Grade 10
Unit 06

Maths

Course Outline

- Quadratic Equations
- Constructions

MAT
(Monthly Achievement Tests)

Short Code: 447311

Test ID: NMM10U060

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. Which of the following is a quadratic equation.

   (a) $x+\frac{3}{x}=x^2$ (b) $x^2-5x+6=0$

   (c) $x^2-6\sqrt{x}+2=0$ (d) $x^3+\frac{1}{x^3}=0$

   T – 1 min
   S – Quadratic Equations

   Ans.

2. Which of the following are the solution of $2x^2-5x-3=0$?

   (a) $x=3$, (b) $x=1$

   (c) $x=4$ (d) $x=-1$

   T – 1 min
   S – Quadratic Equations

   Ans.

3. Find the value of k for which $x=1$ is a root of the equation $x^3+kx+3=0$.

   (a) 4 (b) –4

   (c) –3 (d) 2

   T – 1 min
   S – Quadratic Equations

   Ans.

4. A motorboat whose speed is 9 km/hr in still water, goes 15 km downstream and comes back in a total time of 3 hours 45 minutes. Find the speed of the stream.

   (a) 2 km/hr (b) 3 km/hr

   (c) 5 km/hr (d) 4 km/hr

   T – 1 min
   S – Quadratic Equations

   Ans.

5. Find the value of k for which $x = 2$ is a solution of the equation.
$kx^2 + 2x - 3 = 0$

(a) $\frac{1}{4}$ (b) $\frac{-1}{4}$

(c) $\frac{1}{3}$ (d) $\frac{-1}{3}$

T – 1 min
S – Quadratic Equations

Ans.

6. Roots of the quadratic equation $3x^2 - 2\sqrt{6}\,x + 2 = 0$ are

(a) $\sqrt{2/3}, \sqrt{2/3}$ (b) $\sqrt{3/2}, \sqrt{3/2}$

(c) $\sqrt{1/3}, \sqrt{1/3}$ (d) $\sqrt{4/3}, \sqrt{4/3}$

T – 1 min
S – Quadratic Equations

Ans.

7. What value of k the equation $9x^2 - kx + 81$ has equal roots.

(a) ± 24 (b) ± 32

(c) ± 54 (d) ± 46

T – 1 min
S – Quadratic Equations

Ans.

8. Find the roots of the quadratic equation $\sqrt{2}\,x^2 + 7x + 5\sqrt{2} = 0$.

(a) $5/\sqrt{2}, \sqrt{2}$ (b) $-5/\sqrt{2}, -\sqrt{2}$

(c) $5\sqrt{2}, \sqrt{2}$ (d) $5/\sqrt{2}, 2$

T – 1 min
S – Quadratic Equations

Ans.

9. Solve for x, if $5x^2 - 2x - 2 = 0$.

(a) $\frac{1+\sqrt{11}}{5}, \frac{1-\sqrt{11}}{5}$ (b) $\frac{2+\sqrt{22}}{5}, \frac{2-\sqrt{22}}{5}$

(c) $\frac{4+\sqrt{11}}{5}, \frac{4-\sqrt{11}}{5}$ (d) none of these

T – 1 min
S – Quadratic Equations

Ans.

10. Find the value of x in the quadratic equation $6x^2 - x - 2 = 0$.

(a) $\frac{2}{3}$ or $-\frac{1}{2}$

(b) $\frac{2}{3}$

(c) $\frac{1}{2}$

(d) none

T – 1 min
S – Quadratic Equations

Ans.

11. Find the value of a for which the quadratic equation of $4y^2 - 3ay + 1 = 0$ has equal roots.

(a) $\pm\frac{2}{3}$ (b) $\pm\frac{4}{7}$

(c) $\pm\frac{1}{3}$ (d) $\pm\frac{4}{3}$

T – 1 min
S – Quadratic Equations

Ans.

12. Solve for x $\frac{x}{x+1} + \frac{x+1}{x} = \frac{34}{15}$.

(a) $\frac{3}{2}, \frac{-7}{2}$ (b) $9, \frac{4}{2}$

(c) 4, 7 (d) $\frac{3}{2}, \frac{-5}{2}$

T – 1 min
S – Quadratic Equations

Ans.

13. Find two consecutive odd positive integers sum of whose squares is 265.

(a) 13, 14 (b) – 12, 11

(c) 7, 8 (d) 5, 6

T – 1 min
S – Quadratic Equations

Ans.

14. Find the discriminant of the quadratic equation $8x^2 - 6x + 8 = 0$.

(a) –6 (b) –8

(c) 6 (d) none

T – 1 min
S – Quadratic Equations

Ans.

