# PRACTICE PAPER 19 (2026-27)
# CHAPTER-06
# PERIMETER AND AREA

**SUBJECT: MATHEMATICS** **MAX. MARKS : 40**

**CLASS : IX** **DURATION : 1½ hrs**

**General Instructions:**

(i). **All** questions are compulsory.

(ii). This question paper contains 2**0** questions divided into five Sections A, B, C, D and E.

(iii). **Section A** comprises of **10 MCQs** of **1 mark** each. **Section B** comprises of 4 questions of **2 marks** each. **Section C** comprises of 3 questions of **3 marks** each. **Section D** comprises of 1 question of **5 marks** each and **Section E** comprises of 2 Case Study Based Questions of **4 marks** each.

(iv). There is no overall choice.

(v). Use of Calculators is not permitted

## SECTION – A

**Questions 1 to 10 carry 1 mark each.**

**1.** The length of each side of an equilateral triangle having an area of $9\sqrt{3}$ $cm^2$ is

(a) 8 cm (b) 36 cm (c) 4 cm (d) 6 cm

**2.** The perimeter of an equilateral triangle is 60 m. The area is

(a) $10\sqrt{3}$ $m^2$ (b) $15\sqrt{3}$ $m^2$ (c) $20\sqrt{3}$ $m^2$ (d) $100\sqrt{3}$ $m^2$

**3.** The height of an equilateral triangle is 6 cm. Its area is

(a) $12\sqrt{3}$ $cm^2$ (b) $6\sqrt{3}$ $cm^2$ (c) $12\sqrt{3}$ $cm^2$ (d) 18 $cm^2$

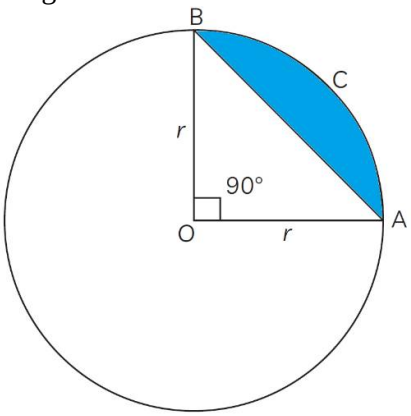
**4.** Sides of a triangle are 8 cm, 11 cm and 13 cm. Then value of 's' is

(a) 19 cm (b) 20 cm (c) 21.5 cm (d) 16 cm

**5.** What is the area of a semi-circle of diameter 'd'?

(a) $\frac{1}{16}\pi d^2$ (b) $\frac{1}{4}\pi d^2$ (c) $\frac{1}{8}\pi d^2$ (d) $\frac{1}{2}\pi d^2$

**6.** In the given figure, the area of the segment ACB is




(a) $\frac{r^2}{4}(\pi-2)$ (b) $\frac{r^2}{4}(\pi+2)$ (c) $\frac{r^2}{4}(\pi-1)$ (d) $\frac{r^2}{4}(\pi+1)$

**7.** The area of the circle that can be inscribed in a square of 6 cm is:

(a) 36π $cm^2$ (b) 18π $cm^2$ (c) 12π $cm^2$ (d) 9π $cm^2$

www.smartachievers.online

**8.** The minute hand of a clock is 84 cm long. The distance covered by the tip of minute hand from 10:10 am to 10:25 am is :

(a) 44 cm (b) 88 cm (c) 132 cm (d) 176 cm

**In the following questions 9 and 10, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.**

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

**9. Assertion (A):** If the radius of an arc is 8 cm and the central angle is 40°, then the length of an arc is 5.59 cm.

