KD EDUCATION ACADEMY [9582701166]

Time : 6 hour

STD 9 Maths

kd 90+ questions ch- 10 Heron's formula

Total Marks : 150

*** Choose the right answer from the given options. [1 Marks Each]** **[48]**

1. The lengths of three sides of a triangle are 20cm, 16cm and 12cm. The area of the triangle is:

(A) $96cm^2$ (B) $120cm^2$ (C) $144cm^2$ (D) $160cm^2$

Ans. :

a. $96cm^2$

Solution:

Let:

a = 20cm, b = 16cm and c = 12cm

$s = \frac{a+b+c}{2} = \frac{26+16+12}{2} = 24cm$

By Heron's formula, we have:

Area of triangle $= \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{24(24-20)(24-16)(24-12)}$

$= \sqrt{24 \times 4 \times 8 \times 12}$

$= \sqrt{6 \times 4 \times 4 \times 4 \times 4 \times 6}$

$= 6 \times 4 \times 4$

$= 96cm^2$

2. The base of a right triangle is 8cm and the hypotenuse is 10cm. Its area will be:

(A) $24cm^2$ (B) $40cm^2$ (C) $48cm^2$ (D) $80cm^2$

Ans. :

a. $24cm^2$

Solution:

Given: Base = 8cm and Hypotenuse = 10cm

Hence, height $= \sqrt{(10^2 - 8^2)} = \sqrt{36} = 6cm$

Therefore area $= \left(\frac{1}{2}\right) \times b \times h = \left(\frac{1}{2}\right) \times 8 \times 6 = 24cm^2$

3. The adjacent sides of a parallelogram are 20cm and 15cm in length. Then the ratio between the corresponding altitudes is:

(A) 2 : 3 (B) 3 : 4 (C) 4 : 3 (D) 1 : 2

Ans. :

b. 3 : 4

Solution:

Since the adjacent sides and corresponding altitudes of a parallelogram are in proportion.

Therefore, $\frac{15}{20} = \frac{3}{4}$

Thus, the required ratio is 3 : 4.

4. If side of a scalene $\triangle$ is doubled then area would be increased by:

(A) 200% (B) 25% (C) 50% (D) 300%

Ans. :

d. 300%

Solution:

Area of triangle with sides a, b, c $(\mathrm{A})=\sqrt{\mathrm{s}(\mathrm{s}-\mathrm{a})(\mathrm{s}-\mathrm{b})(\mathrm{s}-\mathrm{c})}$

New sides are 2a, 2b and 2c

Then $\mathrm{s}'=\frac{2\mathrm{a}+2\mathrm{b}+2\mathrm{c}}{2}=\mathrm{a}+\mathrm{b}+\mathrm{c}$

$\Rightarrow \mathrm{s}'=2\mathrm{s}\ldots(\mathrm{i})$

New area $=\sqrt{\mathrm{s}'(\mathrm{s}'-2\mathrm{a})(\mathrm{s}'-2\mathrm{b})(\mathrm{s}'-2\mathrm{c})}$

$=\sqrt{2\mathrm{s}(2\mathrm{s}-2\mathrm{a})(2\mathrm{s}-2\mathrm{b})(2\mathrm{s}-2\mathrm{c})}$

$=4\sqrt{\mathrm{s}(\mathrm{s}-\mathrm{a})(\mathrm{s}-\mathrm{b})(\mathrm{s}-\mathrm{c})}$

$=4\mathrm{A}$

Increased area = 4A - A = 3A

% of increased area $=\frac{3\mathrm{A}}{\mathrm{A}}\times 100=300\%$

5. The lengths of the three sides of a triangle are 30cm, 24cm and 18cm respectively. The length of the altitude of the triangle corresponding to the smallest side is:

(A) 18cm (B) 30cm (C) 12cm (D) 24cm

Ans. :

d. 24cm

Solution:

Let:

a = 30cm, b = 24cm and c = 18cm

$\mathrm{s}=\frac{\mathrm{a}+\mathrm{b}+\mathrm{c}}{2}=\frac{30+24+18}{2}=36\mathrm{cm}$

On applying Heron's formula, we get

Area of triangle $=\sqrt{\mathrm{s}(\mathrm{s}-\mathrm{a})(\mathrm{s}-\mathrm{b})(\mathrm{s}-\mathrm{c})}$

$=\sqrt{36(36-30)(36-24)(36-18)}$

$=\sqrt{36\times 6\times 12\times 18}$

$=\sqrt{12\times 3\times 12\times 6\times 3}$

$=12\times 3\times 6$

$=216\mathrm{cm}^2$

The smallest side is 18cm.

Hence, the altitude of the triangle corresponding to 18cm is given by:

Area of triangle = 216cm^2

$\Rightarrow \frac{1}{2}\times \text{Base}\times \text{Height}=216$

$\Rightarrow \text{Height}=\frac{216\times 2}{18}=24\mathrm{cm}$

6. The area of a triangle with base 8cm and height 10cm is:

(A) 20cm^2 (B) 40cm^2 (C) 18cm^2 (D) 80cm^2

Ans. :

b. $40cm^2$

Solution:

$\text{Area} = \frac{1}{2} \times \text{Base} \times \text{Height}$

$= \frac{1}{2} \times 8 \times 10$

$= 40\text{cm}^2$

7. If every side of a triangle is doubled, then increase in the area of the triangle is:

(A) $100\sqrt{2}\%$ (B) 200% (C) 300% (D) 400%

Ans. :

c. 300%

Solution:

$\text{s} = \frac{\text{a}+\text{b}+\text{c}}{2}, \text{A} = \sqrt{\text{s}(\text{s}-\text{a})(\text{s}-\text{b})(\text{s}-\text{c})}$

Now, if a' = 2a, b' = 2b and c' = 2c

Then, $\text{s}' = \frac{\text{a}'+\text{b}'+\text{c}'}{2} = \frac{2\text{a}+2\text{b}+2\text{c}}{2} = 2\text{s}$

$\text{A}' = \sqrt{\text{s}'(\text{s}, -\text{a}')(\text{s}'-\text{b}')(\text{s}'-\text{c}')}$

$= \sqrt{2\text{s}(2\text{s}-2\text{a})(2\text{s}-2\text{b})(2\text{s}-2\text{c})}$

$= 4\sqrt{\text{s}(\text{s}-\text{a})(\text{s}-\text{b})(\text{s}-\text{c})}$

$\Rightarrow \text{A}' = 4\text{A}$

⇒ Increase in Area $= \frac{4\text{A}-\text{A}}{\text{A}} \times 100\% = 300\%$

Hence, correct optin is (c).

8. The sides of a triangle are x, y and z. If x + y = 7m, y + z = 9m, and z + x = 8m, then area of the triangle is:

(A) $7m^2$ (B) $4m^2$ (C) $5m^2$ (D) $6m^2$

Ans. :

d. $6m^2$

Solution:

Adding given three equaitons,

2x + 2y + 2z = 24 ⇒ x + y + z = 12

Therefore, $\text{s} = \frac{12}{2} = 6\text{cm}$

Area of triangle $= \sqrt{\text{s}(\text{s}-\text{a})(\text{s}-\text{b})(\text{s}-\text{c})}$

$= \sqrt{6(6-\text{x})(6-\text{y})(6-\text{z})}$

$= \sqrt{6(12-6-\text{x})(12-6-\text{y})(12-6-\text{z})}$

$= \sqrt{6(\text{y}+\text{z}-6)(\text{x}+\text{z}-6)(\text{x}+\text{y}-6)}$

$= \sqrt{6(9-6)(8-6)(7-6)}$

$= \sqrt{6 \times 3 \times 2 \times 1}$

$= 6 \text{ sq.m}$

9. The sides of a triangle are in the ratio of 3: 5: 7 and its perimeter is 300cm. Its area will be:

(A) $1000\sqrt{3}\mathrm{sq.\,cm}$ (B) $1500\sqrt{3}\mathrm{sq.\,cm}$ (C) $1700\sqrt{3}\mathrm{sq.\,cm}$ (D) $1900\sqrt{3}\mathrm{sq.\,cm}$

Ans. :

b. $1500\sqrt{3}\mathrm{sq.\,cm}$

Solution:

The ratio of the sides is 3: 5: 7

Perimeter = 300 cm

Let the sides of the triangle be 3x, 5x and 7x.

Hence,

3x + 5x + 7x = 300cm

15x = 300cm

x = 20

Therefore,

a = 3x = 3 × 20 = 60

b = 5x = 5 × 20 = 100

c = 7x = 7 × 20 = 140

$\mathrm{semiperimeter,s} = \frac{300}{2} = 150\mathrm{cm}$

Using Heron's formula:

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

$= \sqrt{150(150-60)(150-100)(150-40)}$

$= \sqrt{(150 \times 90 \times 50 \times 10)}$

$= 1500\sqrt{3\mathrm{sq.cm}}$

10. One of the diagonals of a rhombus is 12cm and area is 96 sq cm. the perimeter of the rhombus is:

(A) $72\mathrm{cm}$ (B) $\sqrt[6]{10}\,\mathrm{cm}$ (C) $40\mathrm{cm}$ (D) $\sqrt[3]{10}\,\mathrm{cm}$

Ans. :

c. $40\mathrm{cm}$

Solution:

$\mathrm{d}_2 = \frac{\mathrm{Area}\times 2}{\mathrm{d}_1}$

$= \frac{96\times 2}{12}$

$= 16\mathrm{cm}$

Length of side of rhombus $= \sqrt{6^2+8^2} = 10\mathrm{cm}$

perimeter of rhombus = 4 × side

= 4 × 10 = 40cm

11. If side of equilateral triangle is 25m. Its area is:

(A) $5\sqrt{3}$ sq.cm (B) $\frac{625}{4}\sqrt{3}$ sq.cm (C) $54\sqrt{3}$ sq.cm (D) $\sqrt{3}$ sq.cm

Ans. :

b. $\frac{625}{4}\sqrt{3}$ sq.cm

Solution:

Arrea of equilateral triangle $= \frac{\sqrt{3}}{4}(\text{Side})^2$

$= \frac{\sqrt{3}}{4}(25)^2$

$= \frac{625\sqrt{3}}{4}$ sq.cm

12. The sides of a triangle are in ratio 3 : 4 : 5. If the perimeter of the triangle is 84cm, then area of the triangle is:

(A) $290cm^2$ (B) $252cm^2$ (C) $274cm^2$ (D) $294cm^2$

Ans. :

d. $294cm^2$

Solution:

Let the sides be 3x, 4x and 5x.

