minutes + 5 minutes for revision**

Questions 51 to 80 carry 2 marks each.

51. Find the 105th term of the AP 4, $4\frac{1}{2}$, $5\frac{1}{2}$, 6 ..... .

T – 1 min
S – Arithmetic progression

Ans.

52. How many terms are there in the AP 7, 11, 15, ...,139 ?

T – 1 min
S – Arithmetic progression

Ans.

53. Is 51 a term of the AP 5, 8, 11, 14 ..... .

T – 1 min
S – Arithmetic progression

Ans.

54. Which term of the AP 24, 21, 18, 15 ... is the first negative term ?

T – 1 min
S – Arithmetic progression

Ans.

55. Find the sum of first 25 terms of an *AP* whose *n*th term is given by $T_n = 7 - 3n$.

T – 1 min
S – Arithmetic progression

Ans.

56. If the *n*th term of an *AP* is $(2n + 1)$, find the sum of first *n* terms of the *AP*.

T – 1 min
S – Arithmetic progression

Ans.

57. Find four numbers in *AP* whose sum is 20 and the sum of whose squares is 120.

T – 1 min
S – Arithmetic progression

Ans.

58. Find the 37th term of the AP $6, 7\frac{3}{4}, 9\frac{1}{2}, 11\frac{1}{4}$ .....

T – 1 min
S – Arithmetic progression

Ans.

59. Show that the progression 8, 11, 14, 17, 20 .... is an *AP*. Find its first term and the common difference.

T – 1 min
S – Arithmetic progression

Ans.

60. Find the *n*th term of the *AP* 14, 9, 4, – 1, – 6.

T – 1 min
S – Arithmetic progression

Ans.

61. Find the 20th term of the *AP* 1, 5, 9, 13, 17 .....

T – 1 min
S – Arithmetic progression

Ans.

62. Find the *n*th term of the *AP* 16, 9, 2, – 5, ...

T – 1 min
S – Arithmetic progression

Ans.

63. Find 11th term of the *AP* $5a - x, 6a, 7a + x$ .....

T – 1 min
S – Arithmetic progression

Ans.

Q. 64-65 3, 5, 7, 9, 11 .....

64. *n*th term

T – 2 min
S – Arithmetic progression

Ans.

65. 16th term

Ans.

66. Which term of the AP 2, $-1, -4, -7$ ..... is -40 ?

T – 2 min
S – Arithmetic progression

Ans.

67. Find the 12th term of the AP 14, 9, 4, –1, –6, ...

T – 2 min
S – Arithmetic progression

Ans.

Q. 68-Q.70. If the sum of n terms of an AP is given by $s_n = 3n^2 + 2n$***, Find***

68. *n*th therm

T – 6 min
S – Arithmetic progression

Ans.

69. First term

Ans.

70. Common difference

Ans.

71. How many terms of an AP 17, 15, 13, 11 ..... must be added to get the sum 72? Explain the double answers.

T – 2 min
S – Arithmetic progression

Ans.

72. Which term of the AP 72, 63, 54, ... is 0?

T – 2 min
S – Arithmetic progression

Ans.

73. A vertical pole stands on the level ground from a point on the ground, 25 m away from the foot of the pole, the angle of elevation of its top is found to be 60°. Find the height of the pole.

T – 2 min
S – Applications of trigonometry

Ans.

74. A round balloon of radius r subtends an angle α at the the eye of the observer while the angle of elevation of its centre in β. Prove that the height of the centre of the balloon is $\left(r \sin \beta \operatorname{cosec} \frac{\alpha}{2} \right)$.

T – 2 min
S – Applications of trigonometry

Ans.

75. A kite is flying, attached to a thread which is 165 m long. The thread makes an angle of 30° with the ground. Find the height of the kite from the ground, assuming that there is no slack in the thread.

T	– 2 min
S	– Applications of trigonometry

Ans.

76. A man standing on the deck of a ship which is 10 m above the water level observes the angle of elevation of the top of a hill as 60°, and the angle of depression of the base of the hill as 30°. Find the distance of the hill from the ship and the height of the hill.

T	– 2 min
S	– Applications of trigonometry

Ans.

77. An observer, 1.6 m tall is 45 away from a tower. The angle of elevation from his eye to the top of the tower is 30°. Determine the height of the tower.

T	– 2 min
S	– Applications of trigonometry

Ans.

78. The angle of elevation of the top of a building from the foot of the tower is 30° and the angle of elevation of the top of tower from the foot of the building is 60°. If the tower is 50 high then find the height of the building.

T	– 2 min
S	– Applications of trigonometry

Ans.

79. From the top of a light house, the angles of depression of two ships on the opposite sides of it are observed to be α and β. If the height of the light house be h metres and the line joining the ships passes through the foot of the light house, show that the distance between the ships is $\frac{h\tan\alpha + \tan\beta}{\tan\alpha\tan\beta}$ metres.

T	– 2 min
S	– Applications of trigonometry

Ans.

80. A vertical pole stands on the level ground from a point on the ground, 25 m away from the foot of the pole, the angle of elevation of its top is found to be 60°. Find the height of the pole.

T	– 2 min
S	– Applications of trigonometry

Ans.

20 Thinking Ability Questions

Opening Window

To enlighten your regular knowledge of topic. If you score more than 50 marks here, you have achieved this level brilliantly. Move to the next level of test papers.

Section C (60 marks) **Time given – 45 minutes + 5 minutes for revision**

81. Sum of three numbers in AP is 21 and their product is 231. Find the numbers.

T – 2 min
S – Arithmetic progression

Ans.

82. Find the 10th term from the end of the AP 4, 9, 14, ... 254.

T – 2 min
S – Arithmetic progression

Ans.