**Reason (R):** Length of arc = $\pi r^2 \times \frac{\theta}{360^0}$

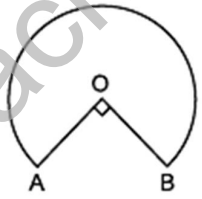
**10. Assertion (A):** Area of an equilateral triangle having each side 4 cm is $4\sqrt{3}$ cm$^2$

**Reason (R):** Area of an equilateral triangle = $\frac{\sqrt{3}}{4} \times (Side)^2$

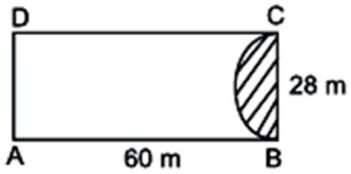
## SECTION – B

**Questions 11 to 14 carry 2 marks each.**

**11.** In the given figure, the shape of the top of a table is that a sector of a circle with centre O and ∠AOB = 90°. If AO = OB = 42 cm, then find the perimeter of the top of the table. [Use $\pi = \frac{22}{7}$]




**12.** A plot is in the form of a rectangle ABCD having semicircle on BC as shown in the figure. The semicircle portion is grassy while the remaining plot is without grass. Find the area of the plot without grass where AB = 60 m and BC = 28 m. [Use $\pi = \frac{22}{7}$]




**13.** The sides of a triangle are in the ratio 13 : 14 : 15 and its perimeter is 84 cm. Find the area of the triangle.

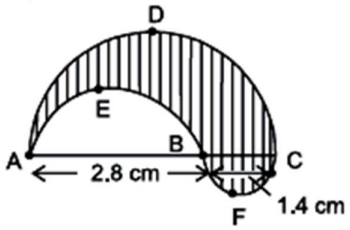
**14.** The perimeter of an isosceles triangle is 32 cm. The ratio of equal side to the base is 3 : 2 Using Heron's formula, find the area of triangle.

## SECTION – C

**Questions 15 to 17 carry 3 marks each.**

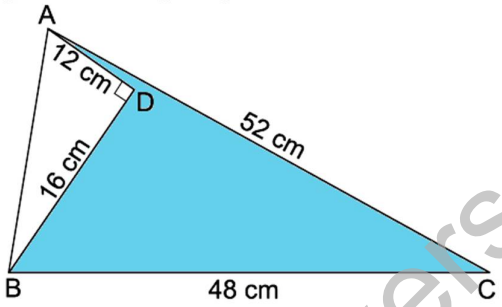
www.smartachievers.online

**15.** In the fig., find the perimeter of shaded region where ADC, AEB and BFC are semicircles on diameters AC, AB and BC respectively.




**16.** The triangular side walls of a flyover have been used for advertisements. The sides of the walls are 13 m, 14 m, 15 m. The advertisements yield an earning of Rs. 2000 per m2 a year. A company hired one of its walls for 6 months. How much rent did it pay?

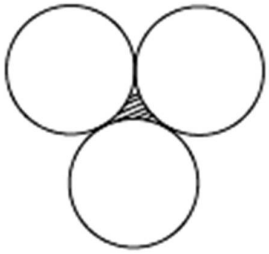
**17.** Find the area of the shaded region in the figure given below.




## SECTION – D

**Questions 18 carry 5 marks.**

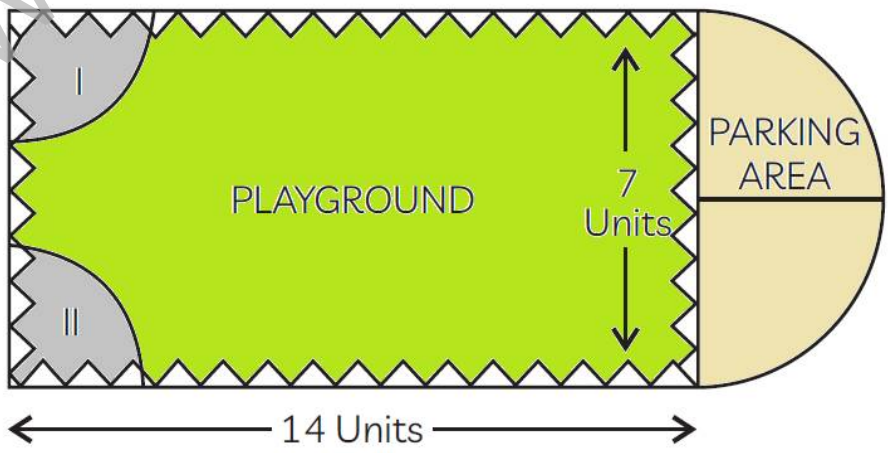
**18.** In the given figure, three circles each of radius 3.5 cm are drawn in such a way that each of them touches the other two. Find the area of shaded region enclosed between these three circles. [Use $\pi = 22/7$ and $\sqrt{3} = 1.732$]



