Grade 10
Unit 04

Maths

Course Outline

Formative 2

- **Introduction to trigonometry**
- **Statistics**

MAT

(Monthly Achievement Tests)

Short Code: 447311

Test ID: NMM10U040

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. $\sin(40^\circ + \theta) - \sin(50^\circ - \theta) =$

   (a) 1 (b) 0

   (c) $\sin 2\theta$ (d) none of these

   T – 1 min
   S – Trigonometry
   Ans.

2. $\sin 45^\circ =$

   (a) $\frac{1}{\sqrt{2}}$ (b) $\frac{1}{2}$

   (c) $\frac{\sqrt{3}}{2}$ (d) 1

   T – 1 min
   S – Trigonometry
   Ans.

3. $1 - \cos^2\theta =$

   (a) $\sec^2\theta$ (b) $\sin^2\theta$

   (c) $\tan^2\theta$ (d) $\text{cosec}^2\theta$

   T – 1 min
   S – Trigonometry
   Ans.

4. If $\sin\alpha = \frac{1}{2}$ and α is acute then $3\cos\alpha - 4\cos^3\alpha =$

   (a) 0 (b) ½

   (c) 1/6 (d) – 1Trigonometry

   T – 1 min
   S – Trigonometry
   Ans.

5. $(\cos 0^\circ + \sin 45^\circ + \sin 30^\circ)(\sin 90^\circ - \cos 45^\circ + \cos 60^\circ) =$

   (a) $\frac{3}{5}$ (b) $\frac{5}{6}$

   (c) $\frac{7}{4}$ (d) $\frac{5}{8}$

   T – 1 min
   S – Trigonometry
   Ans.

6. $\left(\frac{4}{3}\cot^2 30° + 3\sin^2 60° - 2\,\text{cosec}^2 60° - \frac{3}{4}\tan^2 30°\right) =$

T – 1 min
S – Trigonometry

(a) $\frac{10}{3}$ (b) 3

(c) $\frac{8}{3}$ (d) $\frac{9}{4}$

Ans.

7. Relationship between direction and mean ?

T – 1 min
S – Statistics

(a) $\bar{x} = a + \frac{\Sigma di}{\Sigma fi}$ (b) $\bar{x} = a + \frac{\Sigma fi\, di}{\Sigma f}$

(c) $\bar{x} = a + \frac{\Sigma fi}{\Sigma fi\, di}$ (d) none of the above

Ans.

8. Mode can be written as

T – 1 min
S – Statistics

(a) $l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right)h$ (b) $l + \left(\frac{f_0 - f_1}{2f_1 - f_0 - f_2}\right)$

(c) $l + \frac{f_1 - f_0}{f_1 - 2f_0 - f_2}$ (d) none of these

Ans.

9. If median = 5, mode = 6, find the mean of the distribution.

T – 1 min
S – Statistics

(a) 4·5 (b) 4

(c) 6·6 (d) none of these

Ans.

10. The means of a set of number is $\bar{X}$. If each number is divided by 3, then the new mean is

T – 1 min
S – Statistics

(a) $\bar{X}$ (b) $\bar{X} + 3$

(c) $3\bar{X}$ (d) $\frac{\bar{X}}{3}$

Ans.

11. The value of observation having the maximum frequency is called

T – 1 min
S – Statistics

(a) mean (b) median

(c) mode (d) none of these

Ans.

12. Median can be written as

(a) Median $= l + \frac{(n/2 - cf)}{f} \times h$ (b) Median $= l + \left(\frac{cf - n/2}{f}\right) \times h$

(c) Median $= l - \frac{(n/2 - cf)}{f} \times h$ (d) none of these

T – 1 min
S – Statistics

Ans.

13. $\tan 45° =$
(a) 1 (b) 1
(c) – (d) ∞

T – 1 min
S – Trigonometry

Ans.

14. A certain value representative of the whole data and signifying its characteristics is called a/an _____ of the data.
(a) mean (b) average
(c) mode (d) median

T – 1 min
S – Statistics

Ans.

15. _____ $= \frac{\Sigma (f_i \times x_i)}{\Sigma f_i}$
(a) mean (b) mode
(c) median (d) average

T – 1 min
S – Statistics

Ans.