Then according to quesiton, 3x + 4x + 5x = 84

⇒ 12x = 84

⇒ x = 7

Therefore, the sides are 3 × 7 = 21cm, 4 × 7 = 28cm and 5 × 7 = 35cm

$\text{s} = \frac{21+28+35}{2} = 42\text{cm}$

Area of triangle $= \sqrt{\text{s}(\text{s}-\text{a})(\text{s}-\text{b})(\text{s}-\text{c})}$

$= \sqrt{42(42-21)(42-28)(42-35)}$

$= \sqrt{42 \times 21 \times 14 \times 7}$

$21 \times 7 \times 2 = 294$ sq.cm

13. The area of a right-angled triangle is $20m^2$ and one of the sides containing the right triangle is 4cm. Then the altitude on the hypotenuse is:

(A) 10cm (B) $\frac{10}{\sqrt{41}}\text{cm}$ (C) $\frac{20}{\sqrt{29}}\text{cm}$ (D) 8cm

Ans. :

c. $\frac{20}{\sqrt{29}}\text{cm}$

Solution:

Area of right angle triangle = 20 sq. m

$\Rightarrow \frac{1}{2} \times \text{Base} \times \text{Height} = 20$

$\Rightarrow \frac{1}{2} \times \text{Base} \times 4 = 20$

$\Rightarrow \text{Base} = 10\text{cm}$

Then, Hypotenuse $= \sqrt{10^2 + 4^2} = 2\sqrt{29}\,\text{m}$

If the altitude drawn to the hypotenuse of a right-angle triangle, then the length of required altitude $= \frac{10\times4}{2\sqrt{29}} = \frac{20}{\sqrt{29}}\text{cm}$

14. The area of equilateral triangle of side 'a' is $4\sqrt{3}\text{cm}^2$. Its height is given by:

(A) $\frac{2}{\sqrt{3}}\text{cm}$ (B) $2\sqrt{3}\text{cm}$ (C) $\frac{1}{3}\text{cm}$ (D) $\sqrt{3}\text{cm}$

Ans. :

b. $2\sqrt{3}\text{cm}$

Solution:

Area of equilateral triangle $= \frac{\sqrt{3}}{4}(\text{Side})^2$

$\Rightarrow \frac{\sqrt{3}}{4}(\text{Side})^2 = 4\sqrt{3}$

$\Rightarrow (\text{Side})^2 = 4^2$

$\Rightarrow \text{Side} = 4\text{cm}$

Area of triangle $= \frac{1}{2} \times \text{Base} \times \text{Height}$

$\Rightarrow 4\sqrt{3} = \frac{1}{2} \times 4 \times \text{Height}$

$\Rightarrow \text{Height} = 2\sqrt{3}\text{cm}$

15. The sides of a triangle are 325m, 300m and 125m. Its area is:

(A) 37500m^2 (B) 48750m^2 (C) 18750m^2 (D) 97500m^2

Ans. :

c. 18750m^2

Solution:

a = 325m, b = 300m, c = 125m

$s = \frac{a+b+c}{2} = \frac{325+300+125}{4} = 375\text{m}$

s - a = 50m, s - b = 75m, s - c = 250m

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

$= \sqrt{375 \times 50 \times 75 \times 250}$

$= \sqrt{15 \times 25 \times 25 \times 2 \times 3 \times 25 \times 25 \times 10}$

$= \sqrt{25 \times 25 \times 25 \times 25 \times 30 \times 30}$

$= 25 \times 25 \times 30$

$= 18750\text{m}^2$

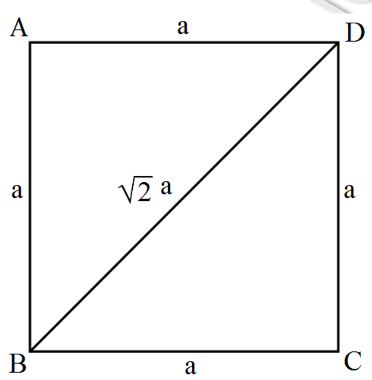
16. A square and an equilateral triangle have equal perimeters. If the diagonal of the square is $12\sqrt{2}\text{cm}$, then area of the triangle is:

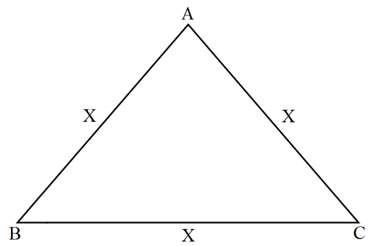
(A) $24\sqrt{2}\text{cm}^2$ (B) $24\sqrt{3}\text{cm}^2$ (C) $48\sqrt{3}\text{cm}^2$ (D) $64\sqrt{3}\text{cm}^2$

Ans. :

d. $64\sqrt{3}\text{cm}^2$

Solution:





If side of a square is a cm

Then, its diagonal $= \sqrt{2}\mathrm{acm}$

But diagonal $= 12\sqrt{2}\mathrm{cm}$

$\Rightarrow \sqrt{2}\mathrm{a} = 12\sqrt{2}$

⇒ a = 12cm

⇒ Perimeter of a square = 4a = 4 × 12 = 48cm

Now, perimeter of an equilateral triangle with side x = 3x cm

But perimeter of equilateral triangle = Perimeter of square

⇒ 3x = 48

⇒ x = 16cm

Now, Area of equilateral $\triangle = \frac{\sqrt{3}\mathrm{x}^2}{4} = \frac{\sqrt{3}}{4} \times 16 \times 16 = 64\sqrt{3}\mathrm{cm}^2$

Hence, correct option is (d).

17. If the area of an equilateral triangle is $\sqrt{163}\mathrm{cm}^2$ then the perimeter of the triangle is:

(A) 12cm (B) 24cm (C) 48cm (D) 306cm

Ans. :

b. 24cm

Solution:

Area of equilateral triangle $= \frac{\sqrt{3}}{4}(\mathrm{Side})^2$

$\Rightarrow \frac{\sqrt{3}}{4}(\mathrm{Side})^2 = 16\sqrt{3}$

⇒ $(\mathrm{Slide})^2 = 64$

⇒ Side = 8cm

Perimeter of equilateral triangle = 3 × side = 3 × 8 = 24cm

18. The sides of a triangle are in the ratio 12 : 17 : 25 and its perimeter is 540cm.The area is:

(A) 1000 sq.cm (B) 5000 sq.cm (C) 9000 sq.cm (D) 8000 sq.cm

Ans. :

c. 9000 sq.cm

Solution:

The ratio of the sides is 12 : 17 : 25

Perimeter = 540cm

Let the sides of the triangle be 12x, 17x and 25x.

Hence,

12x + 17x + 25x = 540cm

54x = 540cm

x = 10

Therefore,

a = 12x = 12 × 10 = 120

b = 17x = 17 × 10 = 170

c = 25x = 25 × 10 = 250

$\mathrm{Semi-perimeter,\ s}=\frac{540}{2}=270\mathrm{cm}$

Using Heron's formula:

$\mathrm{A}=\sqrt{8(8-\mathrm{a})(8-\mathrm{b})(8-\mathrm{c})}$

$=\sqrt{2}70(270-120)(270-170)(270-250)$

$=\sqrt{(}270\times150\times100\times20)$

$=9000\ \mathrm{sq.cm}$

19. The lengths of a triangle are 6cm, 8cm and 10cm. Then the length of perpendicular from the opposite vertex to the side whose length is 8cm is:

(A) 4cm (B) 6cm (C) 5cm (D) 2cm

Ans. :

b. 6cm

20. The base of an isosceles right triangle is 30cm. Its area is:

(A) $225\mathrm{cm}^2$ (B) $225\sqrt{3}\mathrm{cm}^2$ (C) $225\sqrt{2}\mathrm{cm}^2$ (D) $450\mathrm{cm}^2$

Ans. :

d. $450\mathrm{cm}^2$

Solution:

Let ABC be the right triangle in which $\angle\mathrm{B}=90^\circ$

Now, base = BC; Perpendicular = AB; Hypotenuse = AC

Now, BC = 30 cm (given)

Now, $\triangle\mathrm{ABC}$ is an isosceles right angled $\triangle$ and we know that hypotenuse is the longest side of the right $\triangle m$.

So, AB = BC = 30 cm

Area of $\triangle\mathrm{ABC}=\frac{1}{2}\times\mathrm{base}\times\mathrm{height}$

$=\frac{1}{2}\times\mathrm{BC}\times\mathrm{AB}$

$=\frac{1}{2}\times30\times30$

$=450\mathrm{cm}^2$

21. If side of a scalene $\triangle$ is doubled then area would be increased by:

(A) 200% (B) 300% (C) 25% (D) 50%

Ans. :

b. 300%

Solution:

Area of triangle with sides a, b, c (A) $=\sqrt{\mathrm{s}(\mathrm{s}-\mathrm{a})(\mathrm{s}-\mathrm{b})(\mathrm{s}-\mathrm{c})}$

New sides are 2a, 2b, and 2c

Then $s' = \frac{2a+2b+2c}{2} = a+b+c$

$\Rightarrow s' = 2s \ldots. (i)$

New area $= \sqrt{s'(s'-2a)(s'-2b)(s'-2c)}$

$= \sqrt{2s(2s-2a)(2s-2b)(2s-2c)}$

$= 4\sqrt{s(s-a)(s-b)(s-c)}$

$= 4A$

Increased area = 4A - A = 3A

% of increased area $= \frac{3A}{A} \times 100 = 300\%$

22. The area of an equilateral triangle having side length equal to $\sqrt{\frac{3}{4}}cm$ (using Heron's formula) is:

(A) a. $\frac{2}{27}sq.cm$ (B) b. $\frac{2}{15}sq.cm$ (C) c. $3\sqrt{\frac{3}{64}}sq.cm$ (D) d. $\frac{3}{14}sq.cm$

Ans. : c. $3\sqrt{\frac{3}{64}}sq.cm$

Solution:

$\text{Here, } a = b = c\sqrt{\frac{3}{4}}$

$\text{Semiperimeter} = \frac{(a+b+c)}{2}\frac{3a}{2} = 3\sqrt{\frac{3}{8}cm}$

Using Heron's formula,

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

$(\sqrt{3\sqrt{\frac{3}{8}}})(3\sqrt{\frac{3}{8}} - \sqrt{\frac{3}{4}})(3\sqrt{\frac{3}{8}} - \sqrt{\frac{3}{4}})\sqrt{\frac{3}{4}})$

