Exercise – 12.1

1. Find the area of a triangle whose sides are respectively 150 cm, 120 cm and 200 cm.

Sol:

The triangle whose sides are

a = 150 cm

b = 120 cm

c = 200 cm

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

Here 1s = semi perimeter of triangle

2s = a + b + c

S = $\frac{a+b+c}{2} = \frac{150+200+120}{2} = 235cm$

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

= $\sqrt{235(235-150)(235-200)(235-120)}$

= $\sqrt{235(85)(35)(115)}cm^2$

= $8966.56\ cm^2$

2. Find the area of a triangle whose sides are 9 cm, 12 cm and 15 cm.

Sol:

The triangle whose sides are a = 9cm, b = 12 cm and c = 15 cm

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

Here 1s = semi-perimeter of a triangle

2s = a + b + c

S = $\frac{a+b+c}{2} = \frac{9+12+15}{2} = \frac{36}{2} = 18\ cm$

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

= $\sqrt{18(18-9)(18-12)(18-15)} = \sqrt{18(9)(6)(3)}$

= $\sqrt{18\ cm\ \times 3\ cm\ \times 54cm^2}$ = 54 cm^2.

3. Find the area of a triangle two sides of which are 18 cm and 10 cm and the perimeter is 42cm.

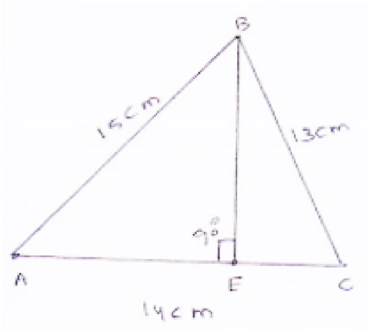
Sol:

$21\sqrt{11}cm^2$

4. In a ΔABC, AB = 15 cm, BC = 13 cm and AC = 14 cm. Find the area of ΔABC and hence its altitude on AC.

Sol:

The triangle sides are



Let a = AB = 15 cm, BC = 13cm = b.

c = AC = 14 cm say.

Now,

2s = a + b + c

⇒ S = $\frac{1}{2}(a+b+c)$

⇒ s = $\left(\frac{15+13+14}{2}\right) cm$

⇒ s = 21 cm

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

= $\sqrt{21(21-15)(21-14)(21-13)}\ cm^2$

= $\sqrt{21\times 6\times 8\times 7}$ cm^2

= 84 cm^2

Let BE be perpendicular ($\perp^{er}$) to AC

Now, area of triangle = 84 cm^2

⇒ $\frac{1}{2}\times BE\times AC = 84$

⇒ BE = $\frac{84\times 2}{AC}$

⇒ BE = $\frac{168}{14} = 12cm$

∴ Length of altitude on AC is 12 cm.

5. The perimeter of a triangular field is 540 m and its sides are in the ratio 25 : 17 : 12. Find the area of the triangle.

Sol:

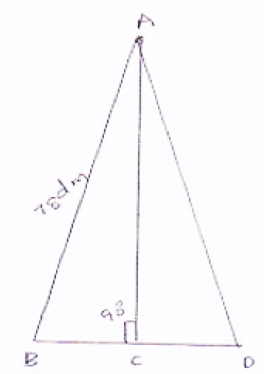
The sides of a triangle are in the ratio 25 : 17 : 12

Let the sides of a triangle are a = 25x, b = 17 x and c = 12x say.
Perimeter = 25 = a + b + c = 540 cm
⇒ 25x + 17x + 12x = 540 cm
⇒ 54x = 540cm
⇒ $x = \frac{540}{54}$
⇒ $x = 10\ cm$
∴ The sides of a triangle are a = 250 cm, b = 170 cm and c = 120 cm
Now, Semi perimeter s = $\frac{a+b+c}{2}$
= $\frac{540}{2} = 270\ cm$
∴ The area of the triangle = $\sqrt{s(s-a)(s-b)(s-c)}$
= $\sqrt{270(270-250)(270-170)(270-120)}$
= $\sqrt{270(20)(100)(150)}$
= $\sqrt{(9000)(9000)}$
= $9000\ cm^2$
∴ The area of triangle = 900 cm^2.

