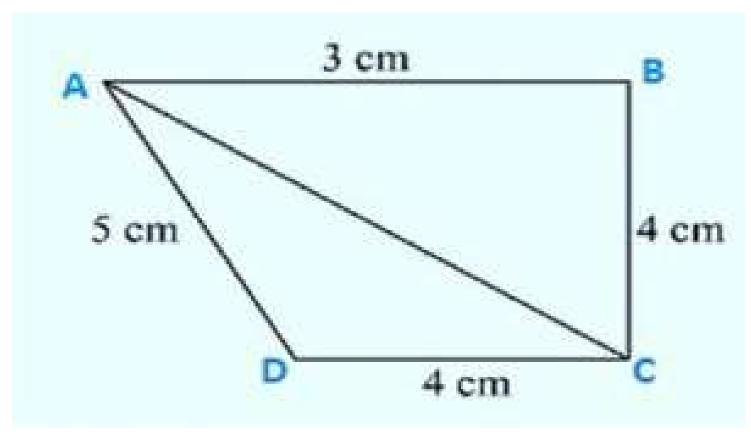
*Q1.Find the area of the quadrilateral ABCD in which AB = 3 cm, BC = 4 cm, CD = 4 cm, DA = 5 cm and AC = 5 cm.*

Solution:




For triangle ABC

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

25 = 9 + 16

So, triangle ABC is a right angle triangle right angled at point R

Area of triangle ABC = $\frac{1}{2} \times AB \times BC$

= $\frac{1}{2} \times 3 \times 4$

= 6 $cm^2$

From triangle CAD

Perimeter = 2s = AC + CD + DA

2s = 5 cm+ 4 cm+ 5 cm

2s = 14 cm

s = 7 cm

By using Heron's Formula

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

= $\sqrt{7 \times (7-5) \times (7-4) \times (7-5)}$

= $9.16 cm^2$

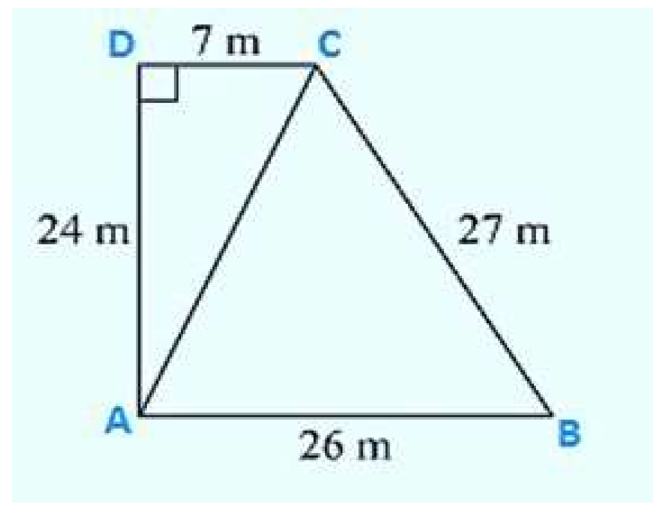
Area of ABCD = Area of ABC + Area of CAD

= (6+9.16) $cm^2$

= 15.16$cm^2$

*Q2. The sides of a quadrilateral field, taken in order are 26 m, 27 m, 7 m, 24 m respectively. The angle contained by the last two sides is a right angle. Find its area.*

Solution:




Here the length of the sides of the quadrilateral is given as

AB = 26 m, BC = 27 m, CD = 7 m, DA = 24 m

Diagonal AC is joined.

