

Grade 09 Unit 05

Maths

Course Outline

Formative 2

- Triangles
- Heron's formula
- Polynomials

MAT

(Monthly Achievement Tests)

Short Code: 447310

Test ID: NMM09U050



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  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 your knowledge through visualization 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.

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.

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. If two angles and the included side of one triangle are equal to the corresponding two angles & the included side of other triangle then the congruence criterion is

(a) SAS

(b) AAS

(c) ASA

(d) RHS

T – 1 min
S – Triangles

Ans.

2. Perimeter of any $\triangle ABC$ will be

(a) AB

(b) $AB + BC$

(c) $AB + BC + CA$

(d) $BC + CA$

T – 1 min
S – Triangles

Ans.

3. Sum of all the angles of a triangle is

(a) 90°

(b) 180°

(c) 80°

(d) 75°

T – 1 min
S – Triangles

Ans.

4. In $\triangle ABC$, $\angle A = 100^\circ$ and $AB = AC$. Find $\angle B$ and $\angle C$.

(a) $40^\circ, 50^\circ$

(b) $40^\circ, 40^\circ$

(c) $60^\circ, 60^\circ$

(d) $50^\circ, 40^\circ$

T – 1 min
S – Triangles

Ans.

5. If all the three sides of a triangle are unequal, then triangle is called a

(a) scalene triangle

(b) equilateral triangle

(c) isosceles triangle

(d) none of the above

T – 1 min
S – Triangles

Ans.

6. If each angle of a triangle is less than 90° , it is called a/an

- (a) right angled triangle
- (b) obtuse- angled triangle
- (c) acute-angled triangle
- (d) None of these Triangles

T – 1 min
S – Triangles

Ans.

7. If all the sides of a triangle are equal, it is called a/an

- (a) isosceles triangle
- (b) equilateral triangle
- (c) scalene triangle
- (d) right angled triangle

T – 1 min
S – Triangles

Ans.

8. In the $\triangle ABC$, $\angle A = 55^\circ$, $\angle B = 75^\circ$, find $\angle C$?

- (a) 30°
- (b) 50°
- (c) 65°
- (d) 45°

T – 1 min
S – Triangles

Ans.

9. In the $\triangle ABC$, $\angle B = 5\angle C$, $\angle A = 3\angle C$, find the angles of the triangle.

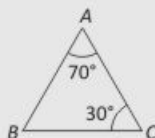
- (a) $\angle A = 60^\circ$, $\angle B = 100^\circ$, $\angle C = 20^\circ$
- (b) $\angle A = 50^\circ$, $\angle B = 50^\circ$, $\angle C = 80^\circ$
- (c) $\angle A = 30^\circ$, $\angle B = 70^\circ$, $\angle C = 130^\circ$
- (d) $\angle A = 30^\circ$, $\angle B = 70^\circ$, $\angle C = 80^\circ$

T – 1 min
S – Triangles

Ans.

10. Find $\angle B$ from the adjoining figure

- (a) 50°
- (b) 70°
- (c) 80°
- (d) 110°



T – 1 min
S – Triangles

Ans.

11. The abbreviation CPCT is generally used for

- (a) Corresponding Parts of Congruent Triangles
- (b) Common Parts of Complementary Triangles
- (c) Common Parts of Congruent Triangles
- (d) None of these

T – 1 min
S – Triangles

Ans.

12. If the angles opposite to the equal sides are equal, it is called a/an

- (a) scalene triangle
- (b) isosceles triangles
- (c) equilateral triangle
- (d) acute angled triangle

T – 1 min
S – Triangles

Ans.

13. In the adjoining figure, find $\angle BAC$ and AB if $DE = 2.1$ cm.

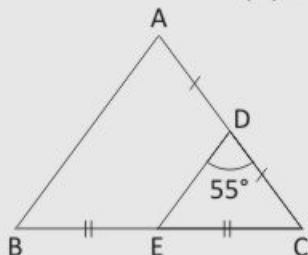
(a) 45° , 4.2 cm

(b) 45° , 3.2 cm

(c) 55° , 4.2 cm

(d) 55° , 3.2 cm

T – 1 min
S – Mid-point theorem



Ans.