6. The perimeter of a triangle is 300 m. If its sides are in the ratio 3 : 5 : 7. Find the area of the triangle.
Sol:
Given that
The perimeter of a triangle = 300 m
The sides of a triangle in the ratio 3 : 5 : 7
Let 3x, 5x, 7x be the sides of the triangle
Perimeter ⇒ 2s = a + b + c
⇒ $3x + 5x + 17x = 300$
⇒ $15x = 300$
⇒ $x = 20m$
The triangle sides are $a = 3x$
$= 3\ (20)m = 60\ m$
$b = 5x = 5(20)\ m = 100m$
$c = 7x = 140\ m$
Semi perimeter $s = \frac{a+b+c}{2}$
$= \frac{300}{2} m$
$= 150m$
∴ The area of the triangle = $\sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{150(150-60)(150-100)(150-140)}$
$= \sqrt{150 \times 10 \times 90 \times 50}$
$= \sqrt{1500 \times 1500 \times 3}\ cm^2$
$\therefore$ ∆le Area $= 1500\sqrt{3}\ cm^2$

7. The perimeter of a triangular field is 240 dm. If two of its sides are 78 dm and 50 dm, find the length of the perpendicular on the side of length 50 dm from the opposite vertex.
Sol:
ABC be the triangle, Here a = 78 dm = AB,
BC = b = 50 dm



Now, perimeter = 240 dm
⇒ AB + BC + CA = 240 dm
⇒ AC = 240 – BC – AB
⇒ AC = 112 dm
Now, 2s = AB + BC + CA
⇒ 2s = 240
⇒ s = 120 dm
∴ Area of ∆ABC = $\sqrt{s(s-a)(s-b)(s-c)}$ by heron's formula
$= \sqrt{120(120-78)(120-50)(120-112)}$
$= \sqrt{120 \times 42 \times 70 \times 8}$
$= 1680\ dm^2$
$Let\ AD\ be\ perpendicualar\ on\ BC$
Area of ∆ABC = $\frac{1}{2} \times AD \times BC$ (area of triangle = $\frac{1}{2} \times b \times h$)
= $\frac{1}{2} \times AD \times BC = 1680$
⇒ AD = $\frac{2 \times 1680}{50} = 67.2\ dm$

8. A triangle has sides 35 cm, 54 cm and 61 cm long. Find its area. Also, find the smallest of its altitudes.

Sol:

The sides of a triangle are a = 35 cm, b = 54 cm and c = 61 cm

Now, perimeter a + b + c = 25

⇒ S = $\frac{1}{2}(35+54+61)$

⇒ s = 75 cm

By using heron's formula

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

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

= $\sqrt{75(40)(21)(14)}$ = 939.14cm^2

∴ The altitude will be a smallest when the side corresponding to it is longest Here, longest side is 61 cm

[∴ Area of Δle = $\frac{1}{2}\times b\times h]$ = $\frac{1}{2}\times base\times height$

∴ $\frac{1}{2}\times h\times 61=939.14$

⇒ $h=\frac{939.14\times 2}{61}=30.79\ cm$

$Hence\ the\ length\ of\ the\ smallest\ altitude\ is\ 30.79\ cm$

9. The lengths of the sides of a triangle are in the ratio 3 : 4 : 5 and its perimeter is 144 cm. Find the area of the triangle and the height corresponding to the longest side.

Sol:

Let the sides of a triangle are 3x, 4x and 5x.