$= 3\sqrt{\frac{3}{64}}\text{sq. cm}$

23. Area of an isosceles triangle ABC with AB = a = AC and BC = b is:

(A) $\frac{1}{2}b\sqrt{a^2-b^2}$ (B) $\frac{1}{4}b\sqrt{a^2-b^2}$ (C) $\frac{1}{2}b\sqrt{4a^2-b^2}$ (D) $\frac{1}{4}b\sqrt{4a^2-b^2}$

Ans. :

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

Solution:

Here, $s = \frac{a+aab}{2} = \frac{2a+b}{2}$

Area of triangle $= \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{\frac{2a+b}{2}\left(\frac{2a+b}{2} - a\right)\left(\frac{2a+b}{2} - a\right)\left(\frac{2a+b}{2} - b\right)}$

$\sqrt{\frac{2a+b}{2}\left(\frac{b}{2}\right)\left(\frac{b}{2}\right)\left(\frac{2a\text{-}b}{2}\right)}$

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

24. The area of a right angled triangle is $20m^2$ and one of the sides containing the right triangle is 4cm. Then the altitude on the hypotenuse is:

(A) $\frac{20}{\sqrt{29}}\mathrm{cm}$ (B) $10\mathrm{cm}$ (C) $\frac{10}{\sqrt{41}}\mathrm{cm}$ (D) $8\mathrm{cm}$

Ans. :

a. $\frac{20}{\sqrt{29}}\mathrm{cm}$

Solution:

Area of right angle triangle = 20 sq.m

$\Rightarrow \frac{1}{2} \times \text{Base} \times \text{Height} = 20$

$\Rightarrow \frac{1}{2} \times \text{Base} \times 4 = 20$

$\Rightarrow \text{Base} = 10\mathrm{cm}$

Then, Hypotenuse $= \sqrt{10^2 + 4^2} = 2\sqrt{29}\mathrm{m}$

If the altitude drawn to the hypotenuse of a right angle triangle, then the length of required altitude $= \frac{10\times4}{2\sqrt{29}} = \frac{20}{\sqrt{29}}\mathrm{cm}$

25. The area of a regular hexagon of side 4cm is:

(A) $4\sqrt{3}\mathrm{cm}^2$ (B) $10\sqrt{3}\mathrm{cm}^2$ (C) $6\sqrt{3}\mathrm{cm}^2$ (D) $24\sqrt{3}\mathrm{cm}^2$

Ans. :

d. $24\sqrt{3}\mathrm{cm}^2$

Solution:

Area of regular hexagon $= \frac{3\sqrt{3}}{2}(\text{Side})^2$

$= \frac{3\sqrt{3}}{2} \times 4 \times 4$

$= 24\sqrt{3}\mathrm{cm}^2$

26. The diagonal of a rhombus are 24cm and 10cm. Then its perimeter is:

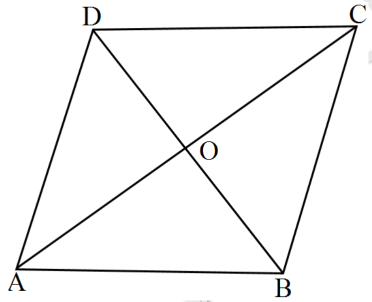
(A) 52cm (B) 68cm (C) 40cm (D) 26cm

Ans. :

a. 52cm

Solution:

Since diagonals of a rhombus bisect each other at right angle.



$\mathrm{OB} = \frac{24}{2} = 12\mathrm{cm}$ and $\mathrm{OC} = \frac{10}{2} = 5\mathrm{cm}$

In triangle OBC,

$\mathrm{BC} = \sqrt{12^2 + 5^2} = \sqrt{144 + 25} = 13\mathrm{cm}$

Perimeter of rhombus $= 4 \times \text{side} = 4 \times 13 = 52\mathrm{cm}$

27. The sides of a triangle are 35cm, 54cm and 61cm respectively, and its area is $420\sqrt{5}\mathrm{cm}^2$. The length of its longest altitude is:

(A) 28cm (B) $10\sqrt{5}\text{cm}$ (C) $21\sqrt{5}\text{cm}$ (D) $24\sqrt{5}\text{cm}$

Ans. :

d. $24\sqrt{5}\text{cm}$

Solution:

Since longest altitude is drawn opposite to the shortest side in a triangle.

Area of triangle $= \frac{1}{2} \times \text{Base} \times \text{Height}$

$\Rightarrow 420\sqrt{5} = \frac{1}{2} \times 35 \times \text{Height}$

$\Rightarrow \text{Height} = \frac{420\sqrt{5}\times 2}{35} = 24\sqrt{5}\text{cm}$

28. Each side of an equilateral triangle is 2x cm. If $\text{x}\sqrt{3} = \sqrt{48}$, then area of the triangle is:

(A) $\sqrt{48}\,\text{cm}^2$ (B) $48\sqrt{3}\text{cm}^2$ (C) $16\sqrt{3}\text{cm}^2$ (D) 16cm^2

Ans. :

c. $16\sqrt{3}\text{cm}^2$

Solution:

Here, $\text{x}\sqrt{3} = \sqrt{48}$

$\Rightarrow \text{x} = \sqrt{16}$

Side = 2x

Area of equilateral triangle $= \frac{\sqrt{3}}{4}(\text{Side})^2$

$= \frac{\sqrt{3}}{4}(2\text{x})^2$

$= \sqrt{3}\text{x}^2 \text{ sq. cm}$

$= \sqrt{3}(\sqrt{16})^2$

$= 16\sqrt{3}\text{cm}^2$

29. The cost of turfing a triangular field at the rate of Rs. 45 per 100m^2 is Rs. 900. If the double the base of the triangle is 5 times its height, then its height is:

(A) 42cm (B) 40cm (C) 44cm (D) 32cm

Ans. :

b. 40cm

Solution:

Cost of turfing a triangular field at the rate of Rs. 45 per 100 = Rs. 900

$\frac{\text{Area}\times 45}{100} = 900$

⇒ Area = 2000 sq.cm

According to question,

2 × Base = 5 × Height

$\Rightarrow \text{Base} = \frac{\text{Height}\times 5}{2}$

Areo of triangle = 2000 sq.cm

$\Rightarrow \frac{1}{2} \times \text{Base} \times \text{Height} = 2000$

$\Rightarrow \frac{1}{2} \times \frac{\text{Height}\times 5}{2} \times \text{Height} = 2000$

⇒ $(\text{Height})^2 = 1600$

⇒ Height = 40cm

30. The area of an equilateral triangle having side length equal to $\frac{3}{\sqrt{4}}\mathrm{cm}$ is:

(A) $\frac{2}{27}\mathrm{sq.cm}$ (B) $\frac{2}{15}\mathrm{sq.cm}$ (C) $\frac{3}{16}\mathrm{sq.cm}$ (D) $\frac{3}{14}\mathrm{sq.cm}$

Ans. :

c. $\frac{3}{16}\mathrm{sq.cm}$

31. The sides of a triangle are in the ratio 5 : 12 : 13 and its perimeter is 150cm. The area of the triangle is:

(A) 375cm^2 (B) 750cm^2 (C) 250cm^2 (D) 500cm^2

Ans. :

b. 750cm^2

Solution:

Let the sides of the triangle be 5x cm, 12x cm and 13xcm.

Perimeter = Sum of all sides

Or, 150 = 5x + 12x + 13x

Or, 30x = 150x

Or, x = 5

Thus, the sides of the triangle are 5 × 5cm, 12 × 5cm and 13 × 5cm, i.e., 25cm, 60cm and 65cm.

Now,

Let:

a = 25cm, b = 60cm and c = 65cm

$\mathrm{s} = \frac{150}{2} = 75\mathrm{cm}$

By using Heron's formula, we have:

Area of triangle $= \sqrt{\mathrm{s}(\mathrm{s}-\mathrm{a})(\mathrm{s}-\mathrm{b})(\mathrm{s}-\mathrm{c})}$

$= \sqrt{75(75-25)(75-60)(75-65)}$

$= \sqrt{75 \times 50 \times 15 \times 10}$

$= \sqrt{15 \times 5 \times 5 \times 10 \times 15 \times 10}$

$= 15 \times 5 \times 10$

$= 750\mathrm{cm}^2$

32. **Directions:** In the following questions, the Assertions (A) and Reason(s) (R) have been put forward. Read both the statements carefully and choose the correct alternative from the following:

Assertion: The perimeter of a right angled triangle is 60cm and its hypotenuse is 26cm. The other sides of the triangle are 10cm and 24cm. Also, area of the triangle is 120cm^2.

Reason: $(\text{Base})^2 + (\text{Perpendicular})^2 = (\text{Hypotenuse})^2$.

(A) A is true, R is true; R is a correct explanation for A.

(B) A is true, R is true; R is nol a correct explanation for A.

(C) A is true; R is false.

(D) A is false; R is true.

Ans. :

b. A is true, R is true; R is nol a correct explanation for A.

33. The diagonal of a rhombus are 24cm and 10cm. Then its perimeter is:

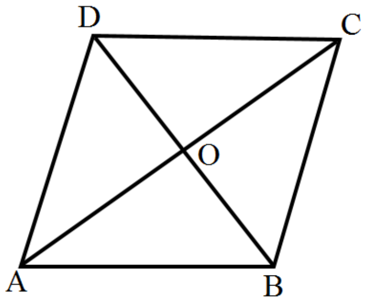
(A) 40cm (B) 52cm (C) 26cm (D) 68cm

Ans. :

b. 52cm

Solution:

Since diagonals of a rhombus bisect each other at right angle.



