VIVEK TUTORIALS

Mathematics
Preliminary Exam
Max Marks: 235

Date : 20/Jan/2024 **Grade: 9th (CBSE)** **Time: 3Hrs**

Attempt the following:

1. Find the area of a triangle whose base and altitude are 5 cm and 4 cm respectively. 1

Choose and write the correct option in each of the following questions:

2. a and b are parallel sides of a trapezium with height 'h'. Which of the following is area of the trapezium? 1
   (a) (a + b) x h (b) 2(a + b) x h
   (c) 1/2 (a + b) x h (d) 1/√2 (a + b) x h
3. The area of an isosceles triangle having base 2 cm and the length of one of the equal sides 4cm is 1

   (a) $\sqrt{15}cm^2$ (b) $2\sqrt{15}cm^2$ (c) $4\sqrt{15}cm^2$ (d) $\sqrt{\frac{15}{2}}cm^2$

4. The perimeter of an isosceles triangle is 44 cm and the ratio of the equal side to its base is 4:3. The area of the triangle is 1

   (a) $12\sqrt{55}cm^2$ (b) $4\sqrt{55}cm^2$

   (c) $3\sqrt{55}cm^2$ (d) $16\sqrt{55}cm^2$

5. The length of side of an equilateral triangle is 8cm then altitude is 1
   (a) 4cm (b) 2cm (c) 4√3 cm (d) 2√3 cm
6. 1
   If area of an equilateral triangle is $\frac{\sqrt{3}}{4}$ cm², which of the following is the side of this triangle?

   (a) $\sqrt{2}$ cm (b) 4 cm (c) 2 cm (d) 1 cm

7. The sides of a triangle are 20 cm, 37 cm and 51 cm long. Then the area of the triangle is 1
   (a) 306 cm² (b) 612 cm² (c) 102 cm² (d) 153 cm²
8. The area of an isosceles triangle having base x cm and one of the equal side y cm is 1

   (a) $\frac{x^2-y^2}{4}cm^2$ (b) $\frac{x}{2}\sqrt{y^2-\frac{x^2}{2}}cm^2$

   (c) $x\sqrt{4y^2-x^2}cm^2$ (d) $\frac{x}{2}\sqrt{\frac{4y^2-x^2}{4}}cm^2$

9. The area of an equilateral triangle with side 2√3 cm is 1
   (a) 5.196 cm² (b) 0.866 cm² (c) 3.496 cm² (d) 1.732 cm²
10. The edges of a triangular board are 12cm, 17 cm and 25 cm, The cost of painting it one of the surface at the rate of 50 paisa per cm² is 1
    (a) Rs 22.50 (b) Rs 45 (c) Rs 55 (d) Rs 90
11. The area of an equilateral triangle with side 3√3 cm is 1

(a) $\frac{9\sqrt{3}}{2}cm^2$ (b) $9\sqrt{3}cm^2$ (c) $9\ cm^2$ (d) $9\sqrt{2}cm^2$

12. The area of a triangle with sides 11 cm, 12 cm and 13 cm is 1

(a) $6\sqrt{105}cm^2$ (b) $12\sqrt{105}cm^2$

(c) $60\sqrt{35}cm^2$ (d) $6\sqrt{35}cm^2$

13. If a, b, c are the lengths of three sides of a triangle, then area of triangle = $\sqrt{s(s-a)(s-b)(s-c)}$ where s is 1

(a) perimeter of the triangle
(b) Semi-perimeter of the triangle
(c) Height of the triangle
(d) Shortest side of the triangle

14. An isosceles right triangle has area 8 cm². The length of its hypotenuse is 1
(a) √32 cm (b) √16 cm (c) √48 cm (d) √24 cm

15. If the side of a rhombus is 10 cm and one diagonal is 16 cm, the area of the rhombus is 1
(a) 24 cm² (b) 48 cm² (c) 96 cm² (d) 90 cm²

16. If the sides of a triangle are doubled, then its area 1
(a) remains same (b) is doubled
(c) become three times (d) become four times

