CBSE Test Paper 04

CH-12 Herons Formula

1. The perimeter of a rhombus is 20 cm. If one of its diagonals is 6 cm, then its area is
   a. 28 cm^2
   b. 24 cm^2
   c. 20 cm^2
   d. 36 cm^2
2. Two adjacent side of a parallelogram are 74cm and 40cm one of Its diagonals is 102cm. area of the ||gram is
   a. 4896 sq m
   b. 2448 sq cm
   c. 1224 sq m
   d. 612 sq m
3. The sides of a triangle are 5 cm, 12 cm and 13 cm. then its area is
   a. 0.003 m^2
   b. 0.0015 m^2
   c. 0.0024 m^2
   d. 0.0026 m^2
4. Each side of an equilateral triangle measures 10 cm. Then the area of the triangle is
   a. 43.2 cm^2
   b. 43.4 cm^2

c. 43.1 cm^2

d. 43.3 cm^2

5. The length of the sides of a triangle are 5 cm, 7 cm and 8 cm. Area of the triangle is :

   a. $100\sqrt{3}\ cm^2$

   b. $10\sqrt{3}\ cm^2$

   c. 300 cm^2

   d. $50\sqrt{3}\ cm^2$

6. Fill in the blanks:

   One side of an equilateral triangle is 4 cm, then its area is________.

7. Fill in the blanks:

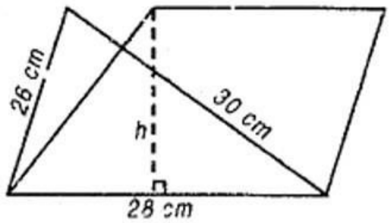
   The area of a triangle whose base and altitude are 5 cm and 4 cm, respectively is ________cm^2.

8. If the perimeter of an isosceles triangle is 11 cm and its unequal side is 5 cm, then find its area.

9. One side of an equilateral triangle is 4 cm. Find its area.

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

11. A triangle and a parallelogram have the same base and the same area. If the sides 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.



12. Find area of triangle with two sides as 18cm & 10cm and the perimeter is 42cm.

13. Find the area of the quadrilateral ABCD, in which AB = 7cm, BC = 6 cm, CD = 12 cm, DA = 15 cm and AC = 9 cm.

14. An umbrella is made by stitching 10 triangular pieces of cloth of two different colours, each piece measuring 20 cm, 50 cm and 50 cm. How much cloth of each colour is required for the umbrella?

15. One side of a right triangle measures 126 m and the difference in lengths of its hypotenuse and other side is 42 cm. Find the measures of its two unknown sides and calculate its area. Verify the result using Heron's Formula.

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Solution

1. (b) 24 cm^2

   Explanation:

   Side = $\frac{20}{4} = 5$ cm

   half diagnoal = $\sqrt{5^2 - 3^2} = 4$ cm

   diagnoal = $4 \times 2 = 8$ cm

   Area = $\frac{1}{2} \times 6 \times 8 = 24\,\text{cm}^2$

2. (b) 2448 sq cm

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

   Let the length of diagonal be c = 102cm

   These two sides and the diagonal forms a triangle

   semi perimeter, s = (a + b + c) / 2

   s= (74+40+102)/2

   =216/2

   =108 cm

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

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

   = 1224 cm^2

   therefore, area of paralleogram=1224*2

   = 2448 sq cm

3. (a) 0.003 m^2

Explanation:

s = $\frac{5+12+13}{2}$ = 15 cm

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

= $\sqrt{15(15-5)(15-12)(15-13)}$

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

= 30 sq. cm

= 0.003 sq. m

4. (d) 43.3 cm^2

Explanation:

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

= $\frac{1.732}{4} \times 10 \times 10$

= 43.3 sq. cm

5. (b) $10\sqrt{3}\ cm^2$

Explanation: s = $\frac{5+7+8}{2}$ = 10 cm

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

= $\sqrt{10(10-5)(10-7)(10-8)}$

= $\sqrt{10 \times 5 \times 3 \times 2}$

= $10\sqrt{3}$ sq. cm

6. $4\sqrt{3}$

7. 10

8. Let equal sides of given isosceles triangle be b cm.

∴ Perimeter of the triangle,

2s = b + b + 5 [∵ 2s = a + b + c]