Now, a = 3x, b = 4x and c = 5x

The perimeter 2s = 144

⇒ 3x + 4x + 5x = 144 [∵ a + b + c = 2s]

⇒ 12x = 144

⇒ x = 12

∴ sides of triangle are a = 3(x) = 36cm

b = 4(x) = 48 cm

c = 5(x) = 60 cm

Now semi perimeter s = $\frac{1}{2}(a+b+c)=\frac{1}{2}(144)=72cm$

By heron's formulas ∴ Area of Δle = $\sqrt{s(s-a)(s-b)(s-c)}$

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

= $864cm^2$

Let l be the altitude corresponding to longest side, ∴ $\frac{1}{2}\times 60\times l=864$

$\Rightarrow l = \frac{864\times2}{60}$

$\Rightarrow l = 28.8cm$

Hence the altitude one corresponding long side = 28.8 cm

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

Sol:

Let 'x' be the measure of each equal sides

∴ Base = $\frac{3}{2}x$

∴ x + x + $\frac{3}{2}x = 42$ [∵ Perimeter = a + b + c = 42 cm]

$\Rightarrow \frac{7}{2}x = 42$

⇒ x = 12 cm

∴ Sides are a = x = 12 cm

b = x = 12 cm

c = x = $\frac{3}{2}$(12) cm = 18 cm

By heron's formulae

∴ Area of triangle = $\sqrt{s(s-a)(s-b)(s-c)}cm^2$

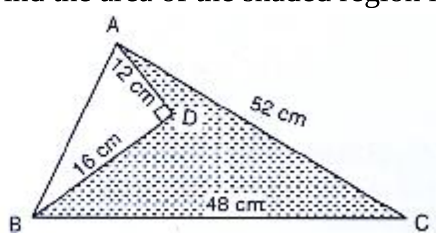
$= \sqrt{21(9)(9)(21-18)}\ cm^2$

$= \sqrt{(21)(9)(9)(3)}cm^2$

$= 71.42cm^2$

∴ Area of triangle = 71.42 cm^2

11. Find the area of the shaded region in Fig. Below.



Sol:

Area of shaded region = Area of ΔABC – Area of ΔADB

Now in ΔADB

⇒ $AB^2 = AD^2 + BD^2$ --(i)

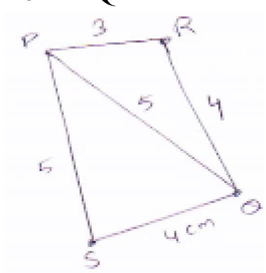
⇒ Given that AD = 12 cm BD = 16 cm

Substituting the values of AD and BD in the equation (i), we get

$AB^2 = 12^2 + 16^2$
$AB^2 = 144 + 256$
AB = $\sqrt{400}$
AB = 20 cm
∴ Area of triangle = $\frac{1}{2} \times AD \times BD$
= $\frac{1}{2} \times 12 \times 16$
= 96 cm^2
Now
In ΔABC, S $= \frac{1}{2}(AB + BC + CA)$
$= \frac{1}{2} \times (52 + 48 + 20)$
$= \frac{1}{2}(120)$
= 60 cm
By using heron's formula
We know that, Area of Δle ABC = $\sqrt{s(s-a)(s-b)(s-c)}$
$= \sqrt{60(60-20)(60-48)(60-52)}$
$= \sqrt{60(40)(12)(8)}$
= 480 cm^2
= Area of shaded region = Area of ΔABC – Area of ΔADB
$= (480 - 96)cm^2$
$= 384\ cm^2$
∴ Area of shaded region = 384 cm^2

Exercise – 12.2

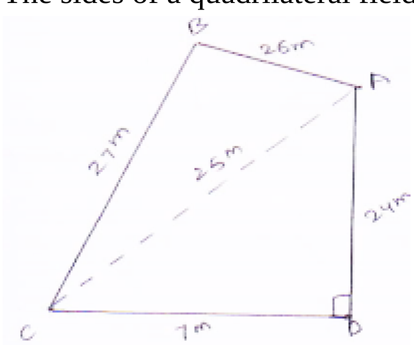
1. Find the area of a quadrilateral ABCD is which AB = 3 cm, BC = 4 cm, CD = 4 cm, DA = 5 cm and AC = 5 cm.
Sol:
For ΔPQR