$\mathrm{OB} = \frac{24}{2} = 12\mathrm{cm}$ and $\mathrm{OC} = \frac{10}{2} = 5\mathrm{cm}$

In triangle OBC,

$\mathrm{BC} = \sqrt{12^2 + 5^2} = \sqrt{144 + 25} = 13\mathrm{cm}$

Perimeter of rhombus = 4 × side = 4 × 13 = 52cm

34. If each side of a $\triangle$ is halved then its perimeter will be decreased by:

(A) 70% (B) 200% (C) 50% (D) 25%

Ans. :

c. 50%

Solutiion:

Perimeter of triangle with sides a, b and c is P = a + b + c ....(i)

New sides are $\frac{a}{2}, \frac{b}{2}, \frac{c}{2}$

New perimeter $= \frac{a+b+c}{2} = \frac{P}{2}$. (From eq.(i))

Decreased perimeter $= \mathrm{P} - \frac{P}{2} = \frac{P}{2}$

% of decreased perimeter $= \frac{\frac{P}{2}}{P} \times 100 = 50\%$

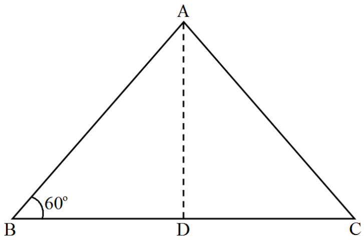
35. If the length of a median of an equilateral triangle is x cm, then its area is:

(A) x^2 (B) $\frac{\sqrt{3}}{2}x^2$ (C) $\frac{x^2}{\sqrt{3}}$ (D) $\frac{x^2}{2}$

Ans. :

c. $\frac{x^2}{\sqrt{3}}$

Solution:



Let the side of equilateral $\triangle \mathrm{ABC}$ be a cm

The median of equilateral triangle is its altitude drawn from A to BC.

$\big($i.e. the height of $\triangle$ over Base BC$\big)$

$\Rightarrow \mathrm{x}=\frac{\mathrm{a}\sqrt{3}}{2}$ [AD = x(given)]

$\Rightarrow \mathrm{a}=\frac{2\mathrm{x}}{\sqrt{3}}$

Area of equilateral $\triangle$ of side a

$=\frac{\sqrt{3}\mathrm{a}^2}{4}$

$=\frac{\sqrt{3}}{4}\left(\frac{2\mathrm{x}}{\sqrt{3}}\right)^3$

$=\frac{\mathrm{x}^2}{\sqrt{3}}$

Hence, correct option is (c).

36. If the perimeter of an equilateral triangle is 180cm. Then its area will be:

(A) $900\mathrm{cm}^2$ (B) $900\sqrt{3}\mathrm{cm}^2$ (C) $300\sqrt{3}\mathrm{cm}^2$ (D) $600\sqrt{3}\mathrm{cm}^2$

Ans. :

b. $900\sqrt{3}\mathrm{cm}^2$

Solution:

Given, Perimeter = 180cm

3a = 180 (Equilateral triangle)

a = 60cm

Semi-perimeter $\frac{180}{2}=90\mathrm{cm}$

Now as per Heron's formula,

$\mathrm{A}=\sqrt{\mathrm{a}(8-\mathrm{a})(8-\mathrm{b})(8-\mathrm{c})}$

In the case of an equilateral triangle, a = b = c = 60cm

Substituting these values in the Heron's formula, we get the area of the triangle as:

$\mathrm{A}=\sqrt{90(90-60)(90-60)(90-60)}$

$=\sqrt{(90\times 30\times 30\times 30)}$

$\mathrm{A}=900\sqrt{3\mathrm{cm}^2}$

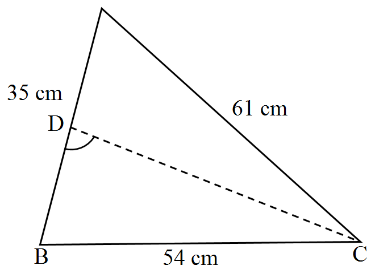
37. The sides of a triangle are 35cm, 54cm and 61cm, respectively. The length of its longest altitude.

(A) $24\sqrt{5}\mathrm{cm}$ (B) $28\mathrm{cm}$ (C) $10\sqrt{5}\mathrm{cm}$ (D) $16\sqrt{5}\mathrm{cm}$

Ans. :

a. $24\sqrt{5}\mathrm{cm}$

Solution:



Let ABC be a triangle in which sides AB = 35cm, BC = 54cm and CA = 61cm

Now semi-perimeter of a triangle,

$s = \frac{a+b+c}{2} = \frac{35+54+61}{32} = \frac{150}{2} = 75\text{cm}$

$\left[\therefore \text{semiperimeter, } s = \frac{a+b+c}{2}\right]$

$\because$ Area of $\triangle ABC = \sqrt{s(s-a)(s-b)(s-c)}$ [by Heron's formula]

$= \sqrt{75(75-35)(75-54)(75-61)}$

$= \sqrt{75 \times 40 \times 21 \times 14}$

$= \sqrt{25 \times 3 \times 4 \times 2 \times 5 \times 7 \times 3 \times 7 \times 2}$

$= 5 \times 2 \times 2 \times 3 \times 7\sqrt{5}$

$= 420\sqrt{5}\text{cm}^2$

Also, Area of $\triangle ABC = \frac{1}{2} \times AB \times \text{Altitude}$

$\Rightarrow \frac{1}{2} \times 35 \times CD$

$\Rightarrow CD = \frac{420 \times 2\sqrt{5}}{35}$

$\therefore CD = 24\sqrt{5}$

Hence, the length of altitude is $24\sqrt{5}\text{cm}$.

38. The area and length of one diagonal of a rhombus are given as 200cm^2 and 10cm respectively. The length of other diagonal is:

(A) 20cm (B) 40cm (C) 25cm (D) 10cm

Ans. :

b. 40cm

Solution:

Area of rhombus $= \frac{1}{2} \times \text{Product of diagonal}$

$\Rightarrow 200 = \frac{1}{2} \times 10 \times d_2$

$\Rightarrow d_2 = \frac{200 \times 2}{10} = 40\text{cm}$

39. The edges of a triangular board are 6cm, 8cm and 10cm. The cost of painting it at the rate of 70 paise per cm^2 is:

(A) ₹17 (B) ₹16.80 (C) ₹7 (D) ₹16

Ans. :

b. ₹16.80

40. The perimeter of a triangle is 60cm. If its sides are in the ratio 1 : 3 : 2, then its smallest side is:

(A) 5cm (B) 10cm (C) 15cm (D) 30cm

Ans. :

b. 10cm

Solution:

Given: Ratio of sides: 1 : 3 : 2

Let the sides of triangle be x, 3x and 2x cm

Perimeter = 60cm

x + 3x + 2x = 60

⇒ 6x = 60

⇒ x = 10

So, sides are

a = 1 × 10 = 10cm

b = 3 × 10 = 30cm

c = 2 × 10 = 20cm

Therefore, Length of smallest side = 10cm.

41. The area of a triangle is 150cm^2 and its sides are in the ratio 3 : 4 : 5. What is its perimeter?

(A) 40cm (B) 60cm (C) 50cm (D) 70cm

Ans. :

b. 60cm

42. The area of a rightangled triangle if the radius of its circumcircle is 3cm and altitude drawn to the hypotenuse is 2cm.

(A) 6cm^2 (B) 3cm^2 (C) 4cm^2 (D) 8cm^2

Ans. :

a. 6cm^2

43. The perimeter of a rhombus is 20cm. One of its diagonals is 8cm. Then area of the rhombus is:

(A) 24cm^2 (B) 42cm^2 (C) 18cm^2 (D) 36cm^2

Ans. :

a. 24cm^2

44. Two adjacent sides of a parallelogram are 74cm and 40cm and one of its diagonals is 102cm. Area of the parallelogram is:

(A) 2448 sq.cm (B) 4896 sq.cm (C) 612 sq.cm (D) 1224 sq.cm

Ans. :

a. 2448 sq.cm

Solution:

Let the two adjacent sides of the parallelogram be a = 74cm, b = 40cm

Let the length of diagonal be c = 102cm

These two sides and the diagonal forms a triangle

semi perimeter, $\mathrm{s} = \frac{\mathrm{a+b+c}}{2}$

$\mathrm{s} = \frac{74+40+102}{2}$

$= \frac{216}{2}$

= 108cm

By Heron's formula, we have area of triangle $= \sqrt{s(s-a)(s-b)(s-c)}$

Area of triangle $= \sqrt{108(108-74)(108-40)(108-102)}$

= 1224cm^2

therefore, area of parallelogram = 1224 × 2

= 2448 sq.cm

45. Area of an equilateral triangle of side 10cm is:

(A) $50\sqrt{3}\text{cm}^2$ (B) $100\sqrt{3}\text{cm}^2$ (C) $10\sqrt{3}\text{cm}^2$ (D) $25\sqrt{3}\text{cm}^2$

Ans. :

d. $25\sqrt{3}\text{cm}^2$

Solution:

Area of equilateral triangle $= \frac{\sqrt{3}}{4}(\text{Side})^2$

$= \frac{\sqrt{3}}{4}(10)^2$

$= 25\sqrt{3}\text{sq.cm}$

46. The area of an isosceles triangle having base 24cm and length of one of the equal sides 20cm is:

(A) 480cm^2 (B) 240cm^2 (C) 196cm^2 (D) 192cm^2

Ans. :

d. 192cm^2

Solution:

$S = \frac{(24+20+20)}{2} = 32\text{cm}$

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

$= \sqrt{32(32-24)(32-20)(32-20)}$

$= 192\text{sq. cm.}$

47. The sides of a triangular field are 325m, 300m and 125m. Its area is:

a. 18750m^2
b. 37500m^2
c. 97500m^2
d. 48750m^2

Ans. :

a. 18750m^2

Solution:

a = 325m, b = 30m, c = 125m

$s = \frac{a+b+c}{2} = \frac{325+300+125}{2} = 375\text{m}$

s - a = 50m, s - b = 75m, s - c = 250m

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

$= \sqrt{375 \times 50 \times 75 \times 250}$

$= \sqrt{15 \times 25 \times 25 \times 2 \times 3 \times 25 \times 25 \times 10}$

$= \sqrt{\underline{25 \times 25} \times \underline{25 \times 25} \times \underline{30 \times 30}}$
$= 25 \times 25 \times 30$
$= 18750\mathrm{m}^2$
Hence, correct option is (a).

48. If every side of a triangle is doubled, then increase in the area of the triangle is:
   a. $100\sqrt{2}\%$
   b. 200%
   c. 300%
   d. 400%

Ans. :
   c. 300%
   Solution:
   $\mathrm{s} = \frac{\mathrm{a+b+c}}{2}, \mathrm{A} = \sqrt{\mathrm{s(s-a)(s-b)(s-c)}}$
   Now, if a' = 2a, b' = 2b and c' = 2c
   Then, $\mathrm{s}' = \frac{\mathrm{a'+b'+c'}}{2} = \frac{\mathrm{2a+2b+2c}}{2} = 2\mathrm{s}$
   $\mathrm{A}' = \sqrt{\mathrm{s'(s, -a')(s'-b')(s'-c')}}$
   $= \sqrt{\mathrm{2s(2s-2a)(2s-2b)(2s-2c)}}$
   $= 4\sqrt{\mathrm{s(s-a)(s-b)(s-c)}}$
   $\Rightarrow \mathrm{A}' = 4\mathrm{A}$
   ⇒ Increase in Area $= \frac{\mathrm{4A-A}}{\mathrm{A}} \times 100\% = 300\%$
   Hence, correct optin is (c).

