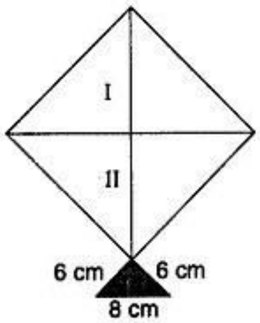
**CBSE Test Paper 01**

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

   = $\sqrt{6(6-3)(6-4)(6-5)} = \sqrt{6 \times 3 \times 2 \times 1}$

   = 6 sq cm

2. (c) 60 $cm^2$

   **Explanation:**

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

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

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

   = $\sqrt{25 \times 12 \times 12 \times 1}$

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

New sides are 2a, 2b and 2c

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

=> s' = 2s ...............(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 = $\frac{3\text{A}}{\text{A}} \times 100$ = 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 = $\frac{1}{2}$ × base × height = $\frac{1}{2}$ × b × h

   If new base B = 2b and height H = 2h

   New area of triangle = $\frac{1}{2}$ × B × H = $\frac{1}{2}$ × 2b × 2h =4( $\frac{1}{2}$ × b × 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)

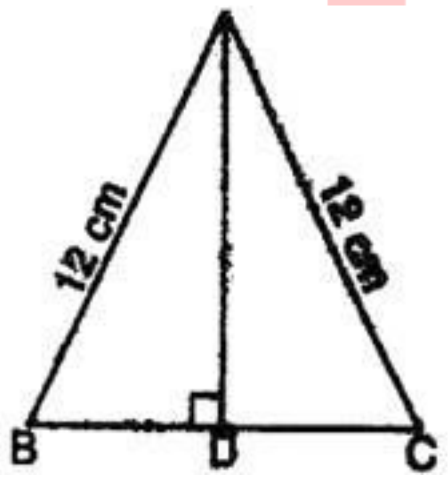
    = $\frac{1}{2}$ (36) = 18 cm

    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

    ⇒ 12 + 12 + c = 30

    ⇒ 24 + c = 30

$\Rightarrow$ c = 30 – 24

$\Rightarrow$ c = 6 cm

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

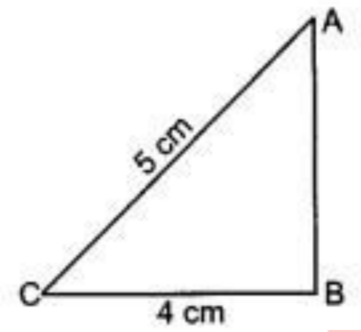
$\therefore$ Area of the triangle $= \sqrt{s(s-a)(s-b)(s-c)}$

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

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

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)

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

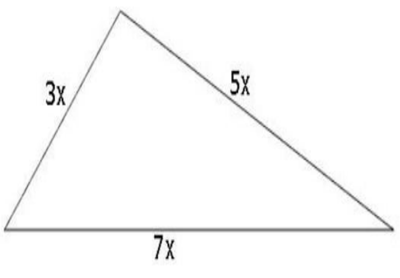
$\Rightarrow AB^2 = 25 - 16 = 9$

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

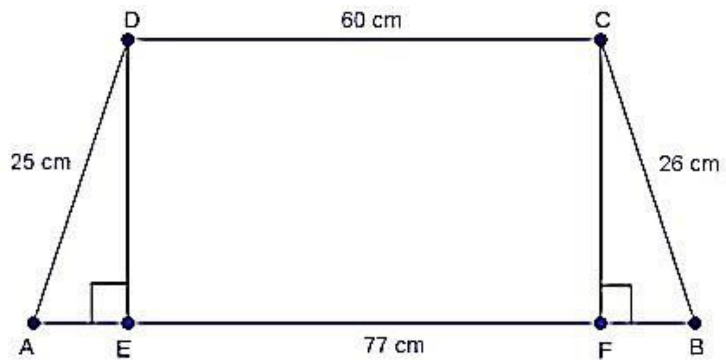
$= \frac{8}{4}\sqrt{4 \times (6)^2 - 64}$

$= 2\sqrt{144 - 64}$

$= 8\sqrt{5}$

= 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

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