14. Sides of a triangle in the ratio of 12 : 17 : 25 and its perimeter is 540 cm. Find its area

(a) 5000 cm^2

(b) 9000 cm^2

(c) 7000 cm^2

(d) 6000 cm^2

T – 1 min
S – Heron's formula

Ans.

15. Heron's formula is

(a) $\sqrt{(s-a)(s-b)(s-c)}$

(b) $\sqrt{s(s-a)(s-b)(s-c)}$

(c) $(s-a)(s-b)(s-c)$

(d) $\sqrt{s(s-a)(s-b)}$

T – 1 min
S – Heron's formula

Ans.

16. Which of the following is a polynomial of degree 1?

(a) $z + \frac{1}{z}$

(b) $6\sqrt{z}$

(c) $106x + 7$

(d) $3\sqrt{x}$

T – 1 min
S – Polynomial

Ans.

17. $x - 1$ is not a factor of

(a) $x^{10} - 1$

(b) $x^{15} - 1$

(c) $2x^{14} - 2$

(d) $x^{12} + 1$

T – 1 min
S – Polynomial

Ans.

18. Factors of $u^2 - 23u + 132$

(a) $(u - 12)(u + 11)$

(b) $(u - 12)(u - 11)$

(c) $(u + 12)(u - 11)$

(d) $(u + 12)(u + 11)$

T – 1 min
S – Polynomial

Ans.

19. 99×101 will be

(a) 9999

(b) 9990

(c) 999

(d) 99999

T – 1 min
S – Polynomial

Ans.

20. In the given polynomials, identify quadratic polynomial

(a) $x^2 + 2x + 4$

(b) $x^3 + 1$

(c) $3x^{47}$

(d) $2x + \frac{1}{x}$

T – 1 min

S – Polynomial

Ans.

Fill in the Blanks

21. If two angles and non included side of one triangle are equal to the corresponding angles and side of another triangle, then the congruence criterion is _____.

T – 1 min

S – Triangles

Ans.

22. The sum of any two sides of a triangle is _____ third side.

T – 1 min

S – Triangles

Ans.

23. Each angle of an equilateral triangle is _____.

T – 1 min

S – Triangles

Ans.

24. The three medians of a triangle are _____.

T – 1 min

S – Triangles

Ans.

25. The sum of all the angles of a triangle is _____.

T – 1 min

S – Triangles

Ans.

26. Congruent triangles are _____ in area.

T – 1 min

S – Triangles

Ans.

27. In an isosceles triangle, the angles opposite to the _____ are equal.

T – 1 min

S – Triangles

Ans.

28. $S =$ _____ .

T – 1 min
S – Heron's formula

Ans. _____

29. For positive real numbers a and b , $(a + \sqrt{b})(a - \sqrt{b}) =$ _____ .

T – 1 min
S – Polynomials

Ans. _____

30. $\sqrt{s(s-a)(s-b)(s-c)}$ is called _____ .

T – 1 min
S – Heron's formula

Ans. _____

True or False

31. Sum of any two sides of a triangle is smaller than the third side.

T – 1 min
S – Triangles

Ans. _____

32. The equality of corresponding sides is essential, for an equilateral triangle.

T – 1 min
S – Triangles

Ans. _____

33. A triangle has two internal bisectors of its angles.

T – 1 min
S – Triangles

Ans. _____

34. Symbol used for Congruency of triangle is \equiv or \cong .

T – 1 min
S – Triangles

Ans. _____

35. Surface area of a triangle $= \sqrt{s(s-a)(s-b)(s-c)}$

T – 1 min
S – Heron's formula

Ans. _____

36. The constant polynomial 0 is called the zero polynomial.

T – 1 min
S – Polynomials

Ans.

37. The highest power of the variable in a polynomial is called constant.

T – 1 min
S – Polynomials

Ans.

38. Dividend = (Divisor ÷ Quotient) + Remainder

T – 1 min
S – Polynomials

Ans.

39. $(x - y)^3 = x^3 - y^3 - 3xy(x - y)$

T – 1 min
S – Polynomials

Ans.

40. Remainder theorem and factor theorem and their use in the factorization of polynomials.

T – 1 min
S – Polynomials

Ans.