$\Rightarrow$ 11 = 2b + 5 $\Rightarrow$ 2b = 11 - 5

$\Rightarrow$ 2b = 6 $\Rightarrow$ b = $\frac{6}{2}$ = 3 cm

Now we have, 2s = 11

∴ s = 5.5 cm

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

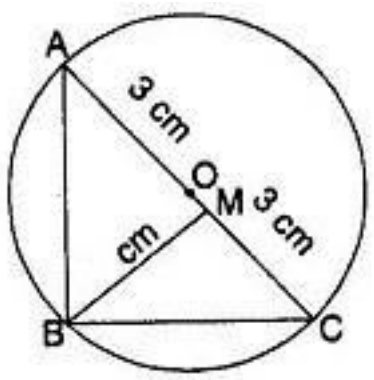
= $\sqrt{5.5(5.5-5)(5.5-3)(5.5-3)}$

= 4.14 cm^2

9. Area of equilateral triangle $= \frac{\sqrt{3}}{4}a^2 = \frac{\sqrt{3}}{4}4^2 = \frac{\sqrt{3}}{4}(16) = 4\sqrt{3}\text{cm}^2$.

Hence the area of equilateral triangle is $4\sqrt{3}\text{cm}^2$.

10.



Let ABC be the right-angled triangle right angled at B.

Let O be the centre of the circumcircle.

O is the mid-point of the hypotenuse AC.

OA = OB = OC = radius of the circumcircle = 3 cm.

∴ Hypotenuse AC = Diameter of the circle.

= 2 $\times$ radius of the circmumcircle

= 2 $\times$ 3 = 6 cm.

Let BM be the perpendicular from B on AC.

∴ BM = 2 cm

∴ Area of the right angled triangle ABC

= $\frac{1}{2}$ $\times$ Base $\times$ Altitude

= $\frac{1}{2}$ $\times$ AC $\times$ BM

= $\frac{1}{2}$ $\times$ 6 $\times$ 2 = 6 cm^2

11. Let's find area of triangle,

Area of triangle = Area of parallelogram

Semi-perimeter of triangle (s) $= \frac{26+28+30}{2}$ =42 cm

Using Heron's formula,

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

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

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

= 336 cm^2

According to question, Area of parallelogram = Area of triangle

$\Rightarrow$ Base $\times$ Corresponding height = 336

$\Rightarrow$ 28 $\times$ Height = 336

$\Rightarrow$ Height = 12 cm

12. Let a=18 cm, b=10 cm

Perimeter =42cm

$\therefore a+b+c=42cm$

So, C=14 cm

$\therefore$ S$=\frac{a+b+c}{2} = \frac{18+10+14}{2}$ = 21 cm

new area of triangles $= \sqrt{21(21-18)\,(21-10)\,(21-14)}$

$= \sqrt{21 \times 3 \times 11 \times 7}$

$=21\sqrt{11}\ sq$ cm

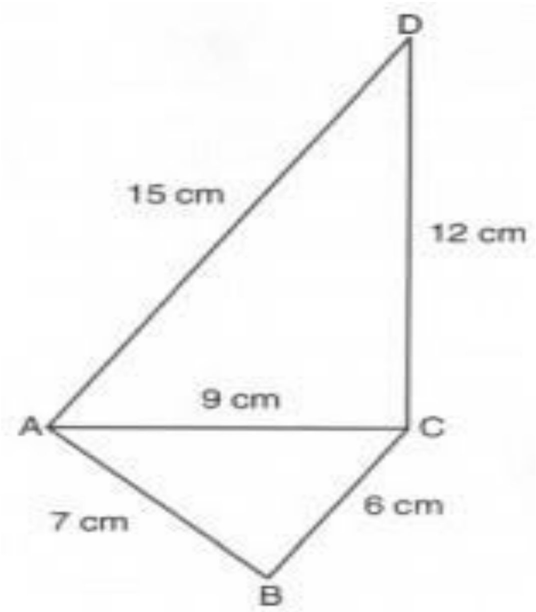
13. The diagonal AC divides the quadrilateral ABCD into two triangles ABC and ACD.