$PQ^2 = QR^2 + RP^2$

$(5^2) = (3)^2 + (4)^2$ [$\because PR = 3\ QR = 4\ and\ PQ = 5$]
So, ΔPQR is a right angled triangle. Right angle at point R.
Area of ΔABC = $\frac{1}{2} \times QR \times RP$
= $\frac{1}{2} \times 3 \times 4$
= $6cm^2$
For ΔQPS
Perimeter = 2s = AC + CD + DA = (5 + 4 + 5)cm = 14 cm
S = 7 cm
By Heron's formulae
Area of Δle $\sqrt{s(s-a)(s-b)(s-c)}\ cm^2$
Area of Δle PQS = $\sqrt{7(7-5)(7-4)(7-3)}cm^2$
= $\sqrt{7 \times 2 \times 2 \times 3}\ cm^2$
= $2\sqrt{21}cm^2$
= $(2 \times 4.583)cm^2$
= $9.166\ cm^2$
Area of PQRS = Area of PQR + Area of ΔPQS = $(6 + 9.166)cm^2 = 15.166cm^2$

2. The sides of a quadrangular field, taken in order are 26 m, 27 m, 7m are 24 m respectively. The angle contained by the last two sides is a right angle. Find its area.
Sol:
The sides of a quadrilateral field taken order as AB = 26m



BC = 27 m
CD = 7m and DA = 24 m
Diagonal AC is joined
Now ΔADC
By applying Pythagoras theorem
$\Rightarrow AC^2 = AD^2 + CD^2$
$\Rightarrow$ AC = $\sqrt{AD^2 + CD^2}$
$\Rightarrow$ AC = $\sqrt{24^2 + 7^2}$

$\Rightarrow$ AC = $\sqrt{625} = 25\ m$

Now area of ΔABC

S = $\frac{1}{2}(AB + BC + CA) = \frac{1}{2}(26 + 27 + 25)$ =

$$= \frac{78}{2} = 39m.$$

By using heron's formula

Area (ΔABC) = $\sqrt{S(S - AD)(S\_BC)(S - CA)}$

$= \sqrt{39(39 - 26)(39 - 21)(39 - 25)}$

= $\sqrt{39 \times 14 \times 13 \times 12 \times 1}$

= 291.849 cm^2

Now for area of ΔADC

S = $\frac{1}{2}(AD + CD + AC)$

= $\frac{1}{2}(25 + 24 + 7) = 28m$

By using heron's formula

∴ Area of ΔADC = $\sqrt{S(S - AD)(S - DC)(S - CA)}$

= $\sqrt{28(28 - 24)(28 - 7)(28 - 25)}$

= 84m^2

∴ Area of rectangular field ABCD = area of ΔABC + area of ΔADC

= $291.849 + 84$

= 375.8m^2

3. The sides of a quadrilateral, taken in order are 5, 12, 14 and 15 meters respectively, and the angle contained by the first two sides is a right angle. Find its area.

Sol:

Given that sides of quadrilateral are AB = 5 m, BC = 12 m, CD = 14 m and DA = 15 m

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

Join AC

Area of ΔABC = $\frac{1}{2} \times AB \times BC$ $\left[\because Area\ of\ \Delta le = \frac{1}{2}(3x + 1)\right]$

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

= 30 cm^2

In ΔABC By applying Pythagoras theorem.