Simple question

41. Find the area of the equilateral triangle of side $2a$ cm.

T – 1 min
S – Triangles

Ans.

42. Construct a triangle ABC in which $BC = 4\text{cm}$, $\angle B = 75^\circ$ and $AB + AC = 10$ cm.

T – 1 min
S – Constructions

Ans.

43. $(2^5)^3$

T – 1 min
S – Exponents

Ans.

44. $2^{\frac{2}{3}} \cdot 2^{\frac{1}{3}}$

T – 1 min
S – Exponents

Ans.

Questions 45-46, Use suitable identity and solve the following

45. $(x + 4)(x + 6)$

T – 1 min
S – Identity

Ans.

46. $(y - 5)(y + 5)$

Ans.

47. Find one rational number between 4 and 5

T – 1 min
S – Rational number

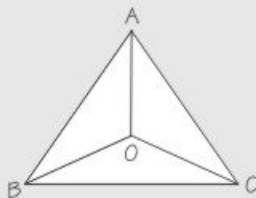
Ans.

48. The sides of a triangle plot are in the ratio of 3 : 5 : 7 and its perimeter is 300 m. Find its area.

T – 1 min
S – Heron's formula

Ans.

49. In $\triangle ABC$, $AB = AC$ and the bisectors of angles B and C intersect at point O . Prove that $BO = CO$ and the ray AO is the bisector of angle BAC .



T – 1 min
S – Triangles

Ans.

50. Factorize each of the following expression.
 $7\sqrt{2}x^2 - 10x - 4\sqrt{2}$

T – 1 min
S – Polynomials

Ans.

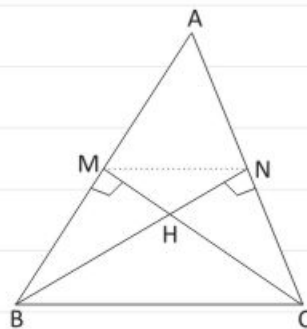
To enlighten your regular knowledge of topic. If you score more than 55 marks here, you have achieved this level brilliantly. Move to the next level of test papers.

Section B (60 marks)

Time given – 45 minutes + 5 minutes for revision

Questions 51 to 80 carry 2 marks each.

Questions 51–53. The altitudes BN and CM of $\triangle ABC$ meet at H .



T – 3 min
S – Triangles

51. Prove that $CN \times HM = BM \times HN$

Ans.

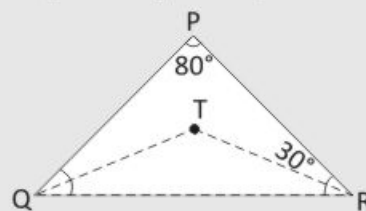
52. Prove that $\frac{HC}{HB} = \sqrt{\frac{CN \times HN}{BM \times HM}}$

Ans.

53. $\triangle MHN \sim \triangle BHC$.

Ans.

54. In figure, TQ and TR are the bisectors of $\angle Q$ and $\angle R$ respectively. If $\angle QPR = 80^\circ$ and $\angle PRT = 30^\circ$ determine $\angle TQR$ and $\angle QTR$.



T – 1 min
S – Triangle

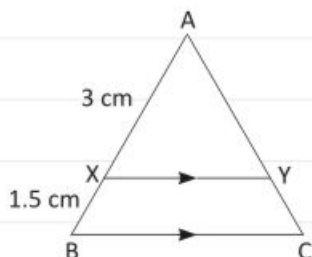
Ans.

55. Legs of a right angle triangle are of lengths 12cm and 6 cm. find the side of the largest square that can be inscribed in the triangle.

T – 1 min
S – Triangles

Ans.

Questions 56–57. In the adjoining figure, $XY \parallel BC$. Given that $AX = 3$ cm, $XB = 1.5$ cm and $BC = 6$ cm, find



56. $\frac{AY}{YC}$

T – 2 min
S – Triangles

Ans.

57. XY

Ans.

58. In a triangle ABC, AD is a median and E is mid-point of AD. BE is joined and produced to meet AC at F. Prove that $AF = \frac{1}{3} AC$.