83. If m times the mth term of an AP is equal to n times the nth term and $m \neq n$, show that its $(m+n)$th term is zero.

T – 2 min
S – Arithmetic progression

Ans.

84. If the sum of first $n, 2n$ and $3n$ terms of an AP be s_1, s_2 and s_3 respectively, then prove that $s_3 = 3(s_2 - s_1)$.

T	– 2 min
S	– Arithmetic progression

Ans.

85. A man standing on the deck of a ship which is 10 m above the water level observes the angle of elevation of the top of a hill as 60°, and the angle of depression of the base of the hill as 30°. Find the distance of the hill from the ship and the height of the hill.

T	– 2 min
S	– Applications of trigonometry

Ans.

86. An observer, 1.6 m tall is 45 metres away from a tower. The angle of elevation from his eye to the top of the tower is 30°. Determine the height of the tower.

T	– 2 min
S	– Applications of trigonometry

Ans.

87. Find the sum of the following *AP*

$5+9+13+17+\ldots\ldots\ldots+81$

T – 2 min
S – Arithmetic progression

Ans.

88. In an *AP* $a=5, d=3, a_n=50$, find n and S_n.

T – 2 min
S – Arithmetic progression

Ans.

89. Find four numbers in *AP* whose sum is 20 and the sum of whose squares is 120.

T – 2 min
S – Arithmetic progression

Ans.

90. The sum of first 8 terms of an *AP* is 100 and the sum of its first 19 terms is 551. Find the *AP*.

T – 2 min
S – Arithmetic progression

Ans.

91. Find the sum of all three digit natural numbers which are multiples of 7.

T	– 2 min
S	– Arithmetic progression

Ans.

92. If the sum of the first m terms of an *AP* be n and the sum of its first n terms be m then show that the sum of its first $(m+n)$ terms is $-(m+n)$

T	– 2 min
S	– Arithmetic progression

Ans.

93. If the mth term of an *AP* be $\frac{1}{n}$ and its nth term be $\frac{1}{m}$, then show that the (mn) th term is 1.

T	– 2 min
S	– Arithmetic progression

Ans.

94. The angle of elevation of the top of the tower is 60° and the angle of elevation of the top of the tower from the foot of the hill is 30°. If the tower is 50 m high, find the height of the hill.

T	– 2 min
S	– Applications of trigonometry

Ans.

95. If the pth term of an AP is $1/q$ and its qth term is $1/p$, show that sum of its first pq term is $\frac{1}{2}(pq+1)$.

T	– 2 min
S	– Applications of trigonometry

Ans.

96. The angle of elevation of the top of the tower is 60° and the angle of elevation of the top of the tower from the foot of the hill is 30°. If the tower is 50 m high, find the height of the hill.

T	– 3 min
S	– Applications of trigonometry

Ans.

97. At the foot of a mountain, the angle of elevation of its summit is 45° After ascending 1 km towards the mountain up an incline of 30°, the elevation changes to 60°. Find the height of the mountain.

T	– 3 min
S	– Applications of trigonometry

Ans.

98. The angle of elevation of a cloud from a point 60 metres above a lake is 30° and the angle of depression of the reflection of the cloud in the lake is 60°. Find the height of the cloud.

T	– 3 min
S	– Applications of trigonometry

Ans.

99. A vertical tower stands on a horizontal plane and is surmounted by a vertical flagstaff of height 5 m. From a point on the plane the angles of elevation of the bottom and the top of the flagstaff are 30° and 60°. Find the height of the tower.

T – 3 min
S – Applications of trigonometry

Ans.

100. A kite is flying, attached to a thread which is 165 m long. The thread makes an angle of 30° with the ground. Find the height of the kite from the ground, assuming that there is no slack in the thread.

T – 3 min
S – Applications of trigonometry

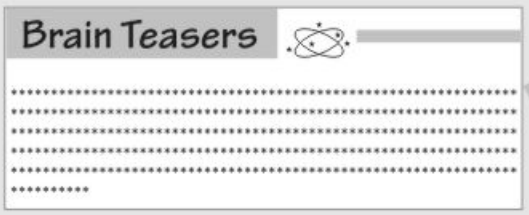
Ans.

Tools at a glance

Opening Window with instructions for your potential analysis and guideline to improve your performance.

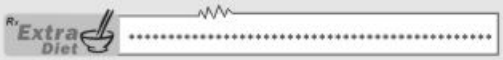
Let's Chat, the feature with suggestive topics for discussion so as to improve your capacity to debate on various topics.

Box with time break-up of questions **(T)** and its concept (**S**, i.e., subject)



Brain Teasers i.e., Questions with difference to make the concepts of students crystal clear. These are the questions with higher difficulty levels to check the grip of the students over the concepts.

Extra Diet, the web link, the notation: www._____ to provide additional information regarding the concept for more clarity of thoughts.



CBSE GRADING PATTERN

As the new pattern includes **CCE** (Continuous and Comprehensive Evaluation) which will be run in two terms i.e., from April to September and October to March. Thus the school will conduct four **Formative** and two **Summative** Assessments.

However, the most generalised version of grades is given below:

MARKS PERCENTAGE	GRADE	GRADE POINT	CATEGORY
91 to 100	A1	10	Exceptional
81 to 90	A2	9	Excellent
71 to 80	B1	8	Very Good
61 to 70	B2	7	Good
51 to 60	C1	6	Ordinary (Fair)
41 to 50	C2	5	Average
33 to 40	D	4	Below Average
21 to 32	E1	3	Improvement Needed
Below 20	E2	Below 2	Unsatisfactory