17. The altitude of an equilateral triangle is5√3 cm. The area is 1
(a) 50√3 cm² (b) 255√3 cm² (c) 40√3 cm² (d) 25√3 cm²

18. The area of an isosceles triangle having base 4 cm and the length of one of the equal sides 5cm is 1
(a) 4√21 cm² (b) 84 cm² (c) 42 cm² (d) 2√21 cm²

19. If the base and height of a triangle are doubled, then its area 1
(a) become 2 times (b) become 4 times
(c) is halved (d) does not change

20. The perimeter of an equilateral triangle is 60 m. Then area of equilateral triangle is 1
(a) 10√3 m² (b) 15√3 m² (c) 20√3 m² (d) 100√3 m²

21. The sides of a triangle are 56 cm, 60 cm and 52 cm long. Then the area of the triangle is 1
(a) 1322 cm² (b) 1311 cm² (c) 1344 cm² (d) 1392 cm²

22. The area of a right angled triangle whose legs are 12 cm and 14 cm in length is 1
(a) 168 cm² (b) 84 cm² (c) 42 cm² (d) 80 cm²

23. The perimeter of an equilateral triangle is 48 cm. Its area is 1
(a) 64√3 m² (b) 144√3 m² (c) 16√3 m² (d) 256√3 m²

24. The area of a trapezium with parallel sides 16 cm and 10 cm in length and the distance of 6 cm between them is 1
(a) 58 cm² (b) 39 cm² (c) 156 cm² (d) 78 cm²

25. The parallel sides of a trapezium have lengths 42 cm and 26 cm and the distance between them is 16 cm. Its area is 1
(a) 1088 cm² (b) 544 cm² (c) 752 cm² (d) 815 cm²

26. The length of each side of an equilateral triangle having an area of 9√3 cm² is 1
(a) 8 cm (b) 36 cm (c) 4 cm (d) 6 cm

27. The length of each side of an equilateral triangle having an area of 16√3 cm² is 1
(a) 10 cm (b) 4 cm (c) 6 cm (d) 8 cm

28. The length of the hypotenuse of an isosceles right triangle with area 72 cm² is 1
(a) 12 cm (b) 12√2 cm (c) 24 cm (d) 12.5 cm

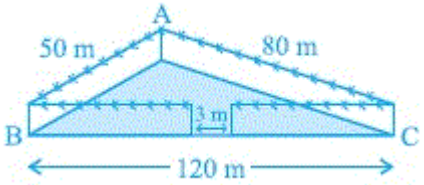
29. If the perimeter of a square 4a units then which of the following is the length of diagonal is: 1
(a) a unit (b) 2a units (c) √a units (d) √2a units

30. If the perimeter of an equilateral triangle is 6 cm, which of the following is its area? 1

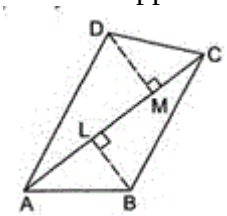
(a) $\sqrt{3}$ cm² (b) $\frac{3}{4}$ cm² (c) $\frac{\sqrt{3}}{2}$ cm² (d) $\frac{3}{2}$ cm²

Attempt the following:

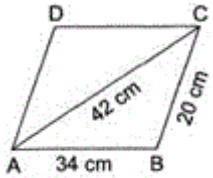
31. Find the area of an equilateral triangle having altitude h cm. 2
32. A triangular park ABC has sides 120m, 80m and 50m. A gardener Dhania has to put a fence all around it and also plant grass inside. How much area does she need to plant? Find the cost of fencing it with barbed wire at the rate of Rs 20 per metre leaving a space 3m wide for a gate on one side. 2



