

Important Questions - Heron's Formula

9th Standard CBSE

Mathematics

Reg.No. :

--	--	--	--	--	--

Time : 01:00:00 Hrs

Total Marks : 50

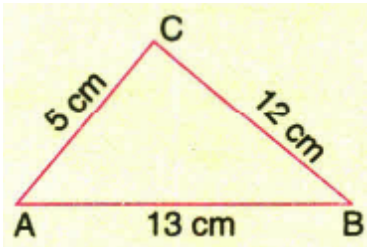
Section-A

- 1) Base of a triangle = 1
- (a) $\frac{2 \times \text{Area}}{\text{Height}}$ (b) $\frac{\text{Area}}{\text{Height}}$ (c) $\frac{\text{Area}}{2 \times \text{Height}}$ (d) $\frac{\text{Area}}{4 \times \text{Height}}$
- 2) Area of an isosceles right triangle is 8 cm^2 . Its hypotenuse is 1
- (a) $\sqrt{32} \text{ cm}$ (b) 4 cm (c) $4\sqrt{3} \text{ cm}$ (d) $2\sqrt{6} \text{ cm}$
- 3) Heron's formula is 1
- (a) $\Delta = \sqrt{s(s+a)(s+b)(s+c)}$ (b) $\Delta = \sqrt{s(s-a)(s-b)(s-c)}$
- (c) $\Delta = \sqrt{s(s-a)(s-b)(s-c)}$, $s=a+b+c$ (d) $\Delta = \sqrt{s(s-a)(s-b)(s-c)}$, $2s=a+b+c$
- 4) In an equilateral triangle of side 'a', the length of the altitude is 1
- (a) $\frac{\sqrt{3}a}{4}$ (b) $\frac{\sqrt{3}a}{2}$ (c) $\sqrt{3}a$ (d) $2\sqrt{3}a$
- 5) Area of a triangle = 1
- (a) $\frac{1}{2} \times \text{Base} \times \text{Height}$ (b) $\text{Base} \times \text{Height}$ (c) $\frac{1}{3} \times \text{Base} \times \text{Height}$ (d) $\frac{1}{4} \times \text{Base} \times \text{Height}$
- 6) The perimeter of a triangular plot is 16 m. If the measures of its two sides are 5 m, and 6m, then find the third side. 1
- (a) 2 m (b) 3 m (c) 5 m (d) 4 m
- 7) The difference of semi-perimeter and the sides of ΔABC are 8 cm, 7 cm, and 5 cm respectively. Its semi-perimeter is 1
- (a) 10 cm (b) 5 cm (c) 15 cm (d) 20 cm
- 8) Area of a quadrilateral = 1
- (a) $\frac{1}{2} \times \text{a diagonal} \times \text{sum of the perpendicular on the diagonal}$
- (b) $\text{a diagonal} \times \text{sum of the perpendicular on the diagonal}$
- (c) $\frac{1}{3} \times \text{a diagonal} \times \text{sum of the perpendicular on the diagonal}$
- (d) $\frac{1}{4} \times \text{a diagonal} \times \text{sum of the perpendicular on the diagonal}$
- 9) The sides of a triangular plot are in the ratio 4:5:6 and its perimeter is 150 cm. Then the sides are 1
- (a) 4 cm, 5 cm, 6 cm (b) 40 cm, 50 cm, 60 cm (c) 8 cm, 10 cm, 12 cm (d) 120 cm, 150 cm, 180 cm
- 10) The side of a square is 5 cm. Its perimeter is 1
- (a) 5 cm (b) 20 cm (c) 25 cm (d) 10 cm.

Section-B

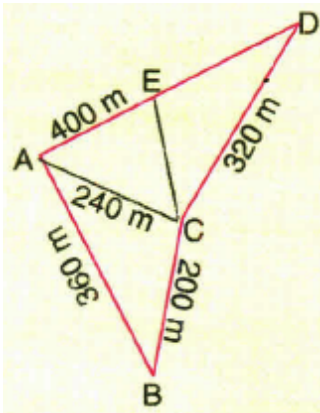
- 11) The sides of a right triangle ABC are 5 cm, 12 cm and 13 cm. Find the area of the triangle.

2



- 12) Kamla has a triangular field with sides 240 m, 200 m, 360 m, where she grew wheat. In another triangular field with sides 240 m, 320 m, 400 m adjacent to the previous field, she wanted to grow potatoes and onions. She divided the field in two parts by joining the mid-point of the longest side to the opposite vertex and grew potatoes in one part and onions in the other part. How much area (in hectares) has been used for wheat, potatoes, and onions? (1 hectare = 10000 m²).

