

ICSE Class 9 Maths Selina Solutions Chapter 20: Here are the Selina Solutions for Maths Class 9 Chapter 20 Area and Perimeter of Plane Figures. Understanding the ideas covered in Class 9 is essential since they serve as the foundation for Class 10 topics.

To achieve remarkable results in the Class 9 Mathematics examination, it is recommended that you complete the exercises in every chapter of the book published by Selina to answer the questions. These Selina maths solutions for class 9 aid pupils in effectively grasping all of the material.

ICSE Class 9 Maths Selina Solutions Chapter 20 Overview

ICSE Class 9 Maths Selina Solutions Chapter 20: Area and Perimeter of Plane Figures focuses on teaching students how to calculate the area and perimeter of various two-dimensional shapes, including rectangles, squares, circles, triangles, and polygons. The chapter provides formulas and methods for finding these measurements, which are fundamental in geometry.

By working through this chapter, students learn to apply these concepts to solve problems, develop problem-solving skills, and prepare for more advanced mathematical topics. Understanding these basic principles helps in everyday situations and builds a solid foundation for future studies in mathematics.

ICSE Class 9 Maths Selina Solutions Chapter 20

Below we have provided ICSE Class 9 Maths Selina Solutions Chapter 20 –

1. Find the area of a triangle whose sides are 18 cm, 24 cm and 30 cm.

Also, find the length of altitude corresponding to the largest side of the triangle.

Solution:

The sides of the triangle are 18 cm, 24 cm and 30 cm respectively

The semi-perimeter is

$$s = (18 + 24 + 30)/2$$

$$= 36$$

Hence, the area of the triangle is

$$\begin{aligned}
A &= \sqrt{[s(s-a)(s-b)(s-c)]} \\
&= \sqrt{[36(36-a)(36-24)(36-30)]} \\
&= \sqrt{(36 \times 18 \times 12 \times 6)} \\
&= \sqrt{46656} \\
&= 216 \text{ sq. cm}
\end{aligned}$$

Again, we have

$$\text{Area} = \frac{1}{2} \times \text{base} \times \text{altitude}$$

Hence,

$$216 = \frac{1}{2} \times 30 \times h$$

$$h = 14.4 \text{ cm}$$

2. The length of the sides of a triangle are in the ratio 3: 4: 5. Find the area of the triangle if its perimeter is 144 cm.

Solution:

Let's assume the sides of the triangle to be

$$a = 3x, b = 4x \text{ and } c = 5x$$

And, given that the perimeter is 144 cm

So,

$$3x + 4x + 5x = 144$$

$$12x = 144$$

$$x = 144/12$$

$$x = 12 \dots (i)$$

Now, semi-perimeter is

$$s = (a + b + c)/2$$

$$= 12x/2$$

$$= 6x$$

$$= 6(12) \dots [\text{From (i)}]$$

$$= 72$$

So, the sides of the triangle are $a = 36$ cm, $b = 48$ cm and $c = 60$ cm

Hence, the area of the triangle is

$$A = \sqrt{[s(s-a)(s-b)(s-c)]}$$

$$= \sqrt{[72(72-36)(72-48)(72-60)]}$$

$$= \sqrt{(72 \times 36 \times 24 \times 12)}$$

$$= \sqrt{746496}$$

$$= 864 \text{ cm}^2$$

3. ABC is a triangle in which $AB = AC = 4$ cm and $\angle A = 90^\circ$. Calculate:

(i) The area of $\triangle ABC$,

(ii) The length of perpendicular from A to BC.