16. $\text{Cot} = 45° =$
(a) 1 (b) 0
(c) -1 (d) ∞

T – 1 min
S – Trigonometry

Ans.

17. If $3\sin\theta + 4\cos\theta = 5$, then the value of $\sin\theta$ is
(a) ¾ (b) 3/5
(c) 4/5 (d) none of these

T – 1 min
S – Trigonometry

Ans.

18. $\sin^2 25° + \sin^2 65° =$
(a) 90 (b) 40
(c) 0 (d) 1

T – 1 min
S – Trigonometry

Ans.

19. $\frac{1 - \tan^2\theta}{1 + \tan^2\theta}$
(a) $\sin^2\theta - \cos^2\theta$ (b) $\cos^2\theta - \sin^2\theta$
(c) $\cot^2\theta - \tan^2\theta$ (d) $\tan^2\theta - \cot^2\theta$

T – 1 min
S – Trigonometry

Ans.

20. $\cot(90° - \theta)$ is equal to

(a) $\cot\theta$ (b) $-\cot\theta$

(c) $\tan\theta$ (d) $-\tan\theta$

T – 1 min
S – Trigonometry

Ans.

Fill in the blank

21. _____ of an acute angle in a right triangle express the relationship between the angle and the length of its sides.

T – 1 min
S – Trigonometry

Ans.

22. _____ is the study of relationships between the sides and angles of a triangle.

T – 1 min
S – Trigonometry

Ans.

23. Fixed number is called the _____.

T – 1 min
S – Trigonometry

Ans.

24. $\cos^2 A +$ _____ $= 1$.

T – 1 min
S – Trigonometry

Ans.

25. $\cos 90° =$ ___.

T – 1 min
S – Trigonometry

Ans.

26. 10 – 20 is called _____.

T – 1 min
S – Statistics

Ans.

27. If n is odd, the median is the _____ .

T – 1 min
S – Statistics

Ans.

28. Mean, median and mode are called measures of _____ .

T – 1 min
S – Statistics

Ans.

29. Class mark = _____.

T – 1 min
S – Statistics

Ans.

30. The mode is a value inside the _____.

T – 1 min
S – Statistics

Ans.

True or False

31. $\cot^2 A + 1 = \sec^2 A$

T – 1 min
S – Trigonometry

Ans.

32. cot *A* is not defined.

T – 1 min
S – Trigonometry

Ans.

33. Cumulative frequency of class is denoted by the letter `*f*'.

T – 1 min
S – Statistics

Ans.

34. Cumulative frequency curves, are called graph.

T – 1 min
S – Statistics

Ans.

35. If *n* is odd, the median is the $\left(\frac{n}{2}\right)^{th}$ observation.

T – 1 min
S – Statistics

Ans.

36. $\tan 45^\circ = \infty$

T – 1 min
S – Trigonometry

Ans.

37. Length of an arc of a sector of angle $\theta = \frac{\theta}{360} \times \pi r^2$.

T – 1 min
S – Statistics

Ans.

38. The trigonometric identities of an acute angle in a right triangle express the relationship between the angles and length of its sides.

T – 1 min
S – Trigonometry

Ans.

39. $\cos 60^\circ = \frac{1}{\sqrt{2}}$

T – 1 min
S – Trigonometry

Ans.

40. $\tan 90^\circ = 0$

T – 1 min
S – Trigonometry

Ans.

For Questions 41–43. Without using trigonometric tables evaluate the following.

41. $\frac{\cos 53^\circ}{\sin 37^\circ}$

T – 1 min
S – Trigonometry

Ans.

42. $\frac{\tan 68^\circ}{\cot 22^\circ}$

T – 1 min
S – Trigonometry

Ans.

43. $\frac{\sec 49^\circ}{\operatorname{cosec} 41^\circ}$

T – 1 min
S – Trigonometry

Ans.

44. Find the mean of the following data.

Class interval	0–10	10–20	20–30	30–40	40–50
Frequency	12	16	6	7	9

T – 1 min
S – Statistics

Ans.

45. The mode of the following series is 36. Find the missing frequency in it.

Class Interval	0–10	10–20	20–30	30–40	40–50	50–60	60–70
Frequency	8	10	–	16	12	6	7

T – 1 min
S – Statistics

Ans.