15. Find the value of a for which the quadratic equation of $4y^2 - 3ay + 1 = 0$ has equal roots.

(a) $\pm\frac{2}{3}$ (b) $\pm\frac{4}{7}$

(c) $\pm\frac{1}{3}$ (d) $\pm\frac{4}{3}$

T – 1 min
S – Quadratic Equations

Ans.

16. Solve for m, $2m^2 - 18 = 0$

(a) ± 3

(b) –3

(c) 3

(d) none

T – 1 min
S – Quadratic Equations

Ans.

17. Can it be possible to construct a triangle similar to a given triangle

(a) possible (b) not possible

(c) Not determined (d) none

T – 1 min
S – Constructions

Ans.

18. For which values of K, Me equation $9x^2 - kz + 81$ as equal roots

(a) $= 24$ (b) $= 32$

(c) $= 54$ (d) $= 46$

T – 1 min
S – Quadratic Equations

Ans.

19. Solve for y

$15x + 4y - 61 < 4x + 15y = 72$

(a) 5 (b) 6

(c) 4 (d) 7

T – 1 min
S – Quadratic Equations

Ans.

20. Find the discriminate of the quardic equation

$2x^2 - 4x + 3 = 0$

(a) -4 (b) -8

(c) 4 (d) 7

T – 1 min
S – Quadratic Equations

Ans.

Fill in the Blanks

21. The zeros of the quadratic polynomial $ax^2 + bx + c$ and the roots of the quadratic equation $ax^2 + bx + c = 0$ are _____.

T – 1 min
S – Quadratic Equations

Ans.

22. Roots of the quadratic equation $ax^2 + bx + c = 0$ are given by_____.

T – 1 min
S – Quadratic Equations

Ans.

23. $ax^2 + bx + c = 0$ is called a _____ equation .

T – 1 min
S – Quadratic Equations

Ans.

24. A quadratic equation $ax^2 + bx + c = 0$ has two distinct real roots, if _____ .

T – 1 min
S – Quadratic Equations

Ans.

25. $2x^2 - 3x + 1 = 0$ is _____ equation.

T – 1 min
S – Quadratic Equations

Ans.

26. _____ is called the discriminate.

T – 1 min
S – Quadratic Equations

Ans.

27. To divide a line segment in a given ratio is based on the _____ theorem.

T – 1 min
S – Constructions

Ans.

28. In $x + \frac{27}{x} = x^2 + x$. The value of x _____.

T – 1 min
S – Quadratic Equations

Ans.

29. $x^2 - 6\sqrt{x} + 5 = 0$ is called a _____ equation.

T – 1 min
S – Quadratic Equations

Ans.

30. If the discriminant < 0 then the roots are _____.

T – 1 min
S – Quadratic Equations

Ans.

True or False

31. $b^2 - 4ac$ is called the discriminant of this quadratic equation.

T – 1 min
S – Quadratic Equations

Ans.

32. A quadratic equation $ax^2 + bx + c = 0$ has two equal real roots if $b^2 - 4ac < 0$.

T – 1 min
S – Quadratic Equations

Ans.

33. A quadratic equation can also be solved by the method of completing the square.

T – 1 min
S – Quadratic Equations

Ans.

34. $x = \alpha$ is a solution of the quadratic equation.

T – 1 min
S – Quadratic Equations

Ans.

35. Quadratic formula $= \dfrac{-b\sqrt{b^2 - 4ac}}{2a}$.

T – 1 min
S – Quadratic Equations

Ans.

36. If $b^2 - 4ac = 0$, a quadratic equation has two equal real roots.

T – 1 min
S – Quadratic Equations

Ans.

37. If $b^2 - 4ac < 0$, the equations has no real roots.

T – 1 min
S – Quadratic Equations

Ans.

38. $x + 12$ is a quadratic equation.

T – 1 min
S – Quadratic Equations

Ans.

39. We can construct the tangents to a circle from a point outride it.

T – 1 min
S – Constructions

Ans.

40. If a point lies on the circle, then there is only one tangent. to the circle at this point.

T – 1 min
S – Constructions

Ans.

Simple Questions

41. Divide $3 - x + 2x^2$ by $2 - x$. Find the quotient and remainder.

T – 1 min
S – Quadratic Equations

Ans.

42. Show that the equation $9x^2 + 7x - 2 = 0$ has real roots and solve it.

T – 1 min
S – Quadratic Equations

Ans.