Solution:

(i) Area of the triangle is given by

$$A = \frac{1}{2} \times AB \times AC$$

$$= \frac{1}{2} \times 4 \times 4$$

$$= 8 \text{ sq. cm}$$

(ii) Now, again the area of the triangle can be expressed as

$$A = \frac{1}{2} \times BC \times h$$

So,

$$8 = \frac{1}{2} \times \sqrt{(4^2 + 4^2)} \times h \text{ [By Pythagoras theorem, } BC^2 = 4^2 + 4^2 \text{]}$$

$$8 = \frac{1}{2} \times 4\sqrt{2} \times h$$

$$8 = 2\sqrt{2} \times h$$

$$h = \frac{8}{2\sqrt{2}}$$

$$h = 2.83 \text{ cm}$$

Hence, the length of perpendicular from A to BC is 2.83 cm

4. The area of an equilateral triangle is $36\sqrt{3}$ sq. cm. Find its perimeter.

Solution:

$$\text{Given, area of equilateral triangle} = 36\sqrt{3} \text{ cm}^2$$

We know that,

Area of an equilateral triangle is given by,

$$A = \frac{\sqrt{3}}{4} \times (\text{side})^2$$

So, now

$$\frac{\sqrt{3}}{4} \times (\text{side})^2 = 36\sqrt{3}$$

$$(\text{side})^2 = (36\sqrt{3}) / (\frac{\sqrt{3}}{4})$$

$$= 36 \times 4$$

$$= 144$$

Taking square root on both sides, we get

$$\text{Side of the equilateral triangle} = 12 \text{ cm}$$

$$\text{Hence, the perimeter of the equilateral triangle} = 3 \times \text{side}$$

$$= 3 \times 12$$

$$= 36 \text{ cm}$$

5. Find the area of an isosceles triangle whose perimeter is 36 cm and base is 16 cm.

Solution:

Given,

$$\text{Perimeter of the isosceles triangle} = 36 \text{ cm and base} = 16 \text{ cm}$$

Since, the length of two sides are equal

The sides are $(36 - 16)/2 = 10$ cm each

Now, we have

a = equal sides = 10 cm and

b = base = 16 cm

Let's assume 'h' to be the altitude of the isosceles triangle.

As the altitude from the vertex bisects the base perpendicularly, we can apply Pythagoras Theorem.

Hence, we have

$$h = \sqrt{a^2 - (b/2)^2}$$

$$= \frac{1}{2} \sqrt{4a^2 - b^2}$$

And, the area of the triangle is given by

$$A = \frac{1}{2} \times \text{base} \times \text{altitude}$$

$$= \frac{1}{2} \times b \times \frac{1}{2} \sqrt{4a^2 - b^2}$$

$$= \frac{1}{2} \times 16 \times \frac{1}{2} \times \sqrt{4 \times 10^2 - 16^2}$$

$$= \frac{1}{4} \times 16 \times \sqrt{400 - 256}$$

$$= 4 \times \sqrt{144}$$

$$= 4 \times 12$$

$$= 48 \text{ sq. cm}$$

Therefore, the area of the isosceles triangle is 48 sq. cm

ICSE Class 9 Maths Selina Solutions Chapter 20 Exercise 20B

1. Find the area of a quadrilateral one of whose diagonals is 30 cm long and the perpendiculars from the other two vertices are 19 cm and 11 cm respectively.

Solution:

We know that,

Area of quadrilateral = $\frac{1}{2} \times \text{one diagonal} \times (\text{sum of the lengths of the perpendiculars drawn from it on the remaining two vertices})$

$$= \frac{1}{2} \times 30 \times (11 + 19)$$

$$= 15 \times 30$$

$$= 450 \text{ sq. cm}$$

2. The diagonals of a quadrilateral are 16 cm and 13 cm. If they intersect each other at right angles; find the area of the quadrilateral.

Solution:

We know that,

Area of the quadrilateral = $\frac{1}{2} \times \text{the product of the diagonals}$

$$= \frac{1}{2} \times 16 \times 13$$

$$= 8 \times 13$$

$$= 104 \text{ cm}^2$$

3. Calculate the area of quadrilateral ABCD, in which $\angle ABD = 90^\circ$, triangle BCD is an equilateral triangle of side 24 cm and AD = 26 cm.