$\therefore$ Area of quad. ABCD = Area of $\triangle$ABC + Area of $\triangle$ACD

For $\triangle$ ABC, we have

s = $\frac{6+7+9}{2}$ = 11 cm

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



$\Rightarrow$ Area of $\triangle$ ABC = $\sqrt{11(11-6)(11-7)(11-9)}$ = $\sqrt{11 \times 5 \times 4 \times 2}$ = $\sqrt{440}$ sq.cm

$\Rightarrow$ Area of $\triangle$ ABC = 20.98 cm^2

For $\triangle$ ACD, we have,

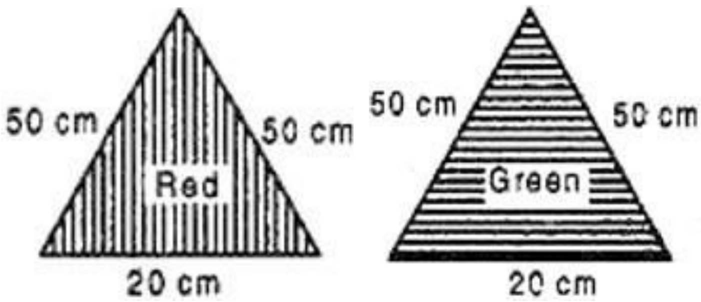
s = $\frac{9+12+15}{2}$ = 18 cm

$\therefore$ Area of $\triangle$ACD = $\sqrt{18(18-9)(18-12)(18-15)}$

$\Rightarrow$ Area of $\triangle$ACD = $\sqrt{18 \times 9 \times 6 \times 3}$ = 54 sq.units

Hence, Area of quad. ABCD = (20.98 + 54) cm^2 = 74.98 cm^2

14. Here, sides of each of 10 triangular pieces of two different colours are 20 cm, 50 cm and 50 cm.



Semi-perimeter of each triangle $(s) = \frac{20+50+50}{2}$ = 60 cm

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

$= \sqrt{60(60-20)(60-50)(60-50)}$

$= \sqrt{60 \times 40 \times 10 \times 10}$

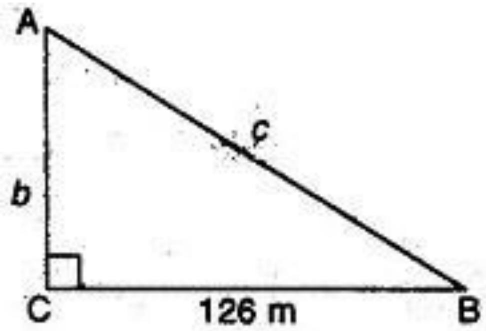
$= 200\sqrt{6}cm^2$

According to question, there are 5 pieces of red colour and 5 pieces of green colour.

$\therefore$ Cloth required for 5 red pieces = $5 \times 200\sqrt{6} = 1000\sqrt{6} cm^2$

And Cloth required to 5 green pieces =$5 \times 200\sqrt{6}$=$1000\sqrt{6} cm^2$

15. Let ABC be the right triangle right angles at C.



a = 126 m . . . (1)

In right triangle ACB.

$AB^2 = AC^2 + BC^2$ . . .[By Pythagoras theorem]

$\Rightarrow c^2 = a^2 + b^2$

$\Rightarrow c = \sqrt{a^2 + b^2}$ . . .(2)

$\Rightarrow c - b = 42$ . . .(3)

$\Rightarrow \sqrt{a^2 + b^2} - b = 42$ . . .[From (2)]

$\Rightarrow \sqrt{126^2 + b^2} - b = 42$ . . .[From (1)]

$\Rightarrow \sqrt{126^2 + b^2} = (42+b)$

$\Rightarrow (126)^2 + b^2 = (42 + b)^2$

$\Rightarrow 15876 + b^2 = 1764 + b^2 + 84b$

$\Rightarrow 84b = 15876 - 1764$

$\Rightarrow 84\ b = 14112$

$\Rightarrow b = \frac{14112}{84}$

$\Rightarrow b = 168$ m . . . (4)

From (3) and (4)

c – 168 = 42

$\therefore$ c = 168 + 42 = 210 m . . . (5)

$\therefore$ Area of the right triangle = $\frac{1}{2} \times$ base $\times$ height

$= \frac{1}{2} \times 126 \times 168$

= 10584 m^2

Using Heron's Formula

a = 126 m, b = 168 m, c = 210 m

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

= $\frac{126+168+210}{2}$ = $\frac{504}{2}$ = 252 m

$\therefore$ Area of the right triangle

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

= $\sqrt{252(252-126)(252-168)(252-210)}$

= $\sqrt{252(126)(84)(42)}$

= $\sqrt{(63\times4)(63\times2)(42\times2)(42)}$

= $63 \times 2 \times 2 \times 42$ = 10584 m^2