$AC^2 = AB^2 + BC^2$

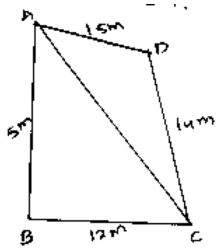
$\Rightarrow AC = \sqrt{5^2 + 12^2}$

$= \sqrt{25 + 144}$

$= \sqrt{169}$ = 13 m

$Now\ in\ \Delta ADC$

Let 2s be the perimeter



∴ 2s = (AD + DC + AC)

⇒ S = $\frac{1}{2}(15 + 14 + 13) = \frac{1}{2} \times 42 = 21m$

By using Heron's formula

∴ Area of ΔADC = $\sqrt{S(S - AD)(S - DC)(S - AC)}$

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

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

$= 84m^2$

∴ $Area\ of\ quadrilateral\ ABCD = area\ of\ (\Delta ABC) + Area\ of\ (\Delta ADC)$ = 30 + 84 = 114 m^2

4. A park, in the shape of a quadrilateral ABCD, has ∠C = 900, AB = 9 m, BC = 12 m, CD = 5 m and AD = 8 m How much area does it occupy?

Sol:

Given sides of a quadrilaterals are AB = 9, BC = 12, CD = 05, DA = 08

Let us joint BD

In ΔBCD applying Pythagoras theorem.

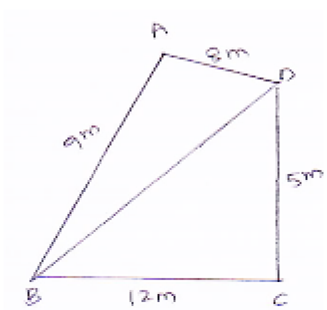
$BD^2 = BC^2 + CD^2$

$= (12)^2 + (5)^2$

$= 144 + 25$

$= 169$

$BD = 13m$



Area of ΔBCD = $\frac{1}{2} \times BC \times CD = \left[\frac{1}{2} \times 12 \times 5\right] m^2 = 30\ m^2$

For ΔABD

S = $\frac{perimeter}{2} = \frac{(9+8+13)}{2} = 15cm$

By heron's formula = $\sqrt{s(s-a)(s-b)(s-c)}$

Area of the triangle = $\sqrt{15(15-9)(15-8)(15-13)}m^2$

= $\sqrt{15(6)(7)(2)}m^2 = 6\sqrt{35}\,m^2 = 35.496m^2$

Area of park = Area of ΔABD + ΔABD + Area of BCD

= 35.496 + 30 m^2

= 65.5 m^2 (approximately)

5. 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.

Sol:

Given that two parallel sides of trapezium are AB = 77 and CD = 60 cm

Other sides are BC = 26 m and AD = 25 cm.

Join AE and CF

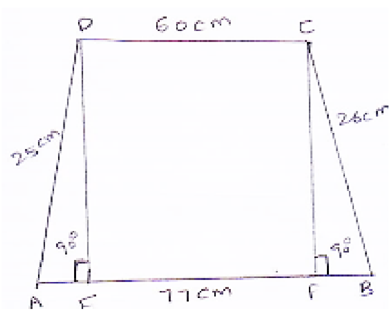
Now, DE ⊥ AB and CF ⊥ AB

∴ DC = EF = 60 cm

Let AE = x

⇒ BF = 77 – 60 – x = 17 – x

In ΔADE, $DE^2 = AD^2 - AE^2 = 25^2 - x^2$ [∵ Pythagoras theorem]



And in ΔBCF, $CF^2 = BC^2 - BF^2$ [∵ By Pythagoras theorem]

⇒ CF = $\sqrt{26^2-(17-x)^2}$

But DE = CF ⇒ $DE^2 = CF^2$

⇒ $25^2 - x^2 = 26^2 - (17-x)^2$

⇒ $25^2x^2 = 25^2 - (289 + x^2 - 34x)$ [∵ $(a-b)^2 = a^2 - 2ab + b^2$]

⇒ 625 – $x^2 = 676 - 289 - x^2 + 34x$

⇒ 34x = 238

⇒ x = 7

∴ DE = $\sqrt{25^2 - x^2} = \sqrt{625 - 7^2} = \sqrt{516} = 24cm$

∴ Area of trapezium = $\frac{1}{2}(sum\ of\ parallel\ sides) \times height = \frac{1}{2}(60 \times 77) \times 24 = 1644cm^2$

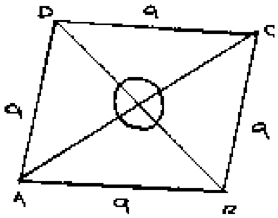
6. Find the area of a rhombus whose perimeter is 80 m and one of whose diagonal is 24 m.