Solution:

From the right triangle ABD, we have $\angle ABD = 90^\circ$

So, by Pythagoras Theorem

$$AB = \sqrt{26^2 - 24^2}$$

$$= \sqrt{676 - 576}$$

$$= \sqrt{100}$$

$$= 10 \text{ cm}$$

Now, the area of right triangle ABD is

$$\text{Ar } (\triangle ABD) = \frac{1}{2} \times AB \times BD$$

$$= \frac{1}{2} \times 10 \times 24$$

$$= 120 \text{ cm}^2$$

Again, in the equilateral triangle BCD we have, $CP \perp BD$

So, by Pythagoras Theorem

$$PC = \sqrt{(24^2 - 12^2)}$$

$$= \sqrt{(576 - 144)}$$

$$= \sqrt{432}$$

$$= \sqrt{(144 \times 3)}$$

$$= 12\sqrt{3} \text{ cm}$$

Now, the area of the triangle BCD is

$$\text{Ar}(\triangle BCD) = \frac{1}{2} \times BD \times PC$$

$$= \frac{1}{2} \times 24 \times 12\sqrt{3}$$

$$= 144\sqrt{3} \text{ cm}^2$$

Therefore, the area of the quadrilateral is given by

$$\text{Ar}(ABCD) = \text{Ar}(\triangle ABD) + \text{Ar}(\triangle BCD)$$

$$= (120 + 144\sqrt{3}) \text{ cm}^2$$

$$= 369.41 \text{ cm}^2$$

4. Calculate the area of quadrilateral ABCD in which $AB = 32 \text{ cm}$, $AD = 24 \text{ cm}$, $\angle A = 90^\circ$ and $BC = CD = 52 \text{ cm}$.

Solution:

We have, quadrilateral ABCD in which $AB = 32 \text{ cm}$, $AD = 24 \text{ cm}$, $\angle A = 90^\circ$ and $BC = CD = 52 \text{ cm}$

Now, as ABD is a right triangle, it's the area is given as

$$\triangle ABD = \frac{1}{2} \times 24 \times 32$$

$$= 12 \times 32$$

$$= 384 \text{ cm}^2$$

Again, by Pythagoras Theorem

$$BD = \sqrt{(24^2 + 32^2)}$$

$$= 8\sqrt{(3^2 + 4^2)}$$

$$= 8\sqrt{25}$$

$$= 8 \times 5$$

$$= 40 \text{ cm}$$

Now, as BCD is an isosceles triangle and $BP \perp BD$, we have

$$DP = \frac{1}{2} BD$$

$$= \frac{1}{2} \times 40$$

$$= 20 \text{ cm}$$

Then,

From the right triangle DPC, we have

$$PC = \sqrt{(52^2 - 20^2)} \text{ [By Pythagoras Theorem]}$$

$$= 4\sqrt{(13^2 - 5^2)}$$

$$= 4\sqrt{(169 - 25)}$$

$$= 4 \times \sqrt{144}$$

$$= 4 \times 12$$

$$= 48 \text{ cm}$$

So, the area of $\triangle DPC = \frac{1}{2} \times 40 \times 48$

$$= 20 \times 48$$

$$= 960 \text{ cm}^2$$

Therefore, the area of the quadrilateral is given by

$$\text{Ar } (\triangle ABD) + \text{Ar } (\triangle DPC) = 960 + 384$$

$$= 1344 \text{ cm}^2$$

5. The perimeter of a rectangular field is $\frac{3}{5}$ km. If the length of the field is twice its width; find the area of the rectangle in sq. metres.

Solution:

Let's assume the width of the rectangular field to be x km and length to be $2x$ km

Now, according to the question, we have

$$2(x + 2x) = \frac{3}{5}$$

$$3x = \frac{3}{10}$$

$$x = \frac{1}{10} \text{ km}$$

$$\text{i.e., } x = \frac{1000}{10} \text{ m} = 100 \text{ m}$$

Thus, the width is 100 m and the length is 200m of the rectangular field

Therefore, the area of the rectangular field is

$$A = \text{length} \times \text{width}$$

$$= 100 \times 200$$

$$= 20,000 \text{ sq. m}$$

ICSE Class 9 Maths Selina Solutions Chapter 20 Exercise 20C

1. The diameter of a circle is 28 cm. Find its:

(i) Circumference

(ii) Area.