## SECTION – E (Case Study Based Questions)

**Questions 19 to 20 carry 4 marks each.**

**19.** Governing council of a local public development authority of Dehradun decided to build an adventurous playground on the top of a hill, which will have adequate space for parking.
After survey, it was decided to build rectangular playground, with a semi–circular area allotted for parking at one end of the playground. The length and breadth of the rectangular playground are 14 units and 7 units, respectively. There are two quadrants of radius 2 units on one side for special seats.




Based on the above information, answer the following questions:

www.smartachievers.online

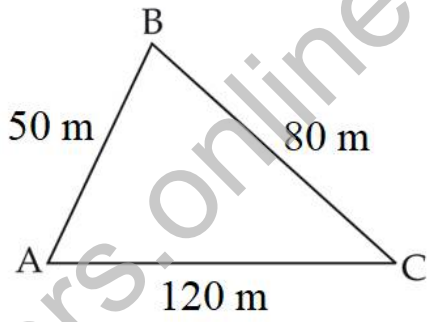
(a) What is the total perimeter of the parking area? (1)
(b) What is the total area of parking and the two quadrants? (2)

**OR**

What is the ratio of area of playground to the area of parking area?
(c) Find the cost of fencing the playground and parking area at the rate of ₹ 2 per unit. (1)

**20.** In my colony a park is situated in front of my house. This park has built in shape of triangle (ABC) with the following sides 120m, 80m and 50m. Now-a-days, some animals entered park and destroy and eat plants. So, our ward member of area has decided to put railing around the park for protecting plants and grass. Ward member ordered to a gardener to place a railing all around this park and maintain grass inside park. He also sanctioned an amount to improve park in a proper way for public of that colony. Costing is decided Rs. 10 per meter for railing around the park.






(i) What is the perimeter of the park? [1]
(ii) Calculate the semi-perimeter of triangle park, in which planting is needed? [2]
(iii) Calculate the area, in which planting is needed? [2]

**OR**

(iii) 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]

www.smartachievers.online

# PRACTICE PAPER 19 (2026-27) CHAPTER-06
# PERIMETER AND AREA
# (ANSWERS)

SUBJECT: MATHEMATICS | MAX. MARKS : 40
CLASS : IX | DURATION : 1½ hrs

**General Instructions:**

(i). **All** questions are compulsory.
(ii). This question paper contains 2**0** questions divided into five Sections A, B, C, D and E.
(iii). **Section A** comprises of **10 MCQs** of **1 mark** each. **Section B** comprises of 4 questions of **2 marks** each. **Section C** comprises of 3 questions of **3 marks** each. **Section D** comprises of 1 question of **5 marks** each and **Section E** comprises of 2 Case Study Based Questions of **4 marks** each.
(iv). There is no overall choice.
(v). Use of Calculators is not permitted

## SECTION – A

**Questions 1 to 10 carry 1 mark each.**

**1.** The length of each side of an equilateral triangle having an area of $9\sqrt{3}$ $cm^2$ is
(a) 8 cm (b) 36 cm (c) 4 cm (d) 6 cm
Ans: (d) 6 cm

$$\frac{\sqrt{3}}{4}a^2 = 9\sqrt{3} \Rightarrow a = 6cm$$

**2.** The perimeter of an equilateral triangle is 60 m. The area is
(a) $10\sqrt{3}$ $m^2$ (b) $15\sqrt{3}$ $m^2$ (c) $20\sqrt{3}$ $m^2$ (d) $100\sqrt{3}$ $m^2$
Ans: (d) $100\sqrt{3}$ $m^2$