Sol:

Given that,

Perimeter of rhombus = 80m

Perimeter of rhombus = 4 × side



⇒ 4a = 80

⇒ a = 20m

Let AC = 24 m

∴ OA = $\frac{1}{2}AC = \frac{1}{2} \times 24 = 12m$

In ΔAOB

$OB^2 = AB^2 - OA^2$ [By using Pythagoras theorem]

⇒ $OB = \sqrt{20^2 - 12^2}$

$= \sqrt{400 - 144}$

$= \sqrt{256} = 16\,m$

Also BO = OD [Diagonal of rhombus bisect each other at 90°]

∴ BD = 20B = 2 ×16 = 32 m

∴Area of rhombus = $\frac{1}{2} \times 32 \times 24 = 384m^2$ [∵Area of rhombus = $\frac{1}{2} \times BD \times AC$]

7. A rhombus sheet, whose perimeter is 32 m and whose one diagonal is 10 m long, is painted on both sides at the rate of Rs 5 per m^2. Find the cost of painting.

Sol:

Given that,

Perimeter of a rhombus = 32 m

We know that,

Perimeter of rhombus = 4 × side

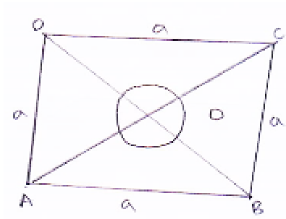
⇒ 49 = 32m

⇒ a = 8 m

Let AC = 10 = OA = $\frac{1}{2}AC$

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

= $5m$



By using Pythagoras theorem:
$\therefore OB^2 = AB^2 - OA^2$
$\Rightarrow$ OB = $\sqrt{AB^2 - OA^2}$
$\Rightarrow$ OB = $\sqrt{8^2 - 5^2}$
$\Rightarrow$ OB = $\sqrt{64 - 25}$
$\Rightarrow$ OB = $\sqrt{39}\, m$
Now, BD = 2OB = $2\sqrt{39}m$
$\therefore$ Area of sheet = $\frac{1}{2} \times BD \times AC = \frac{1}{2} \times 2\sqrt{39} \times 10 = 10\sqrt{39}m^2$
$\therefore$ Cost of printing on both sides at the rate of Rs 5 per m^2 = Rs $2 \times 10\sqrt{39} \times 5$
= Rs. 625.00

8. Find the area of a quadrilateral ABCD in which AD = 24 cm, ∠BAD = 90° and BCD forms an equilateral triangle whose each side is equal to 26 cm. (Take $\sqrt{3}$ = 1.73)

Sol:
Given that, a quadrilateral ABCD in which AD = 24 cm, ∠BAD = 90°
BCD is equilateral triangle and sides BC = CD = BD = 26 cm
In ΔBAD By using Pythagoras theorem
$BA^2 = BD^2 - AD^2$
$\Rightarrow BA = \sqrt{BD^2 - AD^2}$
$= \sqrt{676 - 576}$
$= \sqrt{100} = 10\ cm$
$Area\ of\ \Delta BAD = \frac{1}{2} \times BA \times AD$
$= \frac{1}{2} \times 10 \times 24$
$= 120cm^2$
$Area\ of\ \Delta BCD = \frac{\sqrt{3}}{4} \times (26)^2 = 292.37cm^2$
$\therefore Area\ of\ quadrilateral$
ABCD = Area of ΔBAD + area of ΔBCD
= 120 + 292.37
= 412.37 cm^2

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

Sol:

Given that

Sides of a quadrilateral are AB = 42 cm, BC = 21 cm, CD = 29 cm

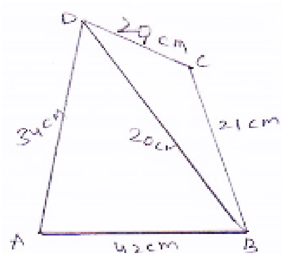
DA = 34 cm and diagonal BD = 20 cm

Area of quadrilateral = area of ΔADB + area of ΔBCD.