Solution:

Let's assume r to be the radius of the circle

(i) Given, diameter = 28 cm

$$\text{So, radius} = \frac{28}{2} = 14 \text{ cm}$$

Now,

$$\text{Circumference} = 2\pi r$$

$$= 2 \times \frac{22}{7} \times 14$$

$$= 88 \text{ cm}$$

(ii) The area of the circle is given by

$$\text{Area} = \pi r^2$$

$$= \frac{22}{7} \times 14^2$$

$$= \frac{22}{7} \times 14 \times 14$$

$$= 44 \times 14$$

$$= 616 \text{ cm}^2$$

2. The circumference of a circular field is 308 m. Find is:

(i) Radius

(ii) Area.

Solution:

Let's assume r to be the radius of the circular field

(i) Given,

The circumference of the circular field = 308 m

$$2\pi r = 308$$

$$r = \frac{308}{2\pi}$$

$$= \frac{154}{\pi}$$

$$= \frac{(154 \times 7)}{22}$$

$$= 49 \text{ m}$$

Hence, the radius of the circular field is 49 m

(ii) Now, the area of the circular field is calculated as

$$\text{Area} = \pi r^2$$

$$= \frac{22}{7} \times 49^2$$

$$= \frac{22}{7} \times 49 \times 49$$

$$= 22 \times 7 \times 49$$

$$= 7546 \text{ cm}^2$$

3. The sum of the circumference and diameter of a circle is 116 cm. Find its radius.

Solution:

Let's consider r to be the radius of the circle

Then, according to the question, we have

$$2\pi r + 2r = 116$$

$$2r(\pi + 1) = 116$$

$$r = 116/2(\pi + 1)$$

$$= 88/(22/7 + 1)$$

$$= 14 \text{ cm}$$

Hence, the radius of the circle is 14 cm

4. The radii of two circles are 25 cm and 18 cm. Find the radius of the circle which has circumference equal to the sum of circumferences of these two circles.

Solution:

We have,

The radii of two circles are 25 cm and 18 cm

Now, the circumference of the first circle is

$$S_1 = 2\pi \times 25$$

$$= 50\pi \text{ cm}$$

And,

The circumference of the second circle is

$$S_2 = 2\pi \times 18$$

$$= 36\pi \text{ cm}$$

According to the question,

Let's assume R to be the radius of the resulting circle

So,

$$2\pi R = 50\pi + 36\pi$$

$$2\pi R = \pi(50 + 36)$$

Dividing by π on both sides, we get

$$2R = 86$$

$$R = 43 \text{ cm}$$

Therefore, the radius of the circle which has circumference equal to the sum of circumferences of the given two circles is 43 cm

5. The radii of two circles are 48 cm and 13 cm. Find the area of the circle which has its circumference equal to the difference of the circumferences of the given two circles.

Solution:

We have,

The radii of two circles are 48 cm and 13 cm

Now, the circumference of the first circle is

$$S_1 = 2\pi \times 48$$

$$= 96\pi \text{ cm}$$

And,

The circumference of the second circle is

$$S_s = 2\pi \times 13$$

$$= 26\pi \text{ cm}$$

According to the question,

Let's assume R to be the radius of the resulting circle

So,

$$2\pi R = 96\pi - 26\pi$$

$$2\pi R = \pi(96 - 26)$$

Dividing by π on both sides, we get

$$2R = 70$$

$$R = 35 \text{ cm}$$

Then, the area of the circle is given by

$$A = \pi R^2$$

$$= \pi \times 35^2$$

$$= 22/7 \times 35 \times 35$$

$$= 22 \times 5 \times 35$$

$$= 3850 \text{ cm}^2$$

Therefore, the area of the required circle is 3850 cm^2

ICSE Class 9 Maths Selina Solutions Chapter 20 Exercise 20D

1. The perimeter of a triangle is 450 cm and its side are in the ratio 12 : 5 : 13. Find the area of the triangle.

Solution:

Let's assume the sides of the triangle to be

$$a = 12x$$

$$b = 5x$$

$$c = 13x$$

And, given that the perimeter of the triangle = 450 cm

$$\text{So, } 12x + 5x + 13x = 450$$

$$\Rightarrow 30x = 450$$

$$\Rightarrow x = 15$$

Thus, the sides of a triangle are

$$a = 12x = 12(15) = 180 \text{ cm}$$

$$b = 5x = 5(15) = 75 \text{ cm}$$

$$c = 13x = 13(15) = 195 \text{ cm}$$

Now,

The semi-perimeter of the triangle, $s = (a + b + c)/2$

$$= (180 + 75 + 195)/2$$

$$= 450/2$$

$$= 225 \text{ cm}$$

Hence, the area of the triangle is given by

$$\text{Area} = \sqrt{[s(s - a)(s - b)(s - c)]}$$

$$= \sqrt{[225(225 - 180)(225 - 75)(225 - 195)]}$$

$$= \sqrt{(225 \times 45 \times 150 \times 30)}$$

$$= 15 \sqrt{(9 \times 5 \times 5 \times 30 \times 30)}$$

$$= 15 \times 3 \times 5 \times 30$$

$$= 6750 \text{ cm}^2$$

2. A triangle and a parallelogram have the same base and the same area. If the side of the triangle are 26 cm, 28 cm and 30 cm and the parallelogram stands on the base 28 cm, find the height of the parallelogram.

Solution:

Let's assume the sides of the triangle to be

$$a = 26 \text{ cm, } b = 28 \text{ cm and } c = 30 \text{ cm}$$

Now,

The semi-perimeter of the triangle, $s = (a + b + c)/2$

$$= (26 + 28 + 30)/2$$

$$= 84/2$$

$$= 42 \text{ cm}$$

Hence, the area of the triangle is given by

$$\text{Area} = \sqrt{[s(s - a)(s - b)(s - c)]}$$

$$= \sqrt{[42(42 - 26)(42 - 28)(42 - 30)]}$$

$$= \sqrt{(42 \times 16 \times 14 \times 12)}$$

$$= \sqrt{(7 \times 6 \times 4^2 \times 7 \times 2 \times 6 \times 2)}$$

$$= 7 \times 6 \times 4 \times 2$$

$$= 336 \text{ cm}^2$$

Given, the base of the parallelogram = 28 cm

And, area of the parallelogram = area of the triangle

So,

$$\text{Base} \times \text{Height} = 336$$

$$28 \times \text{Height} = 336$$

$$\text{Height} = 336/28$$

$$= 12 \text{ cm}$$

Therefore, the height of the parallelogram is 12 cm

3. Using the information in the following figure, find its area.

Solution:

Let's make a construction of drawing $CM \perp AB$

Now,

In right-angled triangle CMB, we have

$$BM^2 = BC^2 - CM^2 \text{ [By Pythagoras Theorem]}$$

$$= (15)^2 - (9)^2$$

$$= 225 - 81$$

$$= 144 \text{ m}$$

On taking square root on both sides, we get

$$BM = 12 \text{ m}$$

Now,

$$AB = AM + BM$$

$$= 23 + 12$$

$$= 35 \text{ m}$$

Hence, the area of the trapezium = $\frac{1}{2} \times (\text{sum of parallel sides}) \times \text{Height}$

$$= \frac{1}{2} \times (AB + CD) \times AD$$

$$= \frac{1}{2} \times (23 + 35) \times 9$$

$$= \frac{1}{2} \times 58 \times 9$$

$$= 261 \text{ m}^2$$

4. Sum of the areas of two squares is 400 cm^2 . If the difference of their perimeters is 16 cm, find the sides of the two squares.