As side of an equilateral triangle = $\frac{60}{3} = 20m$

$$\therefore \text{Area} = \frac{\sqrt{3}}{4}a^2 = \frac{\sqrt{3}}{4} \times 20^2 = 100\sqrt{3}m^2$$

**3.** The height of an equilateral triangle is 6 cm. Its area is
(a) $12\sqrt{3}$ $cm^2$ (b) $6\sqrt{3}$ $cm^2$ (c) $12\sqrt{3}$ $cm^2$ (d) 18 $cm^2$
Ans: (a) $12\sqrt{3}$ $cm^2$

Height of equilateral triangle = $\frac{\sqrt{3}}{2} \times Side \Rightarrow 6 = \frac{\sqrt{3}}{2} \times Side$

$$\Rightarrow Side = \frac{12}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{12}{3} \times \sqrt{3} = 4\sqrt{3}\,cm$$

Now, Area of equilateral triangle = $\frac{\sqrt{3}}{4} \times (Side)^2 = \frac{\sqrt{3}}{4} \times (4\sqrt{3})^2 = \frac{\sqrt{3}}{4} \times 48 = 12\sqrt{3}\,cm^2$

**4.** Sides of a triangle are 8 cm, 11 cm and 13 cm. Then value of 's' is
(a) 19 cm (b) 20 cm (c) 21.5 cm (d) 16 cm
Ans: (d) 16 cm
Perimeter (2s) = 8 + 11 + 13 = 32 cm ⇒ s = 16 cm

**5.** What is the area of a semi-circle of diameter 'd'?

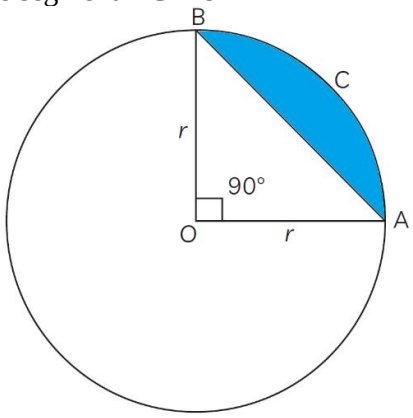
www.smartachievers.online

(a) $\frac{1}{16}\pi d^2$ (b) $\frac{1}{4}\pi d^2$ (c) $\frac{1}{8}\pi d^2$ (d) $\frac{1}{2}\pi d^2$

Ans. (c) $\frac{1}{8}\pi d^2$

Area of semi-circle = $\frac{1}{2}\pi r^2 \frac{1}{2}\pi\left(\frac{1}{2}d\right)^2 = \frac{1}{2}\pi\frac{1}{4}d^2 = \frac{1}{8}\pi d^2$

**6.** In the given figure, the area of the segment ACB is




(a) $\frac{r^2}{4}(\pi-2)$ (b) $\frac{r^2}{4}(\pi+2)$ (c) $\frac{r^2}{4}(\pi-1)$ (d) $\frac{r^2}{4}(\pi+1)$

Ans. (a) $\frac{r^2}{4}(\pi-2)$

Area of segment ACB = Area of sector AOBCA – Area of ΔAOB

$= \frac{\theta}{360°}\times\pi r^2 - \frac{1}{2}\times r\times r$

$= \frac{90°}{360°}\times\pi\times r^2 - \frac{1}{2}\times r^2 = \frac{1}{4}\pi r^2 - \frac{1}{2}r^2 = \frac{1}{4}r^2\left[\pi-2\right]$

**7.** The area of the circle that can be inscribed in a square of 6 cm is:
(a) 36π cm² (b) 18π cm² (c) 12π cm² (d) 9π cm²
Ans. (d) 9π cm²
Diameter of circle = side of square = 6 cm
⇒ Radius = 6/2 = 3 cm
Area of circle = $\pi r^2 = \pi(3)^2 = 9\pi$
Therefore, the area of the circle is 9p square cm.

