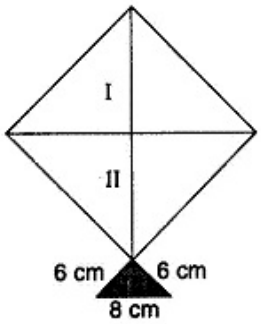
CBSE Test Paper 01

CH-12 Herons Formula

1. The perimeter and area of a triangle whose sides are of lengths 3 cm, 4 cm and 5 cm respectively are
   a. 12 cm, 6 cm^2
   b. 12 cm, 12 cm^2
   c. 6 cm, 6 cm^2
   d. 6 cm, 12 cm^2
2. Each equal side of an isosceles triangle is 13 cm and its base is 24 cm Area of the triangle is :
   a. $40\sqrt{3}\ cm^2$
   b. $25\sqrt{3}\ cm^2$
   c. 60 cm^2
   d. $50\sqrt{3}\ cm^2$
3. An isosceles right triangle has area 8 cm^2. The length of its hypotenuse is
   a. $\sqrt{32}$ cm
   b. $\sqrt{24}$ cm
   c. $\sqrt{16}$ cm
   d. $\sqrt{48}$ cm
4. If side of a scalene $\triangle$ is doubled then area would be increased by
   a. 200%
   b. 25 $\%$
   c. 50 $\%$
   d. 300 $\%$
5. One of the diagonals of a rhombus is 12cm and area is 96 sq cm. the perimeter of the rhombus is
   a. 72 cm
   b. $\sqrt[6]{10}$ cm
   c. 40 cm
   d. $\sqrt[3]{10}$ cm
6. Fill in the blanks: The area of a triangle of base 35 cm is 420 cm^2, then its altitude is

_____ cm.

7. Fill in the blanks: The altitude of an equilateral triangle ABC is _____.
8. The base and the corresponding altitude of a parallelogram are 10 cm and 7 cm, respectively. Find its area.
9. How many times area is changed, when sides of a triangle are doubled.
10. Find the area of a triangle whose sides are 9 cm, 12 cm and 15 cm.
11. An isosceles triangle has perimeter 30 cm and each of the equal sides is 12 cm. Find the area of the triangle.
12. The base of a right-angled triangle measures 4 cm and its hypotenuse measures 5 cm. Find the area of the triangle.
13. The perimeter of a triangle is 300 m. If its sides are in the ratio 3 : 5 : 7 . Find the area of the triangle.
14. A kite in the shape of a square with diagonal 32 cm and an isosceles triangle of base 8 cm and side 6 cm each is to be made of three different shades as shown in a figure. How much paper of each shade has been used in it? (Use $\sqrt{5}$ = 2.24)



15. Two parallel side of a trapezium are 60 cm and 77 cm and other sides are 25 cm and 26 cm. Find the area of the trapezium.

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Solution

1. (a) 12 cm, 6 cm^2

   Explanation: Perimeter of triangle = 3 + 4 + 5 = 12 cm

   Now, s = $\frac{3+4+5}{2} = 6$ cm

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

   = $\sqrt{6\left(6-3\right)\left(6-4\right)\left(6-5\right)} = \sqrt{6\times3\times2\times1}$

   = 6 sq cm

2. (c) 60 cm^2

   Explanation:

   s = $\frac{13+13+24}{2}$ = 25 cm

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

   = $\sqrt{25\left(25-13\right)\left(25-13\right)\left(25-24\right)}$

   = $\sqrt{25\times12\times12\times1}$

   = 60 sq. cm

3. (a) $\sqrt{32}$ cm

   Explanation:

   Area of isosceles triangle = $\frac{1}{2}$ x Base x Height

   Since in an isosceles triangle, Base and Height are equal.

   => 8 = $\frac{1}{2}$ x Base x Base

   => Base = Height = 4 cm

Hypotenuse = $\sqrt{4^2+4^2}$ = $\sqrt{32}$ cm

4. (d) 300 $\%$

   Explanation:

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

   New sides are 2a, 2b and 2c

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

   => s' = 2s .....(i)

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

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

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

   = 4A

   Increased area = 4A - A = 3A

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

5. (c) 40 cm

   Explanation:

   d_2 = $\frac{\text{Area}\times 2}{d_1}$

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

   =16 cm

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

   perimeter of rhombus = 4 x side

   = 4 x 10 = 40 cm

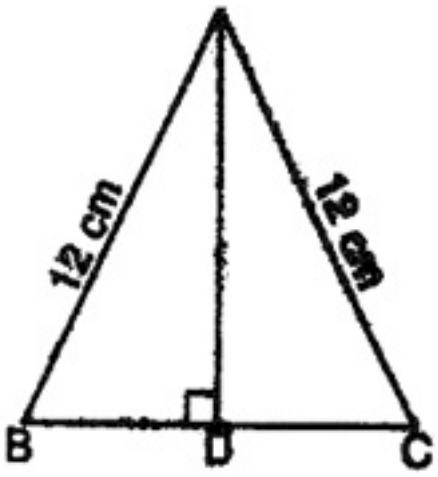
6. 24

7. $\frac{\sqrt{3}}{2}a$

8. The base of parallelogram =10 cm and the corresponding altitude = 7 cm.
   Area of parallelogram = Base $\times$ Corresponding altitude
   = 10 $\times$ 7 = 70 cm^2.

9. Area of triangle = $\frac{1}{2}$ $\times$ base $\times$ height = $\frac{1}{2}$ $\times$ b $\times$ h
   If new base B = 2b and height H = 2h
   New area of triangle = $\frac{1}{2}$ $\times$ B $\times$ H = $\frac{1}{2}$ $\times$ 2b $\times$ 2h =4($\frac{1}{2}$ $\times$ b $\times$ h) = 4 (area of triangle)
   So doubling the sides leads to 4 times the area.