46. If $5\cot\theta = 3$, find the value of $\frac{5\sin\theta - 3\cos\theta}{4\sin\theta + 3\cos\theta}$.

T – 1 min
S – Trigonometry

Ans.

47. Find the median, if mean $= 10$ and mode $= 13$.

T – 1 min
S – Statistics

Ans.

48. A distribution in which mean, median and mode coincide is called symmetrical distribution.

T	– 1 min
S	– Statistics

Ans.

49. Find the mean of the following data.

Class Interval	0–10	10–20	20–30	30–40	40–50
Frequency	12	16	6	7	9

T	– 1 min
S	– Statistics

Ans.

50. Find the midian, of mean = 10 and midian 13

T	– 1 min
S	– Statistics

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.

For Questions 51–52. If $A = 45°$ Find the value of the following.

51. $2 \sin A \cos A$

T – 1 min
S – Trigonometry

Ans.

52. $2 \cos^2 A - 1$

T – 1 min
S – Trigonometry

Ans.

53. In ΔABC, $\angle B = 90°$, $AB = 5$ cm and $BC = 12$ cm. Then sin c = ?

T – 1 min
S – Trigonometry

Ans.

For Questions 54–56. Without using trigonometric tables, evaluate the following.

54. $\dfrac{\tan 50^\circ + \sec 50^\circ}{\cot 40^\circ + \operatorname{cosec} 40^\circ} + \cos 40^\circ \operatorname{cosec} 50^\circ$

T – 1 min
S – Trigonometry

Ans.

55. $\dfrac{\cos^2 20^\circ + \cos^2 70^\circ}{\sin^2 20^\circ + \sin^2 70^\circ} + \sin^2 64^\circ + \cos 64^\circ \sin 26^\circ$

T – 1 min
S – Trigonometry

Ans.

56. $\sec^2 10^\circ - \cot^2 80^\circ + \dfrac{\sin 15^\circ \cos 75^\circ + \cos 15^\circ \sin 75^\circ}{\cos\theta \sin(90^\circ - \theta) + \sin\theta \cos(90^\circ - \theta)}$.

T – 1 min
S – Trigonometry

Ans.

For Questions 57–58. Prove the following identities:

57. $\cos^2\theta + \dfrac{1}{1 + \cot^2\theta} = 1$

T – 1 min
S – Trigonometry

Ans.

58. $(\sec^2\theta - 1)(\text{cosec}^2\theta - 1) = 1$

T – 1 min
S – Trigonometry

Ans.

59. $\sec\theta\,(1 - \sin\theta)(\sec\theta + \tan\theta) = 1$

T – 1 min
S – Trigonometry

Ans.

For Questions 60–61. If $A = 30^\circ$, verify the following:

60. $\sin 2A = \dfrac{2\tan A}{1 + \tan^2 A}$

T – 1 min
S – Trigonometry

Ans.

61. $\cos 2A = \dfrac{1 - \tan^2 A}{1 + \tan^2 A}$

T – 1 min
S – Trigonometry

Ans.

62. Write the formula for finding the median for a grouped or continuous frequency distribution.

T	– 1 min
S	– Statistics

Ans.

63. If the mean of n observations is $\bar{x}$, then find the new mean when the first term is increased by 1, second term by 2 and so on.

T	– 1 min
S	– Statistics

Ans.

64. Find the mean age (in years) from the following frequency distribution.

Age (in years)	15 – 19	20 – 24	25 – 29	30 – 34	35 – 39	40 – 44	45 – 50	Total
frequency	3	13	21	15	5	4	2	63

T	– 1 min
S	– Statistics

Ans.

65. The mean of the following frequency distribution is 62.8 and the sum of all frequencies is 50. Compute the missing frequencies f_1 and f_2

Class	0–20	20–40	40–60	60–80	80–100	100–120	Total
Frequency	5	f_1	10	f_2	7	8	50

T	– 1 min
S	– Statistics

Ans.