**8.** The minute hand of a clock is 84 cm long. The distance covered by the tip of minute hand from 10:10 am to 10:25 am is :
(a) 44 cm (b) 88 cm (c) 132 cm (d) 176 cm
Ans. (c) 132 cm

**In the following questions 9 and 10, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.**
(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

**9. Assertion (A):** If the radius of an arc is 8 cm and the central angle is 40°, then the length of an arc is 5.59 cm.

www.smartachievers.online

**Reason (R):** Length of arc = $\pi r^2 \times \frac{\theta}{360^0}$

Ans. (c) Assertion (A) is true but reason (R) is false.

**10. Assertion (A):** Area of an equilateral triangle having each side 4 cm is $4\sqrt{3}$ cm$^2$

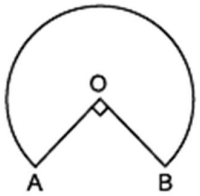
**Reason (R):** Area of an equilateral triangle = $\frac{\sqrt{3}}{4} \times (Side)^2$

Ans: (a) Both A and R are true and R is the correct explanation of A.

## SECTION – B

**Questions 11 to 14 carry 2 marks each.**

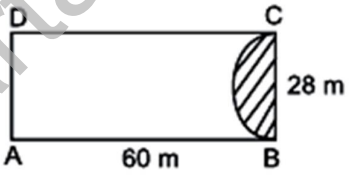
**11.** In the given figure, the shape of the top of a table is that a sector of a circle with centre O and ∠AOB = 90°. If AO = OB = 42 cm, then find the perimeter of the top of the table. [Use $\pi = \frac{22}{7}$ ]




Ans. Perimeter = length of major arc + $2r$

$= \frac{270^0}{360^0} \times 2 \times \pi r + 2r = \frac{3}{2} \times \frac{22}{7} \times 42 + 2 \times 42 = 198 + 84 = 284$ cm

**12.** A plot is in the form of a rectangle ABCD having semicircle on BC as shown in the figure. The semicircle portion is grassy while the remaining plot is without grass. Find the area of the plot without grass where AB = 60 m and BC = 28 m. [Use $\pi = \frac{22}{7}$ ]




Ans. Length of the rectangle = AB = 60 m
Breadth of the rectangle = BC = 28 m
Diameter of the shaded portion = 28 m
$\Rightarrow$ Radius of the shaded portion = $\frac{28}{2}$ =14 m
Grass portion = shaded portion
$\Rightarrow$ Area of the plot without grass = area of the rectangle ABCD – area of the shaded portion

$= \left[60 \times 28 - \frac{1}{2} \times \frac{22}{7} \times 14^2\right] m^2 = (1680 - 308) m^2 = 1372 \text{ m}^2$

**13.** The sides of a triangle are in the ratio 13 : 14 : 15 and its perimeter is 84 cm. Find the area of the triangle.
Ans: Given ratio of the sides of a triangle = 13 : 14 : 15
Let $a = 13k$, $b = 14k$ and $c = 15k$
Perimeter of triangle = 84 cm
$\Rightarrow 13k + 14k + 15k = 84$

www.smartachievers.online

$\Rightarrow 42k = 84 \Rightarrow k = \frac{84}{42} = 2$

So, the sides of a triangle are 13 × 2 = 26 cm, 14 × 2 = 28 cm and 15 × 2 = 30 cm

Its semi-perimeter, $s = \frac{84}{2} = 42$ cm

∴ By Heron's formula, $Area\ of\ \Delta = \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{42(42-26)(42-28)(42-30)} = \sqrt{42(16)(14)(12)} = 336\,cm^2$

**14.** The perimeter of an isosceles triangle is 32 cm. The ratio of equal side to the base is 3 : 2 Using Heron's formula, find the area of triangle.