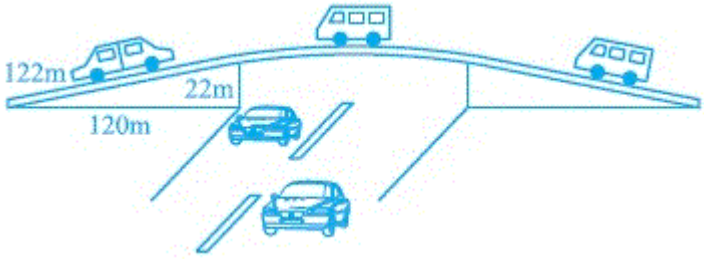
33. Find the area of a triangle two sides of which are 18 cm and 10 cm and the perimeter is 42 cm. 2
34. In a four-sided field, the length of the longer diagonal is 128 m. The length of the perpendiculars from the opposite vertices upon this diagonal are 22.7 m and 17.3 m. Find the area of the field. 2



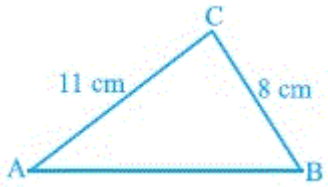
35. The sides of a triangular field are 41 m, 40 m and 9 m. Find the number of rose beds that can be prepared in the field, if each rose bed, on an average needs 900 cm² space. 2
36. The difference between the sides at right angles in a right-angled triangle is 14 cm. The area of the triangle is 120 cm². Calculate the perimeter of the triangle. 2
37. The adjacent sides of a parallelogram ABCD are AB = 34 cm, BC = 20 cm and diagonal AC = 42 cm. Find the area of parallelogram. 2



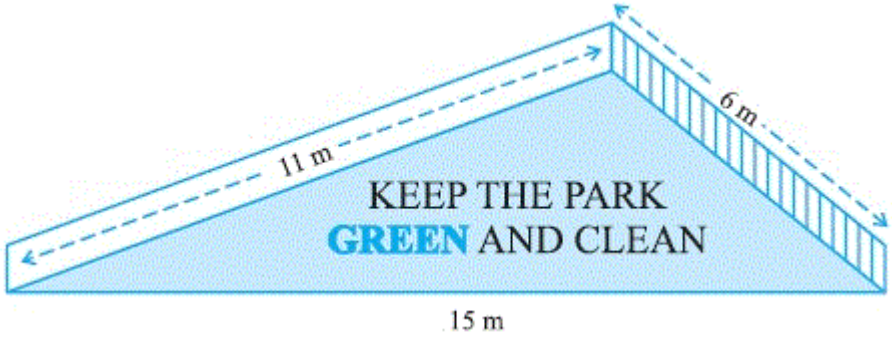
38. Find the area of an equilateral triangle having each side 4 cm. 2
39. Find the area of equilateral triangle having each side x cm. 2
40. The triangular side walls of a flyover have been used for advertisements. The sides of the walls are 122 m, 22 m and 120 m. The advertisements yield an earning of Rs. 5000 per m² per year. A company hired one of its walls for 3 months. How much rent did it pay? 2



41. If each side of an equilateral triangle is tripled then what is the percentage increase in the area of the triangle? 2
42. Find the area of an isosceles triangle each of whose equal sides is 13 cm and whose base is 24 cm. 2
43. Find the area of a triangle whose sides are 3 cm, 4 cm and 5 cm respectively. 2
44. Find the area of a triangle, two sides of which are 8 cm and 11 cm and the perimeter is 32 cm. 2



45. An isosceles triangle has perimeter 30 cm and each of the equal sides is 12 cm. Find the area of the triangle. 2
46. Find the cost of laying grass in a triangular field of sides 50 m, 65 m and 65 m at the rate of Rs 7 per m^2. 2
47. There is a slide in a park. One of its side walls has been painted in some colour with a message "KEEP THE PARK GREEN AND CLEAN". If the sides of the wall are 15 m, 11 m and 6 m, find the area painted in colour. 2