2



- 13) Find the area of a triangle, whose sides are 26 cm, 28 cm, and 30 cm respectively. Find the height corresponding to the longest side.

2

- 14) Find the area of a triangle whose sides are 6.5 cm, 7 cm and 7.5 cm.

2

- 15) The sides of a triangular plot are in the ratio 3: 5: 7 and its perimeter is 300 m. Find its area and the length of perpendicular drawn on the biggest side.

2

- 16) The unequal side of an isosceles triangle is 6 cm and its perimeter is 24 cm. Find its area.

2

- 17) Find the area of an isosceles triangle, whose equal sides are of length 15 cm each and third side is 12 cm.

2

- 18) Find the area of the quadrilateral ABCD where AB = 7 cm, BC = 6 cm, CD = 12 cm, DA = 15 cm and AC = 9 cm.

2

- 19) A triangle and a parallelogram have the same base and same area. If the sides of the triangle are 15 cm, 14 cm and 13 cm and the parallelogram stands on the base 14 cm. find the height of the parallelogram.

2

- 20) Find the area of a right-angled triangle if the radius of its circumcircle is 3 cm and altitude drawn to the hypotenuse is 2 cm.

2

Section-C

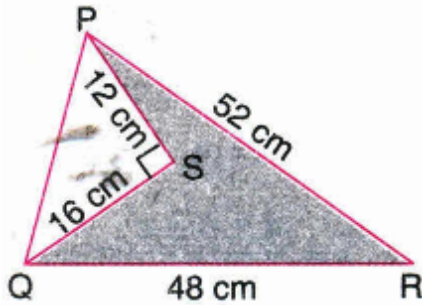
- 21) Students of a school staged a rally for cleanliness campaign. They walked through the lanes in two groups.

5

One group walked through the lanes AB, BC and CA; while the other through AC, CD and DA. Then they cleaned the area enclosed within their lanes. If AB = 9 m, BC = 40 m, CD = 15 m, DA = 28 m and $\angle B = 90^\circ$, which group cleaned more area and by how much? Find the total area cleaned by the students.

22) In the following figure, calculate the area of the shaded portion:

5



23) The cross-section of a canal is in the shape of a trapezium. If the canal is 12 m wide at the top and 8 m wide at the bottom and the area of its cross-section is 84 m^2 , determine its depth.

5

24) A triangle and a parallelogram have the same base and the same area. If the sides of the triangle are 15 cm, 14 cm, and 13 cm, and the parallelogram stands on the base 15 cm, find the height of the parallelogram.

5

Section-A

- | | |
|--|---|
| 1) (a) $\frac{2 \times \text{Area}}{\text{Height}}$ | 1 |
| 2) (a) $\sqrt{32}$ cm | 1 |
| 3) (d) $\Delta = \sqrt{s(s-a)(s-b)(s-c)}$, $2s=a+b+c$ | 1 |
| 4) (b) $\frac{\sqrt{3}a}{2}$ | 1 |
| 5) (a) $\frac{1}{2} \times \text{Base} \times \text{Height}$ | 1 |
| 6) (c) 5 m | 1 |
| 7) (d) 20 cm | 1 |
| 8) (a) $\frac{1}{2} \times \text{a diagonal} \times \text{sum of the perpendicular on the diagonal}$ | 1 |
| 9) (b) 40 cm, 50 cm, 60 cm | 1 |
| 10) (b) 20 cm | 1 |

Section-B

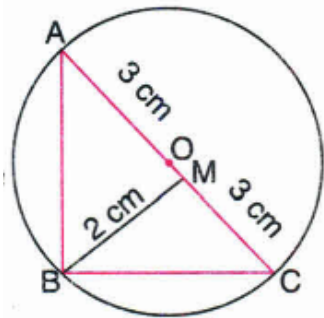
- | | |
|--|---|
| 11) 30 cm^2 | 2 |
| 12) 2.26 hectares (nearly), 1.92 hectares (nearly), 1.92 hectares (nearly) | 2 |
| 13) 336 cm^2 , 22.4 cm | 2 |
| 14) 21 cm^2 | 2 |
| 15) $1500\sqrt{3} \text{ m}^2$, $\frac{150\sqrt{3}}{7} \text{ m}$ | 2 |
| 16) $18\sqrt{2} \text{ cm}^2$ | 2 |
| 17) $18\sqrt{21} \text{ cm}^2$ | 2 |
| 18) 74.97 cm^2 | 2 |
| 19) 6 cm | 2 |

20) Let ABC be the right angled triangle right angled at B. Let O be the centre of the circumcircle.