Ans: Given perimeter of an isosceles triangle = 32 cm

$\Rightarrow 3x + 3x + 2x = 32$ [∵ Ratio of equal side to the base is 3 : 2]

$\Rightarrow 8x = 32 \Rightarrow x = 4$

∴ Sides of triangle are 12 cm, 12 cm and 8 cm

Semi-perimeter, $s = \frac{12+12+8}{2} = \frac{32}{2} = 16$ cm

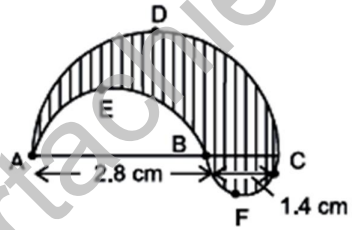
∴ By Heron's formula, $Area\ of\ \Delta = \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{16(16-12)(16-12)(16-8)} = \sqrt{16(4)(4)(8)} = 32\sqrt{2}\,cm^2$

## SECTION – C

**Questions 15 to 17 carry 3 marks each.**

**15.** In the fig., find the perimeter of shaded region where ADC, AEB and BFC are semicircles on diameters AC, AB and BC respectively.




Ans Length of semicircle ADC = $\pi \times \frac{4.2}{2} cm = 2.1\pi cm$

Length of semicircle AEB = $\pi \times \frac{2.8}{2} cm = 1.4\pi cm$

Length of semicircle BFC = $\pi \times \frac{1.4}{2} cm = 0.7\pi cm$

∴ Perimeter of shaded region = 2.1π + 1.4π + 0.7π = 4.2π cm = 13.2 cm

**16.** The triangular side walls of a flyover have been used for advertisements. The sides of the walls are 13 m, 14 m, 15 m. The advertisements yield an earning of Rs. 2000 per m2 a year. A company hired one of its walls for 6 months. How much rent did it pay?

Ans: The sides of the triangle are of length 13 m, 14 m and 15 m.

∴ Semi-perimeter of the triangle is $s = \frac{13+14+15}{2} = \frac{42}{2} = 21\text{m}$

∴ By Heron's formula, $Area\ of\ \Delta ABC = \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{21(21-13)(21-14)(21-15)} = \sqrt{21(8)(7)(6)} = 84\,\text{m}^2$

Now, The rent of advertisements per $m^2$ per year = Rs 2000

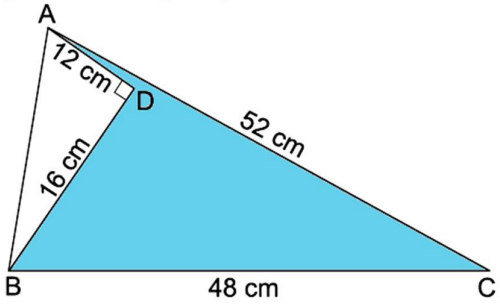
The rent of the wall with area 84 $m^2$ per year = Rs 2000 × 84 = Rs 168000

www.smartachievers.online

The rent of the wall with area 84 $m^2$ for 6 months = Rs $\frac{168000}{2}$ = Rs 84000

Hence, the rent paid by the company is Rs 84000.

**17.** Find the area of the shaded region in the figure given below.




Ans: In right angled $\Delta ABD$,

$AB^2 = AD^2 + DB^2$ (Pythagoras Theorem)

$\Rightarrow AB^2 = 12^2 + 16^2$

$\Rightarrow AB^2 = 144 + 256$

$\Rightarrow AB^2 = 400 \Rightarrow AB = 20$ cm

Area of $\Delta ADB = \frac{1}{2} \times DB \times AD = \frac{1}{2} \times 16 \times 12 = 96\ cm^2$ ....(1)

In $\Delta ACB$,

The sides of the triangle are of length 20 cm, 52 cm and 48 cm.