*** A statement of Assertion (A) is followed by a statement of Reason (R). [5] Choose the correct option.**

49. **Directions:** In the following questions, the Assertions (A) and Reason(s) (R) have been put forward. Read both the statements carefully and choose the correct alternative from the following:
   Assertion: The sides of a triangle are in the atio of 25 : 14 : 12 and its perimeter is 510cm. Then the area of the triangle is 4449.08cm2.
   Reason: Perimeter of a triangle = a + b + c, where a, b, c are sides of a triangle.
   a. Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.
   b. Both Assertion and Reason are correct and Reason is not the correct explanation for Assertion.
   c. Assertion is true but the reason is false.
   d. Both assertion and reason are false.

Ans. :
   a. Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.

50. **Directions:** In the following questions, the Assertions (A) and Reason(s) (R) have been put forward. Read both the statements carefully and choose the correct alternative from the following:

Assertion: The sides of a triangle are in the ratio of 25 : 14 : 12 and its perimeter is 510m. Then the greatest side is 250cm.

Reason: Perimeter of a triangle = a + b + c, where a, b, c are sides of a triangle.

a. Both assertion and reason are true and reason is the correct enatixplaon of assertion.
b. Both assertion and reason are true but reason is not the correct explanation of assertion.
c. Assertion is true but reason is false.
d. Assertion is false but reason is true.

Ans. :

a. Both assertion and reason are true and reason is the correct enatixplaon of assertion.

Solution:

510 = a + b + c

510 = 25x + 14x + 12x

510 = 51x

x = 10

Three sides of the triangle are,

25x = 25 × 10 = 250cm

14x = 14 × 10 = 140cm

and 12x = 12 × 10 = 120cm

51. **Directions:** In the following questions, the Assertions (A) and Reason(s) (R) have been put forward. Read both the statements carefully and choose the correct alternative from the following:

Assertion: The side of an equilateral triangle is 6cm then the height of the triangle is 9cm.

Reason: The height of an equilateral triangle is $\frac{\sqrt{3}}{2}\mathrm{a}$.

a. Both assertion and reason are true and reason is the correct enatixplaon of assertion.
b. Both assertion and reason are true but reason is not the correct explanation of assertion.
c. Assertion is true but reason is false.
d. Assertion is false but reason is true.

Ans. :

d. Assertion is false but reason is true.

Solution:

The height of the triangle,

$\mathrm{h} = \frac{\sqrt{3}}{2}\mathrm{a}.$

$9 = \frac{\sqrt{3}}{2}\mathrm{a}.$

$\mathrm{a} = \frac{9\times 2}{\sqrt{3}} = \frac{18}{\sqrt{3}} = \frac{\sqrt{3}}{\sqrt{3}}$

$= \frac{18\sqrt{3}}{3} = 6\sqrt{3}\mathrm{cm}$

52. **Directions:** In the following questions, the Assertions (A) and Reason(s) (R) have been put forward. Read both the statements carefully and choose the correct alternative

from the following:

Assertion: The height the triangle is 18cm and its area is $72cm^2$ and it's base is 8cm.

Reason: $\text{Area of triangle} = \frac{1}{2} \times \text{base} \times \text{height}.$

a. Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.
b. Both Assertion and Reason are correct and Reason is not the correct explanation for Assertion.
c. Assertion is true but the reason is false.
d. Both assertion and reason are false.

Ans. :

a. Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.

53. **Directions:** In the following questions, the Assertions (A) and Reason(s) (R) have been put forward. Read both the statements carefully and choose the correct alternative from the following:

Assertion: If $2S = \frac{(a+b+c)}{2}$ where a,b,c are the sides of triangle then area $= \sqrt{s(s-a)(s-b)(s-c)}$.

Reason: The sides of triangle are 3cm, 4cm, 5cm it's area is $6cm^2$

a. Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.
b. Both Assertion and Reason are correct and Reason is not the correct explanation for Assertion.
c. Assertion is true but the reason is false.
d. Both assertion and reason are false.

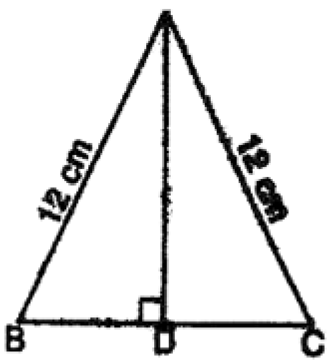
Ans. :

c. Assertion is true but the reason is false.

* Answer the following short questions. [2 Marks Each] [2]

54. An isosceles triangle has perimeter 30 cm and each of the equal sides is 12 cm. Find the area of the triangle.

Ans. :



a = 12 cm, b = 12 cm

Perimeter = 30 cm

a + b + c = 30

⇒ 12 + 12 + c = 30

⇒ 24 + c = 30

$\Rightarrow$ c = 30 – 24

$\Rightarrow$ c = 6 cm

s = $\frac{30}{2}$ cm = 15 cm

$\therefore$ Area of the triangle $= \sqrt{s(s-a)(s-b)(s-c)}$

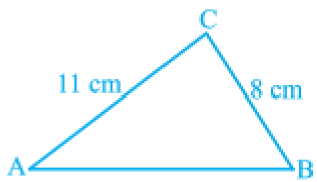
$= \sqrt{15(15-12)(15-12)(15-6)}$

$= \sqrt{15(3)(3)(9)} = 9\sqrt{15}$ cm^2

*** Answer the following questions. [3 Marks Each]** **[15]**

55. Find the area of a triangle, two sides of which are 8 cm and 11 cm and the perimeter is 32 cm.

Ans. :



Let a, b, c be the sides of the given triangle and 2s be its perimeter such that

a = 8 cm, b = 11 cm and 2s = 32 cm i.e. s = 16 cm

Now,

a + b + c = 2s

$\Rightarrow$ 8 + 11 + c = 32

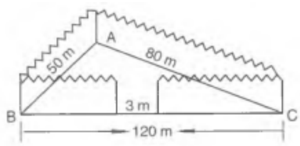
$\Rightarrow$ c = 13

$\therefore$ s - a = 16 - 8 = 8, s - b = 16 - 11 = 5 and s - c = 16 - 13 = 3

Hence, Area of given triangle = $\sqrt{s(s-a)(s-b)(s-c)}$

= $\sqrt{16 \times 8 \times 5 \times 3}$ = $8\sqrt{30}$ cm^2

56. A triangular park ABC has sides 120 m, 80 m and 50 m. (in a given figure). 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 ₹ 20 per metre leaving a space 3m wide for a gate on one side.



Ans. : Computation of area: Clearly, the park is trianglar with sides

a = BC = 120 m, b = CA = 80 m and c = AB = 50 m

Ifs denotes the semi-perimeter of the park, then

2s = a + b + c $\Rightarrow$ 2s = 120 + 80 + 50 $\Rightarrow$ s = 125

$\therefore$ s - a = 125 - 120 = 5, s - b = 125 - 80 = 45 and s - c = 125 - 50 = 75

Hence, Area of the park = $\sqrt{s(s-a)(s-b)(s-c)}$ = $\sqrt{125 \times 5 \times 45 \times 75}$ m^2 = $375\sqrt{15}$ m^2

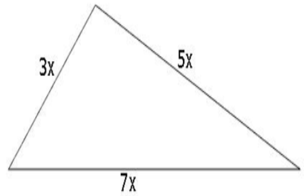
Length of the wire needed for fencing = perimeter of the park - width of the gate

= 250m - 3m = 247 m

Cost of fencing = Rs.(20 $\times$ 247) = Rs.4940

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

Ans. :



Suppose that the sides in metres are 3x, 5x and 7x.

Then, we know that 3x + 5x + 7x = 300 (Perimeter of the triangle)

Therefore, 15x = 300, which gives x = 20.

So the sides of the triangles are 3 $\times$ 20 m, 5 $\times$ 20 m and 7 $\times$ 20 m

i.e., 60m, 100m and 140m.

We have s = $\frac{60+100+140}{2}$ = 150 m

and area will be = $\sqrt{150(150-60)(150-100)(150-140)}$

= $\sqrt{150 \times 90 \times 50 \times 10}$

= 1500$\sqrt{3}$ m^2

58. The area of a trapezium is 475cm^2 and the height is 19cm. Find the lengths of its two parallel sides if one side is 4cm greater than the other.

Ans. : Let one of the parallel sides be x cm, then orter parallel side be = (x + 4)cm

Area of trapezium $= \frac{1}{2} \times$ (Sum of the parallel side) × height

$\Rightarrow 475 = \frac{1}{2} \times (\mathrm{x}+\mathrm{x}+4) \times 19\mathrm{cm}$

$\Rightarrow 2\mathrm{x}+4 = \frac{950}{19} = 50$

$\Rightarrow 2\mathrm{x} = 50-4 = 46$

$\Rightarrow \mathrm{x} = 46 \div 2 = 23$

Hence, the length of two parallel sides are 23cm and (23 + 4)cm i.e., 23cm and 27cm.

59. The triangular side walls of a flyover have been used for advertisements. The sides of the walls are 13m, 14m and 15m. 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?