T – 1 min
S – Triangles

Ans.

Questions 59–60. In $\triangle ABC$, the medians BE and CF are produced to points P and Q respectively such that $EP = BE$ and $FQ = CF$. Prove that :

59. Q, A and P are colinear.

T – 2 min
S – Triangles

Ans.

60. A is the mid point of QP .

Ans.

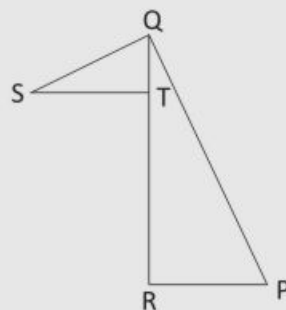
61. Find the area of a triangle whose sides are 40 m, 24 m and 32 m.

T – 1 min
S – Heron's formula

Ans.

62. In figure, T is a point on side QR of $\triangle PQR$ and S is a point such that $RT = ST$ prove that $PQ + PR > QS$.

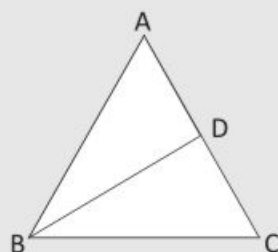
T – 2 min
S – Triangle



Ans.

63. In the figure $AC > AB$ and D is the point on AC such that $AB = AD$ prove that $BC > CD$

T – 2 min
S – Circle



Ans.

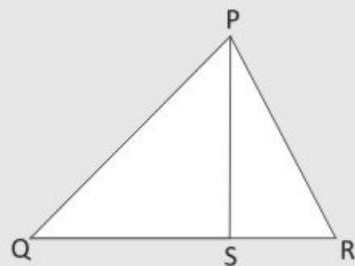
64. Find the area of triangular plot using heron's formula. The sides are 12 m, 5 m and 13 m.

T – 2 min
S – Heron's formula

Ans.

65. In $\triangle PQR$, S is any point on side QR . Show that $PQ + QR + RP > 2PS$

T – 2 min
S – Triangle



Ans.

Questions 66-69, Identify constant, linear, quadratic and cubic polynomials from the following.

66. $f(x) = 2$

T – 4 min
S – Polynomials

Ans.

67. $g(x) = 2x^3 + 7x + 9$

Ans.

68. $p(x) = 2x^2 - x + 4$

Ans.

69. $q(x) = 4x + 3$

Ans.

Questions 70-71, each of the following polynomials, find the value of a if $x + a$ is a factor.

70. $x^3 + ax^2 - 2x + a + 4$

T – 4 min
S – Polynomials

Ans.

71. $f(x) = x^4 - a^2x^2 + 3x - a$

Ans.

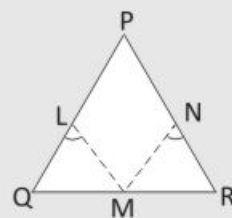
72. If two parallel lines are intersected by transversal, prove that the bisectors of the interior angles on the same side of transversal intersect each other at right angles.

T – 2 min
S – Triangle

Ans.

73. In figure, it is given that $LM = MN$, $QM = MR$, $ML \perp PQ$ and $MN \perp PR$. Prove that $PQ = PR$.

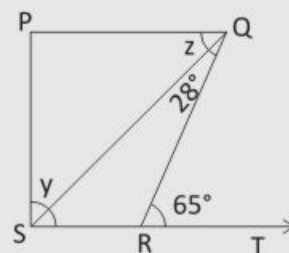
T – 2 min
S – Triangle



Ans.

74. In figure of $PS \perp PQ$, $PQ \parallel SR$, $\angle SQR = 28^\circ$ and $\angle QRT = 65^\circ$, then find the values of x and y .

T – 2 min
S – Triangle



Ans.

75. Prove that the side BC of a $\triangle ABC$ is produced on both sides show that the sum of the exterior angles so formed is greater than $\angle A$ by two right angles.

T – 2 min
S – Triangle

Ans.

76. Find the area of a triangle whose sides are 40 m, 24 m and 32 m.

T – 2 min
S – Heron's formula

Ans.