$\therefore$ Semi-perimeter of the triangle is $s = \frac{20+52+48}{2} = \frac{120}{2} = 60\,cm$

$\therefore$ By Heron's formula, *Area of* $\Delta ABC = \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{60(60-20)(60-52)(60-48)} = \sqrt{60(40)(8)(12)} = 480\,cm^2$ ...(2)

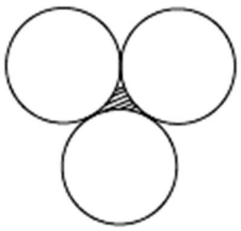
Now, Area of the shaded region = Area of $\Delta ACB$ – Area of $\Delta ADB$ = 480 – 96 = 384 $cm^2$

Hence, the area of the shaded region in the given figure is 384 $cm^2$.

## SECTION – D

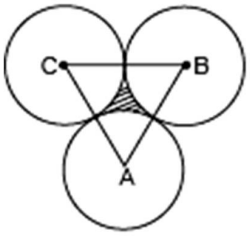
**Questions 18 carry 5 marks.**

**18.** In the given figure, three circles each of radius 3.5 cm are drawn in such a way that each of them touches the other two. Find the area of shaded region enclosed between these three circles. [Use $\pi$ = 22/7 and $\sqrt{3}$ = 1.732]



Ans. The $\Delta ABC$ is an equilateral triangle each of whose side is of length = 3.5 + 3.5 = 7 cm

$\therefore \angle A = \angle B = \angle C = 60°$




www.smartachievers.online

$\text{ar}(\Delta ABC) = \frac{\sqrt{3}}{4}a^2 = \frac{\sqrt{3}}{4}(7^2) = \frac{\sqrt{3}}{4} \times 49 cm^2$

Area of 3 sectors $= 3 \times \frac{60^0}{360^0} \times \pi r^2 = 3 \times \frac{60^0}{360^0} \times \frac{22}{7} \times 3.5 \times 3.5 = \frac{77}{4} cm^2$

Area of shaded region = area of $\Delta ABC$ – area of 3 sectors

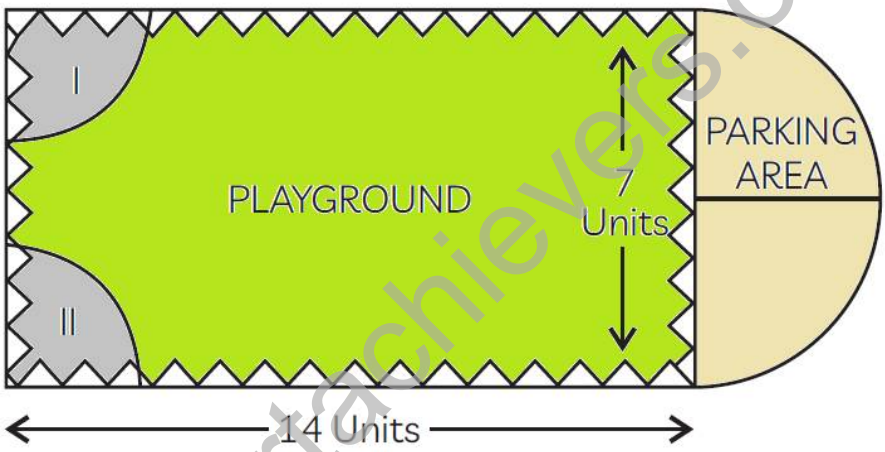
$= \frac{\sqrt{3}}{4} \times 49 - \frac{77}{4} = \frac{1}{4}(49\sqrt{3} - 77) cm^2$

$= \frac{1}{4}(49 \times 1.732 - 77) cm^2 = \frac{1}{4}(84.868 - 77) = \frac{1}{4} \times 7.868 = 1.967 cm^2$

## SECTION – E (Case Study Based Questions)

**Questions 19 to 20 carry 4 marks each.**

**19.** Governing council of a local public development authority of Dehradun decided to build an adventurous playground on the top of a hill, which will have adequate space for parking. After survey, it was decided to build rectangular playground, with a semi–circular area allotted for parking at one end of the playground. The length and breadth of the rectangular playground are 14 units and 7 units, respectively. There are two quadrants of radius 2 units on one side for special seats.