43. The sum of the squares of two consecutive natural numbers is 421. Find the numbers.

T	– 1 min
S	– Quadratic Equations

Ans.

44. Show that the equation $3x^2 + 7x + 8 = 0$ is not true for any real values of x.

T	– 1 min
S	– Quadratic Equations

Ans.

45. Find the values of k for which the quadratic equation $kx(x-3)+9=0$ has real equal roots.

T	– 1 min
S	– Quadratic Equations

Ans.

46. If the roots of the equation $(a-b)x^2 + (b-c)x + (c-a) = 0$ are equal. Prove that $b + c = 2a$.

T	– 1 min
S	– Quadratic Equations

Ans.

47. Solve $\frac{x+3}{x+2} = \frac{3x-7}{2x-3}$

T – 1 min
S – Quadratic Equations

Ans.

For questions 48-50. Find the roots of the equation using quadratic formula.

48. $6x^2 + x - 12 = 0$

T – 1 min
S – Quadratic Equations

Ans.

49. $6x^2 + 11x + 3 = 0$

T – 1 min
S – Quadratic Equations

Ans.

50. $3x^2 + 11x + 10 = 0$

T – 1 min
S – Quadratic Equations

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.

Q.51–Q.53 Check whether the following are quadratic equations :

51. $(x-1)^2+1=3x-5$

T – 1 min
S – Quadratic Equations

Ans.

52. $x(2x+3)=2x^2+3$

T – 1 min
S – Quadratic Equations

Ans.

53. $x^3-4x^2-x+1=(x-1)^3$

T – 1 min
S – Quadratic Equations

Ans.

Q. 54–Q.56 Solve the following using the factorisation method

54. $6x^2 - x - 2 = 0$

T – 3 min
S – Quadratic Equations

Ans.

55. $6x^2 + 40 = 31x$

Ans.

56. $8x^2 - 22x - 21$

Ans.

Q 57. to Q 60. Solve the following using quadratic formula.

57. $2x^2 - 9x + 7 = 0$

T – 4 min
S – Quadratic Equations

Ans.

58. $x^2 - 6x + 4 = 0$

59. $9x^2 - 4 = 0$

60. $x^2 - 2ax + (a^2 - b^2) = 0$

The given equation is $x^2 - 2ax + a^2 - b^2 = 0$, comparing with $ax^2 + bx + c = 0$

Ans.

Q.61–Q.62 Find the nature of the roots of the quadratic equation.

61. $4x^2 - 5x + 3 = 0$

T – 3 min
S – Quadratic Equations

Ans.

62. $3x^2 - 4\sqrt{3}x + 4 = 0$

Ans.

Q. 63 - 65. Find the values of k for which the given equation has real roots

63. $kx^2 - 6x - 2 = 0$

T – 4 min
S – Quadratic Equations

Ans.

64. $3x^2 + 2x + k = 0$

Ans.

65. $2x^2 + kx + 2 = 0$

Ans.

Q. 66 - 68 which of the following equations have both roots equal ? Then find the roots ?

66. $x^2 + 8x + 16 = 0$

T – 4 min
S – Quadratic Equations

Ans.

67. $9x^2 - 6x + 4 = 0$

Ans.

68. $12x^2 - 4\sqrt{15}\,x + 5 = 0$

Ans.

Q 69 - 72 Find the discriminant of each of the following equations.

69. $2x^2 - 7x + 6 = 0$

T – 5 min
S – Quadratic Equations

Ans.

70. $\sqrt{3}\,x^2 + 2\sqrt{2}x - 2\sqrt{3} = 0$

Ans.

71. $x^2 = 4x - c$

Ans.

72. $1 - x = 2x^2$

Ans.

73. Find the value of k for which $x = 2$ is a solution of the equation $kx^2 + 2x - 3 = 0$.

T – 2 min
S – Quadratic Equations

Ans.

74. If $x = 2$ and $x = 3$ are the roots of the equation $3x^2 - 2mx + 2n = 0$, then find the values of m and n.

T – 2 min
S – Quadratic Equations

Ans.

Q. 75 - 76 Solve each of the following using quadratic formula

75. $6x^2 + 7x - 10 = 0$

T – 2 min
S – Quadratic Equations

Ans.

76. $x^2 - 2ax + (a^2 - b^2) = 0$

Ans.

77. Solve the following quadratic equations.
$3x^2 - 243 = 0$

T – 1 min
S – Quadratic Equations

Ans.

78. Solve $\sqrt{2}x^2 + 7x + 5\sqrt{2} = 0$

T	– 2 min
S	– Quadratic Equations

Ans.