Solution:

Let's assume the sides of the two squares to be a and b respectively

Then,

$$\text{Area of one square, } S_1 = a^2$$

$$\text{And, area of the second square, } S_2 = b^2$$

According to the question, we have

$$S_1 + S_2 = 400 \text{ cm}^2$$

$$\Rightarrow a^2 + b^2 = 400 \text{ cm}^2 \dots (1)$$

Also given, the difference in their perimeters = 16 cm

$$\Rightarrow 4a - 4b = 16 \text{ cm}$$

$$a - b = 4$$

$$a = (4 + b)$$

Substituting the value of 'a' in (1), we get

$$(4 + b)^2 + b^2 = 400$$

$$16 + 8b + b^2 + b^2 = 400$$

$$2b^2 + 8b - 384 = 0$$

$$b^2 + 4b - 192 = 0$$

$$b^2 + 16b - 12b - 192 = 0$$

$$b(b + 16) - 12(b + 16) = 0$$

$$(b + 16)(b - 12) = 0$$

$$b + 16 = 0 \text{ or } b - 12 = 0$$

$$\Rightarrow b = -16 \text{ or } b = 12$$

As, the side of a square cannot be negative, we neglect the value -16.

$$\text{Hence, } b = 12$$

And,

$$a = 4 + b = 4 + 12 = 16$$

Therefore, the sides of a square are 16 cm and 12 cm respectively

5. Find the area and the perimeter of a square with diagonal 24 cm. [Take $\sqrt{2} = 1.41$]

Solution:

Given, the diagonal of a square = 24 cm

We know that,

Diagonal of a square = $\sqrt{2}$ times the side of a square

$$24 = \sqrt{2} \times (\text{side of a square})$$

So,

$$\text{Side of the square} = 24/\sqrt{2}$$

$$= 12\sqrt{2} \text{ cm}$$

Thus,

The perimeter of the square = 4 x side

$$= 4 \times 12\sqrt{2}$$

$$= 48\sqrt{2}$$

$$= 48 \times 1.41$$

$$= 67.68 \text{ cm}$$

And,

The area of the square = (side)²

$$= (12\sqrt{2})^2$$

$$= 144 \times 2$$

$$= 288 \text{ cm}^2$$

Benefits of ICSE Class 9 Maths Selina Solutions Chapter 20

The "ICSE Class 9 Maths Selina Solutions Chapter 20: Area and Perimeter of Plane Figures" covers essential concepts in geometry, which are crucial for students at this level. Understanding and mastering these concepts provides several benefits:

1. Foundational Knowledge for Geometry:

Concepts of Area and Perimeter: This chapter lays the groundwork for understanding the area and perimeter of various geometric shapes such as rectangles, squares, circles, triangles, and polygons.

Formulas and Applications: Students learn specific formulas for calculating area and perimeter, which are essential for solving more complex geometric problems in higher grades.

2. Problem-Solving Skills:

Practice with Diverse Problems: The chapter includes a variety of problems that help students practice and apply their knowledge in different scenarios. This enhances their problem-solving skills.

Logical Thinking: Working through these problems helps develop logical reasoning and analytical skills, which are valuable in mathematics and other subjects.

3. Preparation for Advanced Topics:

Foundation for Further Studies: Mastery of area and perimeter is crucial for understanding more advanced topics in geometry and trigonometry in higher classes.

Real-World Applications: Concepts learned in this chapter have practical applications in fields such as architecture, engineering, and design.

4. Exam Readiness:

ICSE Exam Preparation: Familiarity with chapter-specific problems and solutions helps students prepare for ICSE exams. The solutions provide step-by-step guidance, which can be useful for understanding how to approach similar problems in exams.

Improved Accuracy: Regular practice with these solutions improves accuracy and efficiency in solving geometry problems.