Ans. : Since, the sides of a triangular walls are a = 13m, b = 14m and c = 15m

$\therefore$ Semi-perimeter of triangular side wall, $\mathrm{s} = \frac{\mathrm{a}+\mathrm{b}+\mathrm{c}}{2} = \frac{13+14+15}{2} = \frac{42}{2} = 21\mathrm{m}$

$\therefore$ Area of triangular side wall,

$= \sqrt{\mathrm{s}(\mathrm{s}-\mathrm{a})(\mathrm{s}-\mathrm{b})(\mathrm{s}-\mathrm{c})}$ [by Heron's formula]

$= \sqrt{21(21-13)(21-14)(21-15)}$

$= \sqrt{21 \times 8 \times 7 \times 6}$

$= \sqrt{21 \times 4 \times 2 \times 7 \times 3 \times 2}$

$= \sqrt{(21)^2 \times (4)^2}$

$= 21 \times 4 = 84\text{m}^2$

Since, the advertisement yield eaming per year for 1m^2 = Rs. 2000

$\therefore$ Advertisement yield earning per year on 84m^2 = 2000 × 84 = Rs. 168000

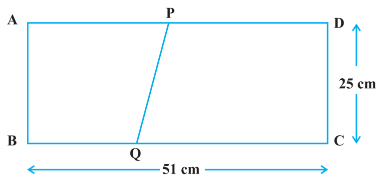
As the company hired one of its walls for 6 moths, therefore company pay the rent

$= \frac{1}{2}(168000) = \text{Rs. } 84000$

Hence, the company6 paid tent Rs. 84000

* Questions with calculation. [4 Marks Each] [48]

60. The dimensions of a rectangle ABCD are 51cm × 25cm. 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 if the area of the trapezium PQCD is $\frac{5}{6}\text{th}$ part of the area of the rectangle, find the lengths QC and PD.



Ans. : ABCD is a rectangle in which CD = 25cm and BC = 51cm

Since parallel sides QC and PD are in the ratio 9 : 8, so let QC = 9x and PD = 8x

Now, are of trapezium $\text{PQCD} = \frac{1}{2} \times (9\text{x} + 8\text{x}) \times 25\text{cm}^2$

$= \frac{1}{2} \times 17\text{x} \times 25$

Area of rectangle ABCD = BC × CD = 51 × 25

It is given that area of trapezium $\text{PQCD} = \frac{5}{6} \times \text{Area of rectangle ABCD}$

$\therefore \frac{1}{2} \times 17\text{x} \times 25 = \frac{5}{6} \times 51 \times 25$

$\Rightarrow \text{x} = \frac{5}{6} \times 51 \times 25 \times 2 \times \frac{1}{17 \times 25} = 5$

Hence, the length QC = 9x = 9 × 5 = 45cm

And the lengthb PD = 8x = 8 × 5 = 40cm

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

Ans. : Given, perimeter of a triangular field is 420m and its sides are in the ratio 6 : 7 : 8.

Let sides of a triangular field be a = 6x, b = 7x and c = 8x

Perimeter of a triangular field, 2s = a + b + c

⇒ 420 = 6x + 7x + 8x

⇒ 420 = 21x

$\Rightarrow \text{x} = \frac{420}{21} = 20\text{m}$

$\therefore$ Sides of a triangular filed are,

$\text{a} = 6 \times 20 = 120\text{m}$

$\text{b} = 7 \times 20 = 140\text{m}$

and $\text{c} = 8 \times 20 = 160\text{m}$

Now, semi-perimeter,

$\text{s} = \frac{\text{a}+\text{b}+\text{c}}{2}$

$= \frac{120+140+160}{2}$

$= \frac{420}{2} = 210\mathrm{m}$

$\therefore$ Area of a triangular field $= \sqrt{\mathrm{s(s-a)(s-b)(s-c)}}$ [by Heron's formula]

$= \sqrt{210(210-120)(210-140)(210-160)}$

$= \sqrt{210 \times 90 \times 70 \times 50}$

$= 100\sqrt{21 \times 9 \times 7 \times 5}$

$= 100\sqrt{7 \times 3 \times 3^2 \times 7 \times 5}$

$= 100 \times 7 \times 3 \times \sqrt{15}$

$= 2100\sqrt{15}\,\mathrm{m}^2$

Hence, the area of triangle field is $2100\sqrt{15}\,\mathrm{m}^2$

62. A hand fan is made by sticking 10 equal size triangular strips of two different types of paper as shown in the figure. The dimensions of equal strips are 25cm, 25cm and 14cm. Find the area of each type of paper needed to make the hand fan.

Ans. : Given that,

AO = 25cm

OB = 25cm

BA = 14cm

Area of each strip = Area of $\triangle \mathrm{AOB}$

Now, for the area of $\triangle \mathrm{AOB}$

Perimeter = AO + OB + BA

2s = 25cm +25cm + 14cm

s = 32cm

By using Heron's Formula,

Area of the $\triangle \mathrm{AOB} = \sqrt{\mathrm{s \times (s-a) \times (s-b) \times (s-c)}}$

$= \sqrt{32 \times (7) \times (4) \times (18)}$

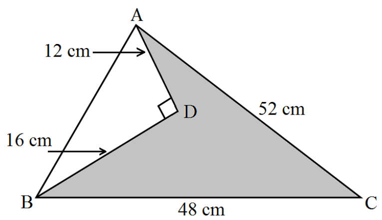
= $168\mathrm{cm}^2$

Also, area of each type of paper needed to make a fan = 5 × Area of $\triangle \mathrm{AOB}$

Area of each type of paper needed to make a fan = 5 × $168\mathrm{cm}^2$

Area of each type of paper needed to make a fan = $840\mathrm{cm}^2$.

63. Find the area of the shaded region in fig. below



Ans. : Area of the shaded region = Area of $\triangle ABC -$ Area of $\triangle ADB$

Now in triangle ADB

$AB^2 = AD^2 + BD^2$....(i)

Given, AD = 12cm, BD =16cm

Substituting the value of AD and BD in eq (i), we get

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

$= 400cm^2$

AB = 20cm

Now, area of a triangle $= \frac{1}{2} \times AD \times BD$

$= 96cm^2$

Now in triangle ABC,

$s = \frac{1}{2} \times (AB + BC + CA)$

$= \frac{1}{2} \times (52 + 48 + 20)$

$= 60cm$

By using Heron's Formula

The area of a triangle $= \sqrt{s \times (s - a) \times (s - b) \times (s - c)}$

$= \sqrt{60 \times (60 - 20) \times (60 - 48) \times (60 - 52)}$

$= 480cm^2$

Thus, the area of a triangle is $480cm^2$

Area of shaded region = Area of $\triangle ABC -$ Area of $\triangle ADB$

$= (480 - 96)cm^2$

$= 384cm^2$

Area of shaded region = $384cm^2$

64. The perimeter of a triangular field is 240dm. If two of its sides are 78dm and 50dm, find the length of the perpendicular on the side of length 50dm from the opposite vertex.

Ans. : Given,

In a triangle ABC, a = 78dm = AB, b = 50dm = BC

Now, Perimeter = 240dm

Then, AB + BC + AC = 240dm

78 + 50 + AC = 240

AC = 240 - (78 + 50)

AC = 112dm = c

Now, 2s = a + b + c

2s = 78 + 50 + 112

s = 120dm

Area of the triangle ABC $= \sqrt{s \times (s - a) \times (s - b) \times (s - c)}$

$= \sqrt{120 \times (120 - 78) \times (120 - 50) \times (120 - 112)}$

$= 1680dm^2$

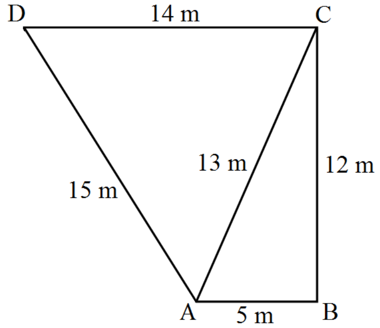
Let AD be a perpendicular on BC

Area of the triangle ABC $= \frac{1}{2} \times \mathrm{AD} \times \mathrm{BC}$

$\frac{1}{2} \times \mathrm{AD} \times \mathrm{BC} = 1680\mathrm{dm}^2$

$\mathrm{AD} = 67.2\mathrm{dm}.$

65. The sides of a quadrilateral, taken in order as 5m, 12m, 14m, 15m respectively. The angle contained by first two sides is a right angle. Find its area.



Ans. : Given that the sides of the quadrilateral are

AB = 5m, BC = 12m, CD = 14m, DA = 15m

Join AC

Now, in $\triangle \mathrm{ABC} = \frac{1}{2} \times \mathrm{AB} \times \mathrm{BC}$

$= \frac{1}{2} \times 5 \times 12$

= $30\mathrm{m}^2$

In $\triangle \mathrm{ABC}$, By applying Pythagoras theorem

$\mathrm{AC}^2 = \mathrm{AB}^2 + \mathrm{BC}^2$

$\mathrm{AC} = \sqrt{5^2 + 12^2}$

AC = 13m

Now area of $\triangle \mathrm{ADC}$,

Perimeter = 2s = AD + DC + AC

2s = 15m + 14m + 13m

s = 21m

By using Heron's Formula

The area of a triangle PSR $= \sqrt{\mathrm{s} \times (\mathrm{s}-\mathrm{a}) \times (\mathrm{s}-\mathrm{b}) \times (\mathrm{s}-\mathrm{c})}$

$= \sqrt{21 \times (21-15) \times (21-14) \times (21-13)}$

= $84\mathrm{m}^2$

Area of quadrilateral ABCD = Area of triangle ABC + Area of triangle ADC

= (30 + 84) m^2

= $114\mathrm{m}^2$

66. The perimeter of an isosceles triangle is 42cm and its base is $\left(\frac{3}{2}\right)$ times each of the equal side. Find the length of each of the triangle, area of the triangle and the height of the triangle.

Ans. : Let 'x' be the length of two equal sides, Therefore the base $= \frac{1}{2} \times \mathrm{x}$

Let the sides a, b, c of a triangle be $\frac{1}{2} \times \mathrm{x}$, x and x respectively

So, the perimeter = 2s = a + b + c

42 = a + b + c

$42 = \frac{3}{2} \times \mathrm{x} + \mathrm{x} + \mathrm{x}$

Therefore, x = 12cm

So, the respective sides are:

a = 12cm

b = 12cm

c = 18cm

Now, semi perimeter

$\mathrm{s} = \frac{\mathrm{a}+\mathrm{b}+\mathrm{c}}{2}$

$= \frac{12+12+18}{2}$

$= 21\mathrm{cm}$

By using Heron's Formula,

The area of a triangle $= \sqrt{\mathrm{s} \times (\mathrm{s}-\mathrm{a}) \times (\mathrm{s}-\mathrm{b}) \times (\mathrm{s}-\mathrm{c})}$

$= \sqrt{21 \times (21-12) \times (21-12) \times (21-18)}$

$= 71.42\mathrm{cm}^2$

Thus, the area of a triangle is 70.42cm^2

The altitude will be smallest provided the side corresponding to this altitude is longest.