48. The sides of a triangular plot are in the ratio of 3 : 5 : 7 and its perimeter is 300 m. Find its area. 2
49. The perimeter of an isosceles triangle is 32 cm. The ratio of the equal side to its base is 3 : 2. Find the area of the triangle. 2
50. A traffic signal board, indicating 'SCHOOL AHEAD', is an equilateral triangle with side 'a'. Find the area of the signal board, using Heron's formula. If its perimeter is 180 cm, what will be the area of the signal board? 2
51. Find the area of a triangle whose base is 25 cm long and the corresponding height is 10.8 cm. 2
52. The base of an isosceles triangle measures 24 cm and its area is 192 cm^2. Find its perimeter. 2

Fill in the blanks

53. Square with side a then area = _____. 1
54. Isosceles triangle with base a and equal side b then area = _____. 1
55. Parallelogram with base b and altitude h then area=_____. 1
56. Rhombus with diagonal d_1 and d_2 then area = _____and perimeter=_____. 1
57. Equilateral triangle with side a then altitude = _____. 1
58. Triangle with base b and altitude h has area = _____. 1
59. Trapezium with parallel side a and b and the distance between two parallel sides as h then area = _____. 1
60. Triangle with sides a,b,c has semi-perimeter = _____ and area = _____. 1
61. Regular hexagon with side a then area = _____. 1
62. Rectangle with length and breadth then area = _____ perimeter = _____ and diagonal= _____. 1

Attempt the following:

63. Find the area of a triangle whose sides are respectively 150 cm, 120 cm and 200 cm. 3
64. Find the area of a triangle two sides of which are 18 cm and 10 cm and the perimeter is 42 cm. 3
65. If each side of a triangle is doubled, then find percentage increase in its area. 3
66. Let triangle be the area of triangle. Find the area of a triangle whose each side is twice the side of the given triangle. 3
67. The perimeter of a triangular field is 144 m and the ratio of the sides is 3 : 4 : 5. Find the area of the field. 3
68. Find the area of quadrilateral ABCD in which AB = 9 cm, BC = 40 cm, CD = 28 cm, DA = 15 cm and $\angle ABC = 90°$. 3

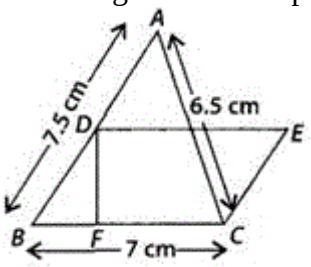
69. The height of an equilateral triangle is 6 cm. Find the area of the triangle. [Take $\sqrt{3} = 1.732$] 3

70. Find the perimeter and area of a triangle whose sides are of lengths 52 cm, 56 cm and 60 cm respectively. 3

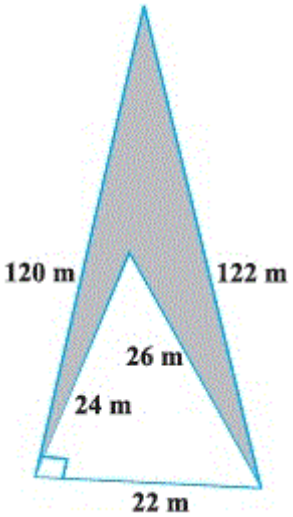
71. Find the area of a triangle whose sides are 9 cm, 12 cm and 15 cm. 3

72. The triangular side walls of a flyover have been used for advertisements. The sides of the walls are 13 m, 14 m and 15 m. The advertisements yield an earning of Rs 2000 per m^2 a year. A company hired one of its walls for 6 months. How much rent did it pay? 3

73. In figure, ΔABC has sides AB = 7.5 cm, AC = 6.5 cm and BC = 7 cm. On base BC a parallelogram DBCE of same area as that of ΔABC is constructed. 3
Find the height DF of the parallelogram.