Now, area of ΔABD

Perimeter of ΔABD

We know that



2s = AB + BD + DA

⇒ S = $\frac{1}{2}(AB + BD + DA)$

= $\frac{1}{2}(34 + 42 + 20) = 96$

=$\frac{96}{2}$

= $48\ cm$

Area of ΔABD = $\sqrt{S(S - AB)(S - BD)(S - DA)}$

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

= $\sqrt{48(14)(6)(28)}$

= $336\ cm^2$

Also for area of ΔBCD,

Perimeter of ΔBCD

2s = BC + CD + BD

⇒ S = $\frac{1}{2}(29 + 21 + 20) = 35\ cm$

By using heron's formulae

Area of ΔBCD = $\sqrt{s(s - bc)(s - cd)(s - db)}$

= $\sqrt{35(35 - 21)(35 - 29)(35 - 20)}$

= $\sqrt{210 \times 210} cm^2$

= $210 cm^2$

∴ Area of quadrilateral ABCD = 336 + 210 = 546 cm^2

10. Find the perimeter and area of the quadrilateral ABCD in which AB = 17 cm, AD =9 cm, CD = l2cm, ∠ACB = 90° and AC=l5cm.

Sol:

The sides of a quadrilateral ABCD in which AB = 17 cm, AD = 9 cm, CD = 12 cm, ∠ACB = 90° and AC = 15 cm

Here, By using Pythagoras theorem

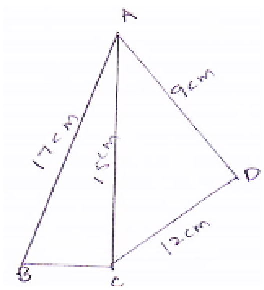
BC = $\sqrt{17^2 - 15^2} = \sqrt{289 - 225} = \sqrt{64} = 8cm$

Now, area of ΔABC = $\frac{1}{2} \times 8 \times 15 = 60\ cm^2$

For area of Δle ACD,

Let a = 15 cm, b = 12 cm and c = 9 cm

Therefore, S = $\frac{15+12+9}{2} = \frac{36}{2} = 18\ cm$



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

= $\sqrt{18(18-15)(18-12)(18-9)}$

= $\sqrt{18 \times 18 \times 3 \times 3}$

$= \sqrt{(18 \times 3)^2}$

= 54 cm^2

∴ Thus, the area of quadrilateral ABCD = 60 + 54 = 114 cm^2

11. The adjacent sides of a parallelogram ABCD measure 34 cm and 20 cm, and the diagonal AC measures 42 cm. Find the area of the parallelogram.

Sol:

Given that adjacent sides of a parallelogram ABCD measure 34 cm and 20 cm, and the diagonal AC measures 42 cm.

Area of parallelogram = Area of ΔADC + area of ΔABC

[∵ Diagonal of a parallelogram divides into two congruent triangles]

= 2 × $[Area\ of\ \Delta ABC]$

Now for Area of ΔABC

Let 2s = AB + BC + CA [∵ Perimeter of ΔABC]

⇒ S = $\frac{1}{2}(AB + BC + CA)$

⇒ S = $\frac{1}{2}(34 + 20 + 42)$

= $\frac{1}{2}(96) = 48\ cm$

∴ Area of ΔABC = $\sqrt{s(s-ab)(s-bc)(s-ca)}$ $[heron's formula]$

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

= $\sqrt{48(14)(28)(6)} = 336cm^2$

∴ $Area\ of\ parallelogram\ ABCD = 2[Area\ of\ \Delta ABC] = 2 \times 336 = 672\ cm^2$