79. Draw a line sigment of 5cm and divide it in the ration 5 : 8. Measure the two ports.

T	– 3 min
S	– Constructions

Ans.

80. Construct a triangle similar to a given tringle, *ABC* with its sides equal to $\frac{5}{4}$ of the corresponding sides of the triangle *ABC*.

T	– 3 min
S	– Constructions

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. The area of a right angled triangle is 600 sq. cm. If the base of the triangle exceeds the altitude by 10 cm, find the dimensions of the triangle.

T	– 2 min
S	– Quadratic Equations

Ans.

82. A rectangular field is 20 m long and 14 m wide. There is a path of equal width all around it, having an area of 111 sq m. Find the width of the path.

T	– 2 min
S	– Quadratic Equations

Ans.

83. Find two consecutive positive integers, the sum of whose squares is 365.

T	– 2 min
S	– Quadratic Equations

Ans.

84. The denominator of a fraction is one more than twice the numerator. If the sum of the fraction and its reciprocal is $2\frac{16}{21}$, find the fraction.

T	– 2 min
S	– Quadratic Equations

Ans.

85. Seven years ago Varun's age was five times the square of Swati's age. Three years hence, Swati's age will be two-fifth of Varun's age. Find their present age.

T	– 2 min
S	– Quadratic Equations

Ans.

86. $4x^2 - 3kx + 1 = 0$

T	– 2 min
S	– Quadratic Equations

Ans.

87. Show that the equation $2(a^2+b^2)x^2+2(a+b)x+1=0$ has no real roots, when $a \neq b$.

T	– 2 min
S	– Quadratic Equations

Ans.

88. A motor boat whose speed in still water is 15 kmph, goes 30 km downstream and return back to the starting point in a total time of 4 hours 30 minutes. Find the speed of the stream.

T	– 2 min
S	– Quadratic Equations

Ans.

89. A takes 6 days less than the time taken by B to finish a piece of work. If both A and B together can finish it in 4 days, find the time taken by B to finish the work.

T	– 2 min
S	– Quadratic Equations

Ans.

90. Solve $\frac{1}{a+b+x} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}$ $[x \neq 0, x \neq -(a+b)]$ and prove that $-a$ and $-b$ are the roots of given equation.

T	– 2 min
S	– Quadratic Equations

Ans.

Q. 91 - 92. Find the values of k for which the given equation has real and equal roots

91. $(k-12)x^2+2(k-12)x+2=0$

T – 4 min
S – Quadratic Equations

Ans.

92. $k^2x^2-2(k-1)x+4=0$

Ans.

Q. 93 - 95 Solve the following quadratic equations.

93. $4\sqrt{3}\,x^2+5x-2\sqrt{3}=0$

T – 6 min
S – Quadratic Equations

Ans.

94. $(3x-5)(2x+3)=0$

Ans.

95. $3x^2-243=0$

Ans.

96. Solve $\frac{x}{x+1}+\frac{x+1}{x}=\frac{34}{15}$, $x \neq -1$ and $x \neq 0$.

T – 3 min
S – Quadratic Equations

Ans.

97. The time taken by a man to cover 300 km on a scooter was $1\frac{1}{2}$ hours more than the time taken by him during the return journey. If the speed in returning be 10 kmph more than the speed in going, find his speed in each direction.

T – 3 min
S – Quadratic Equations

Ans.

98. Solve : $9x^2 - 9(a+b)x + (2a^2 + 5ab + 2b^2) = 0$

T – 3 min
S – Quadratic Equations

Ans.

99. Draw a Circle of radius 4.2 cm from a point 7.5cm away from its centre. Construct the pair of tangents to the circle and measure their lengths.

T – 3 min
S – Quadratic Equations

Ans.

100. Draw a pair of tangents to a circle of radii 4cm which are inclined to each other an angle of 60°.

T – 3 min
S – Quadratic Equations

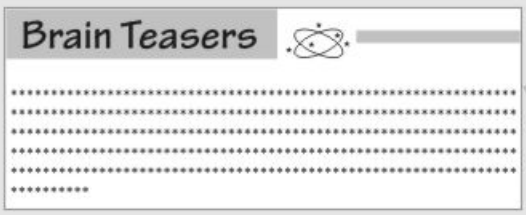
Ans.

Tools at a glance

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

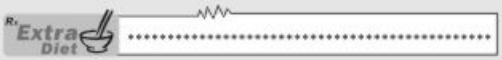
Let's Chat, the feature with suggestive topics for discussion so as to improve your capacity to debate on various topics.

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