66. Calculate the mode for the following frequency distribution.

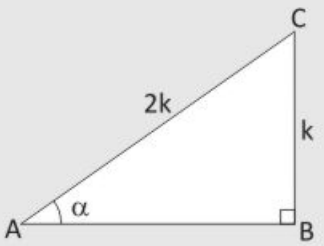
Class	0–10	10–20	20–30	30–40	40–50	50–60	60–70	70–80
frequency	5	8	7	12	28	20	10	10

T – 2 min
S – Statistics

Ans.

67. If $\sin\alpha = \frac{1}{2}$, show that $(3\cos\alpha - 4\cos^3\alpha) = 0$.

T – 2 min
S – Trigonometry



Ans.

Q.68 to Q.70 Evaluate the following

68. $\sin 60^\circ \cos 30^\circ - \cos 60^\circ \sin 30^\circ$

T – 2 min
S – Trigonometry

Ans.

69. $\sin^2 30^\circ \cos^2 45^\circ + 4\tan^2 30^\circ + \frac{1}{2}\sin^2 90^\circ + \frac{1}{8}\cot^2 60^\circ$

T – 2 min
S – Trigonometry

Ans.

70. $\dfrac{\sin^2 60^\circ + 4\sin^2 45^\circ + 3\sec^2 30^\circ + 5\cos^2 90^\circ}{\operatorname{cosec} 30^\circ + \sec 60^\circ - \cot^2 30^\circ}$

T – 2 min
S – Trigonometry

Ans.

Q.71 to Q.72. Verify the following equations.

71. $\cos 60^\circ \cos 30^\circ - \sin 60^\circ \sin 30^\circ = \cos 90^\circ$

T – 2 min
S – Trigonometry

Ans.

72. $\dfrac{\tan 60^\circ - \tan 30^\circ}{1 + \tan 60^\circ \tan 30^\circ} = \tan 30^\circ$

T – 2 min
S – Trigonometry

Ans.

73. Prove that $\cot\theta - \tan\theta = \dfrac{2\cos^2\theta - 1}{\sin\theta\cos\theta}$.

T – 2 min
S – Trigonometry

Ans.

74. Prove that $\dfrac{1 + \tan^2 A}{1 + \cot^2 A} = \left[\dfrac{1 - \tan A}{1 - \cot A}\right]^2$.

T – 2 min
S – Trigonometry

Ans.

75. Prove that $(\tan^2\theta + \cot^2\theta + 2) = \sec^2\theta \operatorname{cosec}^2\theta$.

T – 2 min
S – Trigonometry

Ans.

76. Prove that $(cosec\theta - \cot\theta)^2 = \frac{1-\cos\theta}{1+\cos\theta}$.

T – 2 min
S – Trigonometry

Ans.

77. Find the mean of the following data
8, 7, 15, 12, 10, 8, 9

T – 2 min
S – Trigonometry

Ans.

78. The mean of 6 variates in 8. Find of them are 8, 15, 0, 6, 11. Find the sixth variates.

T – 2 min
S – Trigonometry

Ans.

79. Write the formula for finding the median for a grouped or continuous frequency distribution.

T – 2 min
S – Trigonometry

Ans.

80. Complete the airtmetic mean for the following data

Marks obtained	No. of students
Less than 10	14
Less than 20	22
Less than 30	37
Less than 40	58
Less than 50	67
Less than 60	75

T – 2 min
S – 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. Prove that $\text{cosec}\,\theta - \cot\theta = \dfrac{1}{\text{cosec}\,\theta + \cot\theta}$ is an identity.

T – 2 min
S – Trigonometry

Ans.

82. Prove that $\dfrac{\tan A + \sin A}{\tan A - \sin A} = \dfrac{sec\ A + 1}{sec\ A - 1}$

T – 2 min
S – Trigonometry

Ans.

83. Show that $\cos^2\theta - \sin^2\theta = \dfrac{2\tan\theta}{1 - \tan^2\theta}$ is not an identity.

T – 2 min
S – Trigonometry

Ans.

84. If $\sin\theta + \sin^2\theta = 1$, Prove that $\cos^2\theta + \cos^4\theta = 1$.

T – 2 min
S – Trigonometry

Ans.

85. Prove that $\cot 12^\circ \cot 38^\circ \cot 52^\circ \cot 60^\circ \cot 78^\circ = \frac{1}{\sqrt{3}}$.

T – 2 min
S – Trigonometry

Ans.