The longest side = 18cm

Area of the triangle $= \frac{1}{2} \times \mathrm{h} \times 18$

$\frac{1}{2} \times \mathrm{h} \times 18 = 71.42\mathrm{cm}^2$

$\mathrm{h} = 7.94\mathrm{cm}$

Hence the length of the smallest altitude is 7.93cm.

67. The perimeter of a triangullar field is 144m and the ratio of the sides is 3 : 4 : 5. Find the area of the field.

Ans. : The area of a triangle having sides a, b, c and *s* as semi-perimeter is given by,

$\mathrm{A} = \sqrt{\mathrm{s}(\mathrm{s}-\mathrm{a})(\mathrm{s}-\mathrm{b})(\mathrm{s}-\mathrm{c})}$, where,

$\mathrm{s} = \frac{\mathrm{a}+\mathrm{b}+\mathrm{c}}{2}$

It is given the sides of a triangular field are in the ratio 3 : 4 : 5 and perimeter = 144m

Therefore, a : b : c = 3 : 4 : 5

We will assume the sides of triangular field as

a = 3x; b = 4x; c = 5x

$2\mathrm{s} = 144$

$\mathrm{s} = \frac{144}{2}$

$\mathrm{s} = 72$

$72 = \frac{3\mathrm{x}+4\mathrm{x}+5\mathrm{x}}{2}$

$72 \times 2 = 12\mathrm{x}$

$x = \frac{144}{12}$

$x = 12$

Substituting the value of *x* in, we get sides of the triangle as

a = 3x = 3 × 12

a = 36m

b = 4x = 4 × 12

b = 48m

c = 5x = 5 × 12

c = 60m

Area of a triangular field, say A having sides a, b, c and s as semi-perimeter is given by:

a = 36m; b = 48m; c = 60m

$s = 72m$

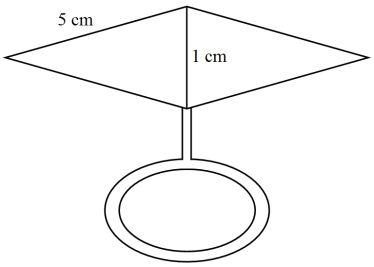
$A = \sqrt{72(72-36)(72-48)(72-60)}$

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

$A = \sqrt{746496}$

$A = 864m^2$.

68. Find the area of the of the blades of the magnetic compass shown in Fig. below $\left(\text{Take } \sqrt{11} = 3.32\right)$.



Ans. : Area of the blades of magnetic compass = Area of $\triangle ADB$ + Area of $\triangle CDB$

Now, for the area of $\triangle ADB$

Perimeter = 2s = AD + DB + BA

2s = 5cm + 1cm + 5cm

s = 5.5cm

By using Heron's Formula,

Area of the $\triangle DEF = \sqrt{s(s-a) \times (s-b) \times (s-c)}$

$= \sqrt{5.5 \times (5.5) \times (4.5) \times (0.5)}$

= 2.49cm^2

Also, area of $\triangle ADB$ = Area of $\triangle CDB$

Therefore area of the blades of the magnetic compass = 2 × area of $\triangle ADB$

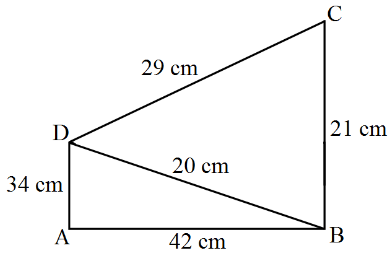
Area of the blades of the magnetic compass = 2 × 2.49

Area of the blades of the magnetic compass = 4.98cm^2

69. Find the area of quadrilateral ABCD in which AB = 42cm, BC = 21cm, CD = 29cm, DA = 34cm and the diagonal BD = 20cm.

Ans. : Given:

AB = 42cm, BC = 21cm, CD = 29cm, DA = 34cm, and the diagonal



BD = 20cm.

Now, for the area of triangle ABD

Perimeter of triangle ABD 2s = AB + BD + DA

2s = 34cm + 42cm + 20cm

s = 48cm

By using Heron's Formula,

Area of the $\triangle \mathrm{ABD} = \sqrt{\mathrm{s} \times (\mathrm{s}-\mathrm{a}) \times (\mathrm{s}-\mathrm{b}) \times (\mathrm{s}-\mathrm{c})}$

$= \sqrt{48 \times (48-42) \times (48-20 \times (48-34)}$

= 336cm^2

Now, for the area of triangle BCD

Perimeter of triangle BCD 2s = BC + CD + BD

2s = 29cm + 21cm + 20cm

s = 35cm

By using Heron's Formula,

Area of the $\triangle \mathrm{BCD} = \sqrt{\mathrm{s} \times (\mathrm{s}-\mathrm{a}) \times (\mathrm{s}-\mathrm{b}) \times (\mathrm{s}-\mathrm{c})}$

$= \sqrt{35 \times (14) \times (6) \times (15)}$

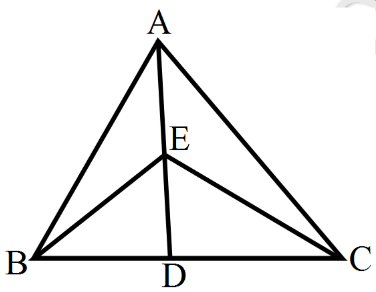
= 210cm^2

Therefore, Area of quadrilateral ABCD = Area of $\triangle \mathrm{ABC}$ + Area of $\triangle \mathrm{BCD}$

Area of quadrilateral ABCD = 336 + 210

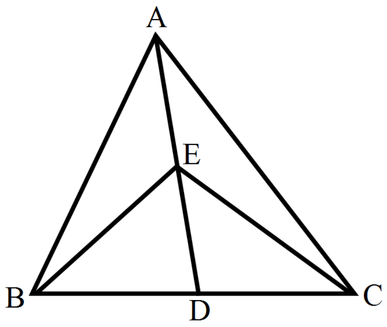
Area of quadrilateral ABCD = 546cm^2

70. The vertex A of $\triangle \mathrm{ABC}$ is joined to a point D on the side BC. The mid-point of AD is E. Prove that $\operatorname{ar}(\triangle \mathrm{BEC}) = \frac{1}{2}\operatorname{ar}(\triangle \mathrm{ABC})$.



Ans. : Given:

A $\triangle \mathrm{ABC}$ in which E is the mid-point of line segment AD where D is a point on BC.



To prove:

$\text{ar}(\triangle \text{BEC}) = \frac{1}{2}\text{ar}(\triangle \text{ABC})$

Proof:

Since BE is the median of $\triangle \text{ABD}$

So,

$\text{ar}(\triangle \text{BDE}) = \text{ar}(\triangle \text{ABE})$

$\text{ar}(\triangle \text{BDE}) = \frac{1}{2}\text{ar}(\triangle \text{ABD}) \ldots \text{(i)}$

As, CE is median of $\triangle \text{ADC}$

$\text{ar}(\triangle \text{CDE}) = \frac{1}{2}\text{ar}(\triangle \text{ACD}) \ldots \text{(ii)}$

Adding (i) and (ii), we get

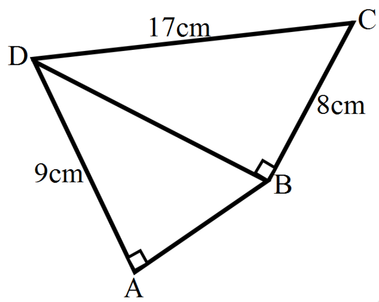
$\text{ar}(\triangle \text{BDE}) = \text{ar}(\triangle \text{CDE})$

$= \frac{1}{2}\text{ar}(\triangle \text{ABD}) + \frac{1}{2}\text{ar}(\triangle \text{ACD})$

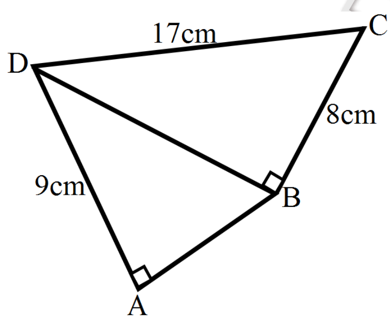
$\text{ar}(\triangle \text{BEC}) = \frac{1}{2}[\text{ar}(\triangle \text{ABD}) + \text{ar}(\triangle \text{ACD})]$

$= \frac{1}{2}\text{ar}(\triangle \text{ABC})$.

71. Calculate the area of quadrilateral ABCD, given in Figure (i).



Ans. : ABCD is a quadrilateral.



Now in rightarrow angled $\triangle \text{DBC}$,

$DB^2 = DC^2 - CB^2$

$= 17^2 - 8^2$

= 289 - 64

= 225cm^2

$\therefore\ \mathrm{DB}=\sqrt{225}=15\mathrm{cm}$

So,

$\text{Area of } \triangle\mathrm{DBC}=\left(\frac{1}{2}\times 15\times 8\right)\mathrm{cm}^2$

$=60\mathrm{cm}^2$

Again, in right angled $\triangle\mathrm{DAB}$,

AB^2 = DB^2 - AD^2

= 15^2 - 9^2

= 225 - 81 = 144cm^2

$\therefore\ \mathrm{AB}=\sqrt{144}=12\mathrm{cm}$

$\therefore\ \text{Area of } \triangle\mathrm{DAB}=\left(\frac{1}{2}\times 12\times 9\right)\mathrm{cm}^2$

$=54\mathrm{cm}^2$

So,

Area of quadrilateral ABCD $=\text{Area of } \triangle\mathrm{DBC}+\text{Area of } \triangle\mathrm{DAB}$

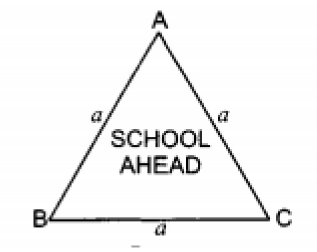
= (60 + 54)cm^2 = 114cm^2

$\therefore$ Area of quadrilateral ABCD = 114cm^2.

*** Answer the following questions. [5 Marks Each] [20]**

72. 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?

Ans. :



A traffic signal board is an equilateral triangle with side a.