10. Let a = 9 cm, b = 12 cm and c = 15 cm
    Since, 2s = a + b + c
    $\Rightarrow$ s = $\frac{1}{2}$ (a + b + c)
    = $\frac{1}{2}$ (9 + 12 + 15)
    = $\frac{1}{2}$ (36) = 18 cm
    Now, area of triangle = $\sqrt{s(s-a)(s-b)(s-c)}$
    = $\sqrt{18(18-9)(18-12)(18-15)}$
    = $\sqrt{18 \times 9 \times 6 \times 3}$
    = 54 cm^2

11. 

    a = 12 cm, b = 12 cm
    Perimeter = 30 cm
    a + b + c = 30
    $\Rightarrow$ 12 + 12 + c = 30
    $\Rightarrow$ 24 + c = 30

⇒ c = 30 – 24

⇒ c = 6 cm

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

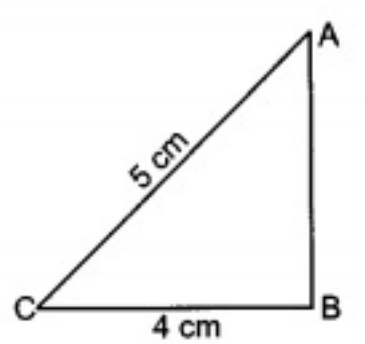
∴ Area of the triangle $= \sqrt{s(s-a)(s-b)(s-c)}$

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

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

12. Given: base of a right-angled triangle = 4 cm and hypotenuse = 5 cm.

In right-angled triangle ABC



AB^2 + BC^2 = AC^2 (By Pythagoras Theorem)

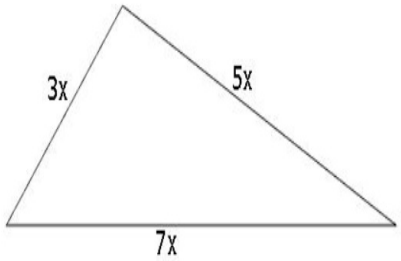
$\Rightarrow$ AB^2 + 4^2 = 5^2

$\Rightarrow$ AB^2 = 25 - 16 = 9

$\Rightarrow$ AB = 3 cm

$\therefore$ Area of $\Delta ABC = \frac{1}{2}BC \times AB = \frac{1}{2} \times 4 \times 3 = 6\text{cm}^2$

Hence area of given right-angled triangle is 6 cm^2.

13. 

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

14. Here ABCD be the square and $\triangle$CEF be an isosceles triangle.

Let the diagonals bisect each other at O.

Then,

AO = $\frac{1}{2} \times$ 32 cm

= 16 cm

Area of shaded portion I = $\frac{1}{2} \times 32 \times 16\ sq\ cm$

= 256 sq cm

Similarly, Area of shaded portion II = $\frac{1}{2} \times 32 \times 16\ sq\ cm$

= 256 sq cm

And, for triangle

base, a = 8 cm

and side, b = 6 cm

Area of portion III = $\frac{a}{4}\sqrt{4b^2 - a^2}$

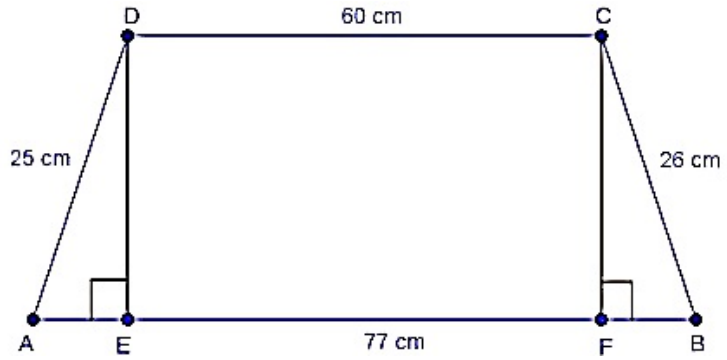
$= \frac{8}{4}\sqrt{4 \times (6)^2 - 64}$

$= 2\sqrt{144 - 64}$

$= 8\sqrt{5}$

= 17.92 sq cm

Thus, the papers of three shades required are 256 sq cm, 256 sq cm and 17.92 sq cm.

15. 

Given that,

AB = 77 cm, CD = 60 cm, BC = 26 cm and AD = 25 cm

Now, DE $\perp$ AB and CF $\perp$ AB is drawn.

$\therefore$ EF = DC = 60 cm

Let AE = x

$\Rightarrow$ BF = 77 - 60 - x = (17 - x)

In $\triangle$ADE, $DE^2 = AD^2 - AE^2$ [pythagoras theorem]

$= 25^2 - x^2$

And $\triangle$BCF, $CF^2 = BC^2 - BF^2$ [pythagoras theorem]

$= 26^2 - (17 - x)^2$

But DE = CF $\Rightarrow$ $DE^2 = CF^2$

$\Rightarrow 25 - x^2 = 26^2 - (17 - x)^2$

$\Rightarrow 25^2 - x^2 = 26^2 - (289 + x^2 - 34x)$ [$\because (a - b)^2 = a^2 + b^2 - 2ab$]

$\Rightarrow 625 - x^2 = 676 - 289 - x^2 + 34x$

$\Rightarrow 34x = 238$

$\Rightarrow x = 7$

$\therefore$ DE = $\sqrt{25^2 - x^2} = \sqrt{25^2 - 7^2} = \sqrt{576}$ = 24 cm

$\therefore$ Area of trapezium = $\frac{1}{2}$(sum of parallel sides) $\times$ height

$= \frac{1}{2} \times (60 + 77) \times 24 = 1644$ cm^2