74. Calculate the area of the shaded region in figure. 3

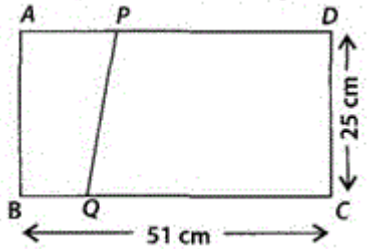


75. Using Heron's formula, find the area of an equilateral triangle of side a units. 3

76. The perimeter of a triangular field is 420 m and its sides are in the ratio 6 : 7 : 8. Find the area of the triangular field. 3

77. Sides of a triangle are in the ratio of 12 : 17 : 25 and its perimeter is 540 cm. Find its area. 3

78. The dimensions of a rectangle ABCD are 51 cm × 25 cm. A trapezium PQCD with its parallel sides QC and PD in the ratio 9 : 8, is cut off from the rectangle as shown in the figure. If the area of the trapezium PQCD is 5/6 th part of the area of the rectangle, find the lengths QC and PD. 3



True or False

79. The area of a rhombus with each side 5cm and one of the diagonal 6cm is 15 cm^2. 1

80. The area of a triangle with base 4 cm and height 6 cm is 24 cm^2. 1

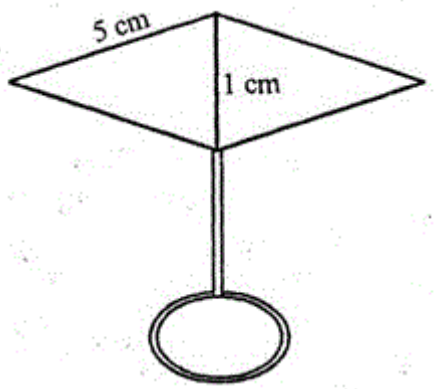
81. The area of any quadrilateral ABCD is twice the area of triangle ABC. 1

82. The area of a triangle with sides 12cm, 14 cm and 16 cm and height 6 cm corresponding to side 16 cm, is 48 cm^2. 1

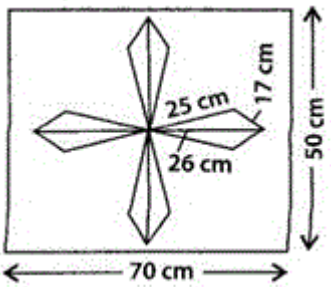
83. The area of a regular hexagon of side a is the sum of the areas of the five equilateral triangle with side a. 1
84. s is used in Heron's formula for the perimeter of the triangle. 1
85. The area of the equilateral triangle is $3\sqrt{3}$ cm²whose side is $2\sqrt{3}$ cm. 1
86. The altitude of an equilateral triangle with side a is $\sqrt{3}/2a$. 1
87. The area of an isosceles right triangle is the product of the length of its two legs. 1
88. The area of the equilateral triangle is $20\sqrt{3}$ cm² whose each side is 8 cm. 1

Attempt the following:

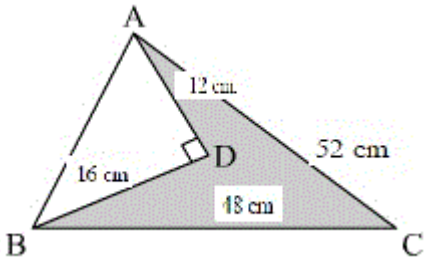
89. If each side of a triangle is doubled, then find the ratio of area of the new triangle thus formed and the given triangle. 5
90. Find the area of the blades of the magnetic compass shown in figure. (Take $\sqrt{11} = 3.32$) 5



91. The lengths of the sides of a triangle are in the ratio 3 : 5 : 5 and its perimeter is 155 cm. Find the area of the triangle and the height corresponding to the longest side. 5
92. A design is made on a rectangular tile of dimensions 50 cm × 70 cm as shown in figure. The design shows 8 triangles, each of sides 26 cm, 17 cm and 25 cm. Find the total area of the design and the remaining area of the tile. 5