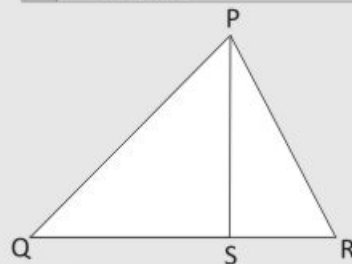
77. Find the area of triangular plot using heron's formula. The sides are 12 m, 5 m and 13 m.

T – 2 min
S – Heron's formula

Ans.

78. In $\triangle PQR$, S is any point on side QR. Show that $PQ + QR + RP > 2PS$

T – 2 min
S – Triangle



Ans.

79. If $x - y = 4$ and $xy = 21$. Find the value of $x^3 - y^3$

T – 2 min
S – Polynomials

Ans.

80. If $x - \frac{1}{x} = 3$, find the value of $x^3 - \frac{1}{x^3}$

T – 2 min
S – Polynomials

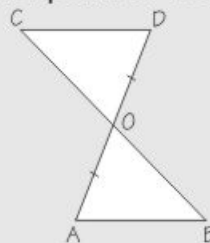
Ans.

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. In figure, line-segment AB is parallel to another line-segment CD . O is the mid-point of AD . Show (i) $\triangle AOB \cong \triangle DOC$ (ii) O is also the mid-point of BC .

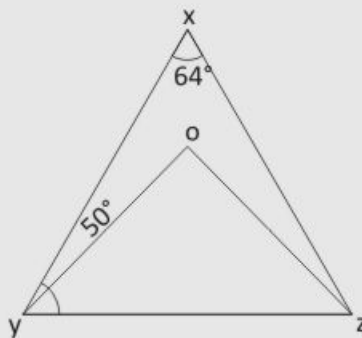


T – 2 min
S – Polynomials

Ans.

82. In the figure $\angle x = 64^\circ$, $\angle xyz = 50^\circ$. If yo and zo are the bisector of $\angle xyz$ and $\angle xzy$ respectively of $\triangle xyz$ find $\angle ozy$ and $\angle yoz$.

T – 2 min
S – Triangles



Ans.

83. ABC and DBC are two isosceles triangles on the same base BC . Show that, $\angle ABD = \angle ACD$.

T – 2 min
S – Triangles

Ans.

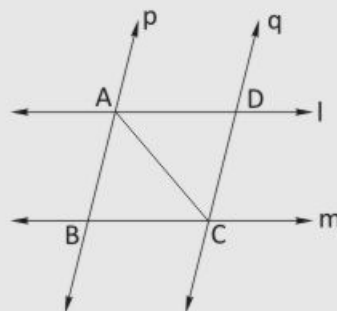
84. Construct a triangle PQR in which $QR = 6$ m, $\angle Q = 60^\circ$ and $PR - PQ = 2$ cm.

T – 2 min
S – Constructions

Ans.

85. In figure, l and m are two parallel lines intersected by another pair of parallel lines p and q show that $\triangle ABC = \triangle CDA$.

T – 2 min
S – Triangles



Ans.

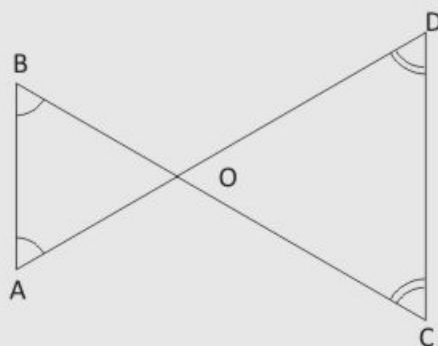
86. ABC is a triangle in which altitudes BE and CF to sides AC and AB are equal. Show that (i) $\triangle ABE \cong \triangle ACF$, (ii) $AB = AC$ i.e., $\triangle ABC$ is an isosceles triangle.

T – 2 min
S – Triangles

Ans.

87. In figure, $\angle B < \angle A$ and $\angle C < \angle D$. Show that $AD < BC$.

T – 2 min
S – Triangles



Ans.