2

Then, O is the midpoint of the hypotenuse AC. I by geometry

$$\begin{aligned} OA &= OB = OC \\ &= \text{Radius of the circumcircle} = 3 \text{ cm} \end{aligned}$$



$$\begin{aligned} \therefore \text{Hypotenuse AC} &= \text{Diameter of the circle} \\ &= 2 \times \text{Radius of the circumcircle} \\ &= 2 \times 3 = 6 \text{ cm} \end{aligned}$$

Let BM be the perpendicular from B on AC.

$$\therefore BM = 2 \text{ cm}$$

\therefore Area of the right angled triangle ABC

$$\begin{aligned} &= \frac{1}{2} \times \text{Base} \times \text{Altitude} \\ &= \frac{1}{2} \times AC \times BM = \frac{1}{2} \times 6 \times 2 = 6 \text{ cm}^2. \end{aligned}$$

Section-C

21) First group cleaned more area by 54m^2 ; 306 m^2 .

5

22) In right triangle PSQ, $PQ^{\frac{1}{2}^2} = PS^2 + QS^2$ |By Pythagoras Theorem

5

$$\begin{aligned} &= (12)^2 + (16)^2 \\ &= 144 + 256 = 400 \end{aligned}$$

$$\Rightarrow PQ = \sqrt{400} = 20 \text{ cm}$$

Now, for ΔPQR

$$a=20\text{cm}, b=48\text{cm}, c=52\text{cm}$$

$$\therefore s = \frac{a+b+c}{2} = \frac{20+48+52}{2} = 60 \text{ cm}$$

$$\begin{aligned} \therefore \text{Area of } \Delta PQR &= \sqrt{s(s-a)(s-b)(s-c)} \\ &= \sqrt{60(60-20)(60-48)(60-52)} \\ &= \sqrt{(60)(40)(12)(8)} \\ &= \sqrt{(6 \times 10)(4 \times 10)(6 \times 2)(8)} \\ &= 6 \times 10 \times 8 = 480 \text{ cm}^2 \end{aligned}$$

$$\text{Area of } \Delta PSQ = \frac{1}{2} \times \text{Base} \times \text{Altitude}$$

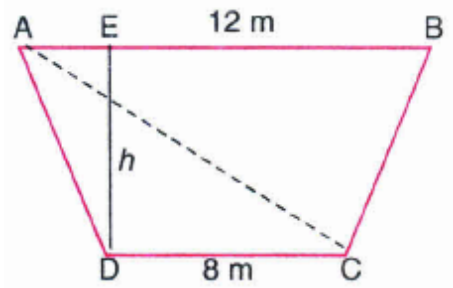
$$= \frac{1}{2} \times 16 \times 12 = 96 \text{ cm}^2$$

\therefore Area of the shaded portion = Area of ΔPQR - Area of ΔPSQ

$$= 480 - 96 = 384 \text{ cm}^2$$

23) Let the depth be h m

$$\text{Area of trapezium} = 84 \text{ m}^2$$



$$\Rightarrow \text{Area of } \triangle ABC + \text{Area of } \triangle ADC = 84 \text{ m}^2$$

$$\Rightarrow \frac{1}{2} (AB)(DE) + \frac{1}{2} (DC)(DE) = 84$$

$$\Rightarrow \frac{1}{2} (12)(h) + (8)(h) = 84$$

$$\Rightarrow 6h + 4h = 84$$

$$\Rightarrow 10h = 84$$

$$\Rightarrow h = \frac{84}{10} = 8.4$$

Hence, the depth of the canal is 8.4 m.

24) For triangle $a=15$ cm, $b=14$ cm, $c=13$ cm

$$\therefore s = \frac{a+b+c}{2} = \frac{15+14+13}{2} = 21 \text{ cm}$$

$$\begin{aligned} \therefore \text{Area} &= \sqrt{s(s-a)(s-b)(s-c)} \\ &= \sqrt{21(21-15)(21-14)(21-13)} \\ &= \sqrt{21(6)(7)(8)} = 84 \text{ cm}^2 \end{aligned}$$

Let the height of the parallelogram be h cm.

$$\text{Then, area of the parallelogram} = \text{Base} \times \text{Height} = 15 \times h = 84 \text{ cm}^2$$

According to the question, Area of the parallelogram = Area of the triangle

$$\Rightarrow 15h = 84$$

$$\Rightarrow \frac{84}{15} = 5.6 \text{ cm}$$

Hence, the height of the parallelogram is 5.6 cm.