12. Find the area of the blades of thc magnetic compass shown in Fig.. 12.27. (Take $\sqrt{11}$ = 3.32).

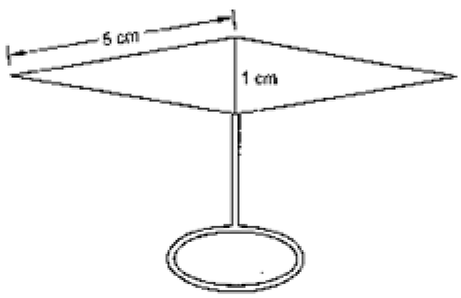


Fig.12.27

Sol:

Area of the blades of magnetic compass = Area of ΔADB + Area of ΔCDB

Now, for area of ΔADB

Let, 2s = AD + DB + BA (Perimeter of ΔADB)

Semi perimeter (S) = $\frac{1}{2}(5+1+5) = \frac{11}{2}cm$

By using heron's formulae

Now, area of ΔADB = $\sqrt{s(s-ad)(s-bd)(s-ba)}$

= $\sqrt{\frac{11}{2}\left(\frac{11}{2}-5\right)\left(\frac{11}{2}-1\right)\left(\frac{11}{2}-5\right)}$

= 2.49 cm^2

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

∴ Area of the blades of magnetic compass

= $2 \times (area\ of\ \Delta ADB)$

= 2×2.49

= 4.98 m^2

13. A hand fan is made by stitching lo equal size triangular strips of two different types of paper as shown in Fig. 12.28. The dimensions of equal strips are 25 cm, 25 cm and 14 cm. Find the area of each type of paper needed to make the hand fan.

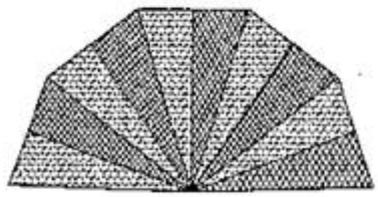


Fig. 12.28

Sol:

Given that the sides of ΔAOB are

AO = 24 cm

OB = 25 cm

BA = 14 cm

Area of each equal strips = Area of Δle AOB

Now, for area of ΔAOB

Perimeter of ΔAOB

Let 2s = AO + OB + BA

$\Rightarrow s = \frac{1}{2}(AO + OB + BA)$

$= \frac{1}{2}(25 + 25 + 14) = 32\ cm$

$\therefore By\ using\ Heron's formulae$

$Area\ of\ (\Delta AOB) = \sqrt{s(s-ao)(s-ob)(s-ba)}$

$= \sqrt{32(32-25)(32-25)(32-14)}$

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

$= 168\ cm^2$

∴ Area of each type of paper needed to make the hand fan = $5 \times (area\ of\ \Delta AOB)$

$= 5 \times 168$

$= 840\ cm^2$

14. A triangle and a parallelogram have the same base and the same area. If the sides of the triangle are 13 cm, 14 cm and 15 cm and the parallelogram stands on the base 14 cm, find the height of the parallelogram.

Sol:

The sides of a triangle DCE are

DC = 15 cm, CE = 13 cm, ED = 14 cm

Let h be the height of parallelogram ABCD

Given,

Perimeter of ΔDCE

2s = DC + CE + ED

$\Rightarrow$ S = $\frac{1}{2}(15 + 13 + 4)$

$\Rightarrow S = \frac{1}{2}(42)$

$\Rightarrow S = 21\ cm$

$Area\ of\ \Delta DCE = \sqrt{s(s-dc)(s-ce)(s-ed)}$ [By heron's formula]

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

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

$= \sqrt{84 \times 84}$

$= 84cm^2$

Given that

Area of $\Delta^{le}\ DCE =\ area\ of\ ABCD$

= Area of parallelogram ABCD = = $84cm^2$

$\Rightarrow 24 \times h = 84$ [∴ Area of parallelogram = base × height]

$\Rightarrow$ h = 6 cm