86. If $x = \sin^3\theta + y\cos^3\theta = \sin\theta\cos\theta$ and $x\sin\theta = y\cos\theta$, prove that $x^2 + y^2 = 1$.

T – 2 min
S – Trigonometry

Ans.

87. If $\text{cosec}\,\theta - \sin\theta = m$ and $\sec\theta - \cos\theta = n$ Prove that $(m^2n)^{2/3} + (mn^2)^{2/3} = 1$.

T – 2 min
S – Trigonometry

Ans.

88. The arithmetic mean of the following frequency distribution is 25. Determine the value of p.

Class	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
Frequency	5	18	15	p	6

T – 2 min
S – Statistics

Ans.

89. Calculate the mode for the following freqeuncy distribution:

Class	25 – 30	30 – 35	35 – 40	40 – 45	45 – 50	50 – 55
Frequency	25	34	50	42	38	14

T – 2 min
S – Statistics

Ans.

90. The median of the following data is 5.25. Find the values of x and y, if the total frequency is 100.

Class interval	0-100	100-200	200-300	300-400	400-500	500-600	600-700	700-800	800-900	900-1000
Frequency	2	5	x	12	17	20	y	9	7	4

T – 2 min
S – Statistics

Ans.

91. Find the mean of the following frequency distribution.

Class	50-70	70-90	90-110	110-130	130-150	150-170
frequency	18	12	13	27	8	22

T – 2 min
S – Statistics

Ans.

92. Calculate the median for the following data.

Marks obtained	No. of students
Below 10	6
Below 20	15
Below 40	41
Below 50	60
Below 60	70
Below 30	29

T – 2 min
S – Statistics

Ans.

93. A bag contains 5 red balls and some blue balls. If the probability of drawing a blue balls from the bag is trice that of area ball find the number of blue balls in the bag.

T – 2 min
S – Statistics

Ans.

Q.94 to Q.95. Evaluate the following.

94. $\cot^2 30° - 2\cos^2 30° - \frac{3}{4}\sec^2 45° + \frac{1}{4}\text{cosec}^2 30°$

T – 2 min
S – Trigonometry

Ans.

95. $\frac{\sin 30°}{\cos 45°} + \frac{\cot 45°}{\sec 60°} - \frac{\sin 60°}{\tan 45°} - \frac{\cos 30°}{\sin 90°}$

T – 2 min
S – Trigonometry

Ans.

96. Prove that $(1 - \sin^2\theta)\sec^2\theta = 1$.

T – 3 min
S – Trigonometry

Ans.

97. Prove that $\frac{\cot\theta + \operatorname{cosec}\theta - 1}{\cot\theta - \operatorname{cosec}\theta + 1} = \frac{1+\cos\theta}{\sin\theta}$.

T – 3 min
S – Trigonometry

Ans.

98. Taking $\theta = 30°$ verify the following equation $\sin 3\theta = 3\sin\theta - 4\sin^3\theta$.

T – 3 min
S – Trigonometry

Ans.

99. Calculate the arithmetic mean of the following frequency distribution, using the step deviation method.

T – 3 min
S – Statistics

Class Interval	Frequences
0 – 50	17
50 – 100	35
100 – 150	43
150 – 200	40
200 – 250	21
250 – 300	24

Ans.

100. Find the missing frequencies in the following frequency distribution table, if $N = 100$ and median is 32.

T – 3 min
S – Statistics

Marks	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	Total
Number of Students	10	?	25	30	?	10	100

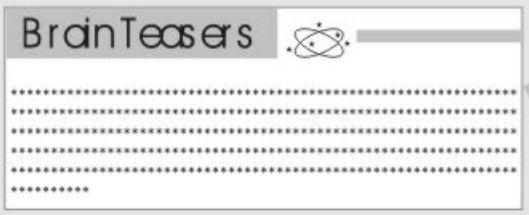
Ans.

Tools at a glance

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

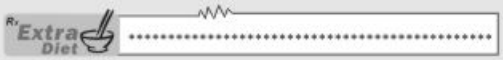
Let's Chat, the feature with suggestive topics for discussion so as to improve your capacity to debate on various topics.

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