93. A triangle has sides 35 cm, 55 cm and 61 cm ling. Find its area. Also, find the smallest of its attitude. 5
94. From a point in the interior of an equilateral triangle, perpendiculars are drawn on the three sides. The lengths of the perpendiculars are 15 cm, 10 cm and 6 cm. Find the area of the triangle. 5
95. The perimeter of a triangular field is 250 dm. If two of its sides are 78 dm and 50 dm, find the length of the perpendicular on the side of length 50 dm from the opposite vertex. 5
96. The sides of a quadrangular field taken in order are 26 m, 27 m, 7 m and 25 m respectively. The angle contained by the last two sides is a right angle. Find its area. 5
97. The adjacent sides of a parallelogram ABCD measures 35 cm and 20 cm, and the diagonal AC measures 52 cm. Find the area of the parallelogram. 5
98. The lengths of the sides of a triangle are in ratio 3 : 5 : 5 and its perimeter is 155 cm. Find (i) the area of the triangle and (ii) the height corresponding to the longest side. 5
99. Find the area of the shaded region in Figure. 5



100. In a Δ ABC, AB = 15 cm, BC = 13 cm and AC = 15 cm. Find the area of ΔABC and hence its altitude on AC. 5

101. The perimeter of an isosceles triangle is 52 cm and its base is (3/2) times each of the equal sides. Find the length of each side of the triangle, area of the triangle and the height of the triangle. 5

102. The perimeter of a triangle is 50 cm. One side of a triangle is 5 cm longer than the smaller side and the third side is 6 cm less than twice the smaller side. Find the area of the triangle. 5

Assertion and Reason type questions:

103. Assertion (A): If the area of an equilateral triangle is $36\sqrt{3}$ cm², then its height is $6\sqrt{3}$. 1
Reason (R): Area of parallelogram = base × altitude.
(a) Both A and R are true and R is the correct explanation for A.
(b) Both A and R are true and R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

104. Assertion: The area of parallelogram ABCD = 2322 cm² 1
Reason: Area of parallelogram ABCD = 2 × ar (triangle ABC)
Area of $(\Delta ABC) = \sqrt{s(s-a)(s-b)(s-c)}$
Where a = 40 cm, b = 80 cm, c = 60 cm and 2 s = a + b + c
(a) Both A and R are true and R is the correct explanation for A.
(b) Both A and R are true and R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

105. Assertion: The area of an equilateral triangle having side 4cm is 3 cm². 1
Reason: The area of an equilateral triangle each side a is $\frac{\sqrt{3}}{4}a^2$ squnits
(a) Both A and R are true and R is the correct explanation for A.
(b) Both A and R are true and R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

106. Assertion: The area of an isosceles triangle having base 24 cm and each of the equal sides = 13 cm is 60 cm². 1
Reason: If 2s = a + b + c where a, b, c are the sides of a triangle then the area of triangle is $\sqrt{s(s-a)(s-b)(s-c)}$

(a) Both A and R are true and R is the correct explanation for A.
(b) Both A and R are true and R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

107. Assertion: If the base of an isosceles triangle is 6cm and its perimeter is 16 cm, then its area is 12 cm^2. 1
Reason: If a, b, c be the sides of the triangle ABC then its perimeter $2s = a + b + c$ and its area $= \sqrt{s(s-a)(s-b)(s-c)}$

(a) Both A and R are true and R is the correct explanation for A.
(b) Both A and R are true and R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

108. Assertion: The side of Triangle ABC are in the ratio 2:3:4 and its perimeter is 36 cm then ar (triangle ABC) $= 12\sqrt{15}cm^2$ 1
Reason: If $2s = a + b + c$, where a, b, c are the sides of a triangle, then its area $= \sqrt{s(s-a)(s-b)(s-c)}$

(a) Both A and R are true and R is the correct explanation for A.
(b) Both A and R are true and R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

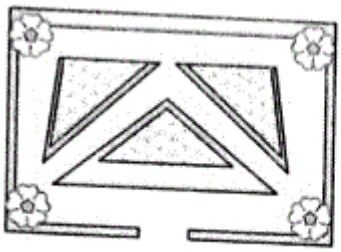
109. Assertion (A): The edges of a triangular board are 6cm, 8 cm and 10 cm. Then the cost of painting it at the rate at 9 paise per cm^2 is Rs 2.16 1
Reason (R): The perimeter of the triangle ABC with sides a,b,c is 2s= a + b + c
(a) Both A and R are true and R is the correct explanation for A.
(b) Both A and R are true and R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