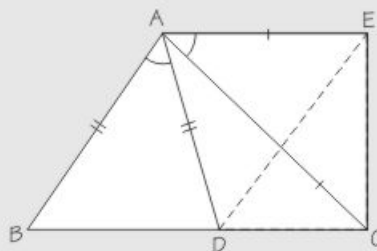
88. If the bisectors of angles $\angle ABC$ and $\angle ACB$ meet at a point O . Prove that $\angle BOC = 90^\circ + \frac{1}{2} \angle A$.

T – 2 min
S – Triangles

Ans.

89. In the figure $AC = AE$, $AB = AD$ and $\angle BAD = \angle EAC$. Prove that $BC = DE$.

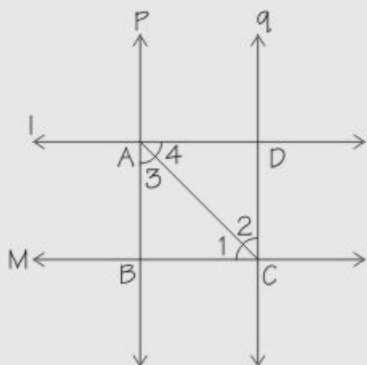
T – 2 min
S – Triangles



Ans.

90. l and m are two parallel lines intersected by another pair of parallel lines p and q as shown in the figure. Show that $\triangle ABC = \triangle CDA$.

T – 2 min
S – Triangles



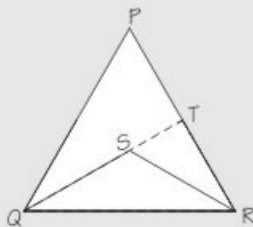
Ans.

91. If the altitudes from vertices of a triangle to the opposite sides are equal, prove that the triangle is isosceles.

T	– 2 min
S	– Triangles

Ans.

92. In figure, PQR is a triangle and S is any point in its interior. show that $SQ + SR < PQ + PR$.

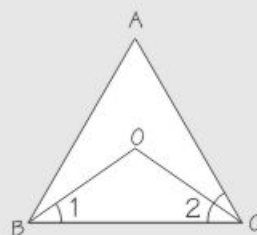


T	– 2 min
S	– Triangles

Ans.

93. If the bisectors of angles $\angle ABC$ and $\angle ACB$ meet at a point O . Then Prove that $\angle BOC = 90^\circ + \frac{1}{2} \angle A$.

T – 2 min
S – Triangles



Ans.

94. A, B, C are three angles of triangle, if $A - B = 15^\circ$ $B - C = 30^\circ$, find $\angle A, \angle B$ and $\angle C$.

T – 2 min
S – Triangles

Ans.

95. In the figure $AC = AE, AB = AD$ and $\angle BAD = \angle EAC$ Prove that $BC = DE$

T – 2 min
S – Congruent triangles

Ans.

96. If $x^2 + \frac{1}{x^2} = 7$, find the value of $x^3 + \frac{1}{x^3}$

T – 3 min
S – Polynomials

Ans.

97. Factorize $9z^3 - 27z^2 - 100z + 300$, if it is given that $(3z + 10)$ is a factor of it.

T – 3 min
S – Polynomials

Ans.

98. Prove that $\frac{0.87 \times 0.87 \times 0.87 + 0.13 \times 0.13 \times 0.13}{0.87 \times 0.87 - 0.87 \times 0.13 + 0.13 \times 0.13} = 1$

T – 3 min
S – Polynomials

Ans.

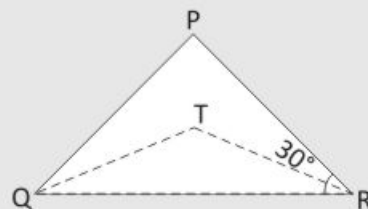
99. If $3x + 2y = 12$ and $xy = 6$, find the value of $9x^2 + 4y^2$

T – 3 min
S – Polynomials

Ans.

100. In figure TQ and TR are the bisectors of $\angle Q$ and $\angle R$ respectively. If $\angle QPR = 80^\circ$ and $\angle PRT = 30^\circ$ determine $\angle TQR$ and $\angle QTR$

T – 3 min
S – Polynomials



Ans.

Tools at a glance

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

Opening Window

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

T —
S —

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



Let's Chat

Brain Teasers



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.



Extra Diet

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
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