Perimeter of the signal board,

2s = a + a + a

$\Rightarrow \mathrm{s}=\frac{3}{2}a$

Area of triangle $=\sqrt{s(s-a)(s-b)(s-c)}$

$=\sqrt{\frac{3a}{2}\left(\frac{3}{2}a-a\right)\left(\frac{3}{2}a-a\right)\left(\frac{3}{2}a-a\right)}$

$=\sqrt{\frac{3a}{2}\times\frac{a}{2}\times\frac{a}{2}\times\frac{a}{2}}=\sqrt{\frac{3a^4}{16}}=\frac{\sqrt{3}}{4}a^2$ sq. units

Now, if perimeter = 180 cm

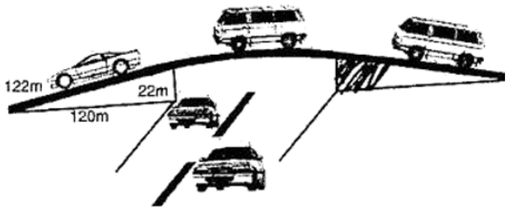
3a = 180

$\Rightarrow$ a = 60 cm

$\therefore$ Area of signal board $= \frac{\sqrt{3}}{4}a^2 = \frac{\sqrt{3}}{4} \times (60)^2 = 900\sqrt{3}\mathrm{cm}^2$

So, area of the signal board is $900\sqrt{3}\mathrm{cm}^2$.

73. 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 (see Fig.). The advertisements yield an earning of ₹ 5000 per m^2 per year. A company hired one of its walls for 3 months. How much rent did it pay?



Ans. : Given: = 122 m, = 22 m and = 120 m

Semi-perimeter of triangle (s)$= \frac{122+22+120}{2} = \frac{264}{2}$ = 132 m Using Heron's Formula,

Area of triangle $= \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{132(132-122)(132-22)(132-120)}$

$= \sqrt{132 \times 10 \times 110 \times 12}$

$= \sqrt{11 \times 12 \times 10 \times 10 \times 11 \times 12}$

= 10 $\times$ 11 $\times$ 12

= 1320 m^2

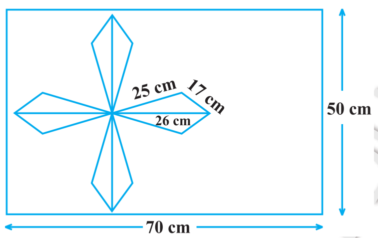
$\because$ Rent for advertisement on wall for 1 year = Rs. 5000 perm^2

$\therefore$ Rent for advertisement on wall for 3 months for 1320 m^2; $\frac{5000}{12} \times 3 \times 1320$

= Rs.1650000

Hence rent paid by company = Rs. 16,50,000

74. A design is made on a rectangular tile of dimensions 50cm × 70cm as shown in the design shows 8 triangles, each of sides 26cm, 17cm and 25cm. Find the total area of the design and the remaining area of the tile.



Ans. : Given, tha dimension of rectangular lile is 50cm × 70cm

Area of rectangular tile = 50 × 70 = 3500cm^2

The sides of a design of one triangle be,

a = 25cm, b = 17cm and c = 26cm

Now, semi-perimeter, $\mathrm{s} = \frac{\mathrm{a+b+c}}{2} = \frac{25+17+26}{2} = \frac{68}{2} = 34$

$\therefore$ Area of one triangle $= \sqrt{\mathrm{s(s-a)(s-b)(s-c)}}$ [by Heron's formula]

$= \sqrt{34 \times 9 \times 17 \times 8}$

$= \sqrt{17 \times 2 \times 3 \times 3 \times 17 \times 2 \times 2 \times 2}$

$= 17 \times 3 \times 2 \times 2 = 204\text{cm}^2$

$\therefore$ Total area of eight triangles = 204 × 8 = 1632cm

Now, area of the desion = Total area of eight triangles

= 1632cm^2

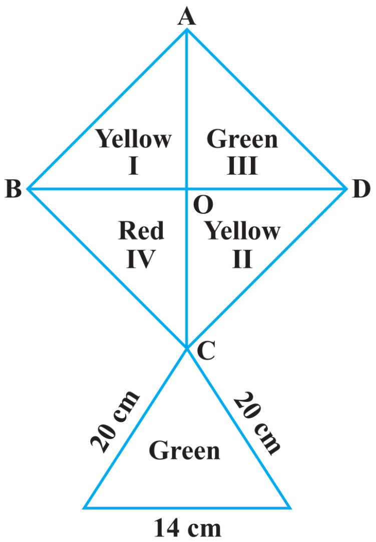
Also, remaining area of the tile = Area of the rectangle - Area of the design

= 3500 - 1632

= 1868cm

Hence, the total area of the design is 1632cm^2 and the remaining area of the tile is 1868cm^2

75. How much paper of each shade is needed to make a kite given in which ABCD is a square with diagonal 44cm.



Ans. : We know that, all the sides of a square are always equal.

i.e., $\text{AB} = \text{BC} = \text{CD} = \text{DA}$

In $\triangle\text{ABCD},\ \text{AC} = 44\text{cm}, \angle\text{D} = 90^\circ$

Using pythagoras theorem in $\triangle\text{ACD}$,

$\text{AC}^2 = \text{AD}^2 + \text{DC}^2$

$\Rightarrow 44^2 = \text{AD}^2 + \text{AD}^2$

$\Rightarrow 2\text{AD}^2 = 44 \times 44$

$\Rightarrow \text{AD}^2 = 22 \times 44$

$\Rightarrow \text{AD} = \sqrt{22 \times 44}$ [taking positive square because length is always positive]

$\Rightarrow \text{AD} = \sqrt{2 \times 11 \times 4 \times 11}$

$\Rightarrow \text{AD} = 22\sqrt{2}\text{cm}$

So, $\text{AB} = \text{BC} = \text{CD} = \text{DA} = 22\sqrt{2}\text{cm}$

$\therefore$ Area od squre $\text{ABCD} = \text{Side} \times \text{Side} = 22\sqrt{2} \times 22\sqrt{2} = 968\text{cm}^2$

$\therefore$ Area of the red portion $= \frac{968}{4} = 242\text{cm}^2$ [Since, area of square is divided into four parts]

area of the yellow portion $= \frac{968}{2} = 484\text{cm}^2$

In $\triangle PCQ$, Side PC = a = 20cm, CQ = b = 20cm and PQ = c = 14cm

$s = \frac{a+b+c}{2} = \frac{20+20+4}{2} = \frac{54}{2} = 27\text{cm}$

$\therefore$ Area of $\triangle PCQ = \sqrt{s(s-a)(s-b)(s-c)}$ [by Heron's formula]

$= \sqrt{27(27-20)(27-20)(27-14)}$

$= \sqrt{27 \times 7 \times 7 \times 13}$

$= \sqrt{3 \times 3 \times 3 \times 7 \times 7 \times 13}$

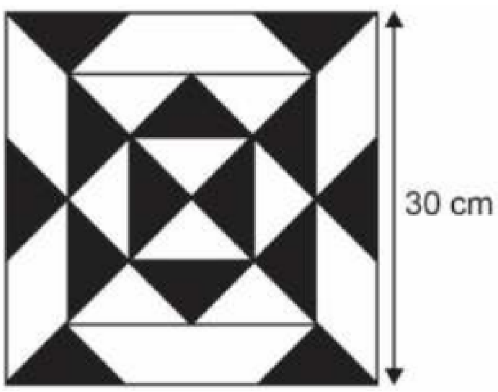
$= 21\sqrt{39} = 21 \times 6.24 = 131.04\text{cm}^2$

$\therefore$ Total area of the green portion = 242 + 131.04 = 373.04cm^2

Hence, the paper required for each shade to make a kite is red paper 242cm^2, yellow paper 484cm^2 and green paper 373.04cm^2

* Case study based questions. [12]

76. The design on a tile is made of isosceles triangles.
The side lengths of the triangles are 6 cm, 6 cm and 8 cm.



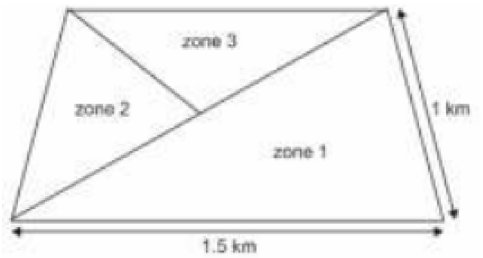
5. How much area of the tile is black?
   A. 24 cm^2
   B. $9\sqrt{7}$ cm^2
   C. 90 cm^2
   D. $112\sqrt{5}$ cm^2
6. A tile is made by joining the vertices of four equilateral triangles. The side length of the triangles is 15 cm. What is the area of the tile?

Ans. : 5. D. $112\sqrt{5}$ cm^2

6. $225\sqrt{3}$ square centimetres

$225\sqrt{3}$ sq cm

77. A zoo is in the shape of an isosceles trapezium.
It is divided into three zones – Zone 1, Zone 2 and Zone 3.
Animals are kept without cages in Zone 1. Zone 2 is for visitors and Zone 3 is reserved for park
authorities.



To avoid the entry of animals in zones 2 and 3, a 1.8 km long wired fencing is installed.

7. Which of the following calculations shows the area for animals?

A. $\sqrt{1.35\times0.65\times1.15}$

B. $2.15\times0.35\times0.65\times1.15$

C. $\sqrt{3.15\times1.35\times1.65\times1.15}$

D. $\sqrt{4.30\times1.35\times0.65\times1.15}$

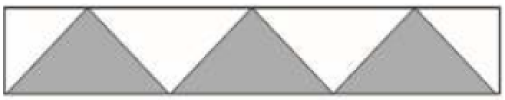
8. "The area reserved for animals is twice the area reserved for the zoo authorities." Do you have enough information to support this statement? Explain your answer.

Ans. : 7. B. $2.15\times0.35\times0.65\times1.15$

8. No, with a valid explanation.

● No, we don't have enough information to say that the area reserved for animals is double the area reserved for the zoo authorities. The area reserved under zone 1 = area reserved under zone 2 + 3, but we cannot say the area reserved under zone 2 and 3 are equal.

78. The outer boundary of Zone 1 is made of solid structures in the shape of isosceles triangles of the same size and barbed wires.



The wall consists of 15 such solid structures.

9. Which of the following calculations shows the total area (in square meters) of the solid structures?

A. $\sqrt{50\times 50\times30}$

B. $\sqrt{130\times50\times50\times30}$

C. $15\sqrt{130\times50\times50\times30}$

D. $15\sqrt{260\times180\times180\times16}$

10. What is the area of a triangle with side lengths 20 cm, 20 cm and 8 cm?

Ans. : 9. C. $15\sqrt{130\times50\times50\times30}$

10. $32\sqrt{6}\,cm^2$

----- "Our greatest glory is not in never falling, but in rising every time we fall." -----