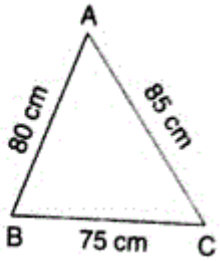
Case Study Questions:

110. Decoration was done in the form of triangles on a kid's birthday party. There were paper decorations made of little to large triangles all over the place. Based on the given information, answer the following questions. 4

(a) What is the semi-perimeter of the triangle decorations of side 5cm each? [1 Mark]
(b) What is the cost of paper required for one triangle of sides 5 cm each if the cost of paper is INR 0.5 per meter?
OR
What is the area covered by one triangular decoration by heron's formula? [2 Mark]
(c) What will be the semi-perimeter of triangle with sides 4 cm, 6 cm and 3 cm? [1 Mark]

111. To beautify parks in a city, city municipal corporation decided to make triangular flower beds in parks as shown in figure below. The dimensions of a triangular flower bed are 75 m × 80 m × 85 m. Based on this information answer the following questions. 4





(i) If each triangular flower bed is to be fenced with two parallel wires are below than length of the wire used is

(a) 120 m (b) 240 m (c) 260 m (d) 480 m

(ii) The area of a flower bed is

(a) $300\sqrt{42}$ m² (b) $300\sqrt{21}$ m² (c) $600\sqrt{21}$ m² (d) $400\sqrt{21}$ m²

(iii) If each triangular bed is an equilateral triangle of side 60 m, then its area is

(a) $900\sqrt{3}$ m² (b) $600\sqrt{3}$ m² (c) $1200\sqrt{3}$ m² (d) $400\sqrt{3}$ m²

(iv) The area of an isosceles triangle with base 'a' and equal sides 'b' is given by

(a) $\frac{a}{4}\sqrt{4b^2-a^2}$ (b) $\frac{b}{4}\sqrt{4a^2-b^2}$ (c) $\frac{a}{2}\sqrt{2b^2-a^2}$ (d) $\frac{b}{2}\sqrt{4a^2-b^2}$

(v) If each triangular bed is in the form of an isosceles triangles with base 60 m and sides of length 40 m each, then area of a flower bed is

(a) $150\sqrt{7}$ m² (b) $75\sqrt{7}$ m² (c) $300\sqrt{7}$ m² (d) $200\sqrt{7}$ m²

112. In the road there was a traffic sign for the pedestals. After seeing that sign, the traffic moves slowly knowing that there are pedestals walking. Based on the given information, answer the following questions. 4

(a) If the sides of the triangular warning sign is 3 cm, 4 cm and 5 cm. what is the semi-perimeter of the triangle? [1 Mark]

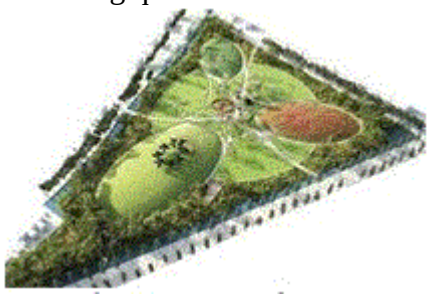
(b) What will be the area of the warning sign?

OR

What is the perimeter of the triangle if the sides are 3 cm, 6 cm and 2 cm? [2 Mark]

(c) What is the semi- perimeter of the triangle if the sides are 3 cm, 6 cm and 2 cm? [1 Mark]

113. There is a triangular park where different types of flowers have been planted. The three sides of triangular park are of length 9 m, 12 m and 15 m. based on the give information, answer the following questions. 4



(a) What will be the side of equilateral triangle if its perimeter is 150 cm. [1 Mark]

(b) What is the semi-perimeter of the park?
OR
What is the perimeter of the triangular park? [2 Mark]
(c) Mention Heron's formula for calculating the area of triangle? [1 Mark]

-------- All the Best --------