Based on the above information, answer the following questions:

(a) What is the total perimeter of the parking area? (1)

(b) What is the total area of parking and the two quadrants? (2)

**OR**

What is the ratio of area of playground to the area of parking area?

(c) Find the cost of fencing the playground and parking area at the rate of ₹ 2 per unit. (1)

Ans. (a) Perimeter of parking area = $\pi r + 2r = r(\pi + 2) = \frac{7}{2}\left(\frac{22}{7} + 2\right) = \frac{7}{2} \times \frac{36}{7}$ = 18 units

(b) Total area of parking and the two quadrants = area of semi-circular region + area of 2 quadrants

$= \frac{\pi R^2}{2} + 2 \times \frac{1}{4} \times \pi r^2 = \frac{\pi}{2}[R^2 + r^2] = \frac{22}{7 \times 2}\left[\left(\frac{7}{2}\right)^2 + (2)^2\right]$

$= \frac{11}{7}\left[\frac{49}{4} + 4\right] = \frac{11}{7}\left[\frac{49+16}{4}\right] = \frac{11}{7}\left[\frac{65}{4}\right]$

$= \frac{715}{28}$ unit² = 25.54 unit² (approx)

**OR**

Area of playground = 14 × 7 units²

Area of parking = $\frac{1}{2} \times \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} = \frac{77}{4}$ units²

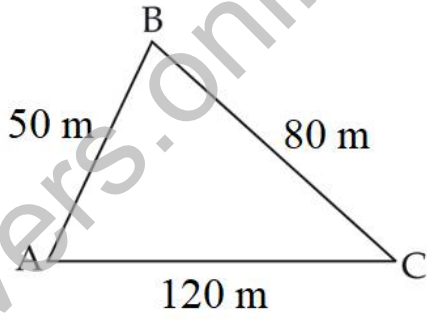
www.smartachievers.online

∴ Ratio of area of playground to the area of parking area = $\frac{14\times 7}{\frac{77}{4}} = \frac{56}{11} = 56 : 11$

(c) Length of fencing = Perimeter of rectangular playground + Perimeter of parking area
= 2(l + b) + 2πr/2
= 2(14 + 7) + 22/7 × 7/2
= 42 + 11 = 53 units
Cost of fencing = 53 × 2 = ₹ 106

**20.** In my colony a park is situated in front of my house. This park has built in shape of triangle (ABC) with the following sides 120m, 80m and 50m. Now-a-days, some animals entered park and destroy and eat plants. So, our ward member of area has decided to put railing around the park for protecting plants and grass. Ward member ordered to a gardener to place a railing all around this park and maintain grass inside park. He also sanctioned an amount to improve park in a proper way for public of that colony. Costing is decided Rs. 10 per meter for railing around the park.






(i) What is the perimeter of the park? [1]
(ii) Calculate the semi-perimeter of triangle park, in which planting is needed? [2]
(iii) Calculate the area, in which planting is needed? [2]

**OR**

(iii) 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]

Ans: (i) Perimeter = 50 m + 80 m + 120 m = 250 m.
(ii) Semi-perimeter = Perimeter/2 = 250/2 = 125 m
(iii) By Heron's formula *Area of* $\Delta = \sqrt{s(s-a)(s-b)(s-c)}$
$= \sqrt{125(125-120)(125-80)(125-50)} = \sqrt{125(5)(45)(75)} = 375\sqrt{15}\, m^2$

**OR**

(iii) Perimeter of the park = AB + BC + CA = 250 m
Therefore, length of the wire needed for fencing = 250 m – 3 m (to be left for gate) = 247 m
And so the cost of fencing = Rs 20 × 247 = Rs 4940

www.smartachievers.online