Now, in triangle ADC

By applying Pythagoras theorem

$AC^2 = AD^2 + CD^2$

$AC^2 = 14^2 + 7^2$

AC = 25 m

Now area of triangle ABC

Perimeter = 2s = AB + BC + CA

2s = 26 m + 27 m + 25 m

s = 39 m

By using Heron's Formula

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

= $\sqrt{39 \times (39-26) \times (39-27) \times (39-25)}$

= $291.84m^2$

Thus, the area of a triangle is $291.84m^2$

Now for area of triangle ADC

Perimeter = 2s = AD + CD + AC

= 25 m + 24 m + 7 m

s = 28 m

By using Heron's Formula

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

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

= $84 m^2$

Thus, the area of a triangle is $84 m^2$

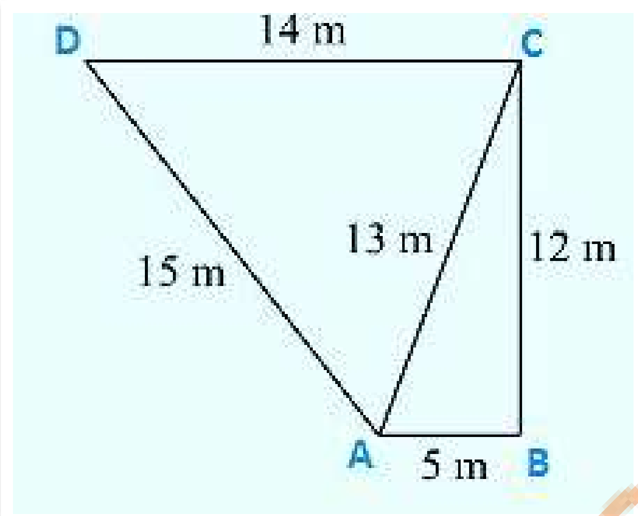
Therefore, Area of rectangular field ABCD

= Area of triangle ABC + Area of triangle ADC

= 291.84 + 84

= 375.8 $m^2$

*Q3. The sides of a quadrilateral, taken in order as 5 m, 12 m, 14 m, 15 m respectively, and the angle contained by first two sides is a right angle. Find its area.*




Solution:

Given that the sides of the quadrilateral are

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

Join AC

Now area of triangle ABC = $\frac{1}{2} \times AB \times BC$

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

= 30 $m^2$

In triangle ABC, By applying Pythagoras theorem

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

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

AC = 13 m

Now in triangle ADC,

Perimeter = 2s = AD + DC + AC

2s = 15 m +14 m +13 m

s = 21 m

By using Heron’s Formula,

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

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

= $84 m^2$

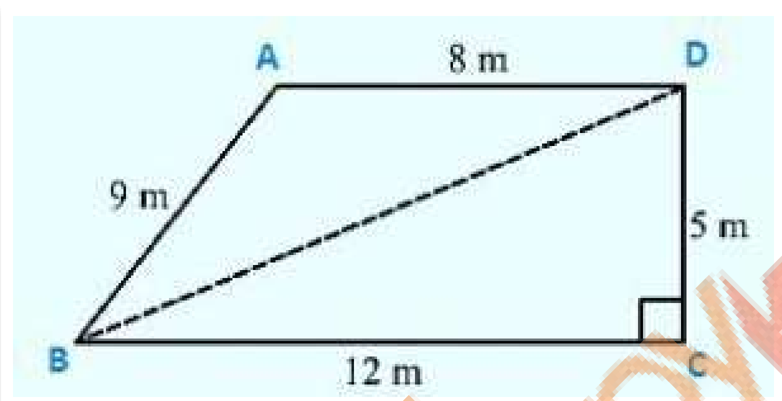
Area of quadrilateral ABCD = Area of triangle ABC + Area of triangle ADC

= (30 + 84) $m^2$

= $114 m^2$

*Q4. A park in the shape of a quadrilateral ABCD, has angle C = $90^0$, AB = 9 m, BC = 12 m, CD = 5 m, AD = 8 m. How much area does it occupy?*

Solution:






Given sides of a quadrilateral are AB = 9 m, BC = 12 m, CD = 5 m, DA = 8 m.

Let us join BD

In triangle BCD , apply Pythagoras theorem

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

$$BD^2 = 12^2 + 5^2$$

BD = 13 m

Area of triangle BCD = $\frac{1}{2} \times BC \times CD$

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

= 30 $m^2$

Now, in triangle ABD

Perimeter = 2s = 9 m + 8m + 13m

s = 15 m

By using Heron’s Formula,

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

= $\sqrt{15 \times (15-9) \times (15-8) \times (15-13)}$

= $35.49 m^2$

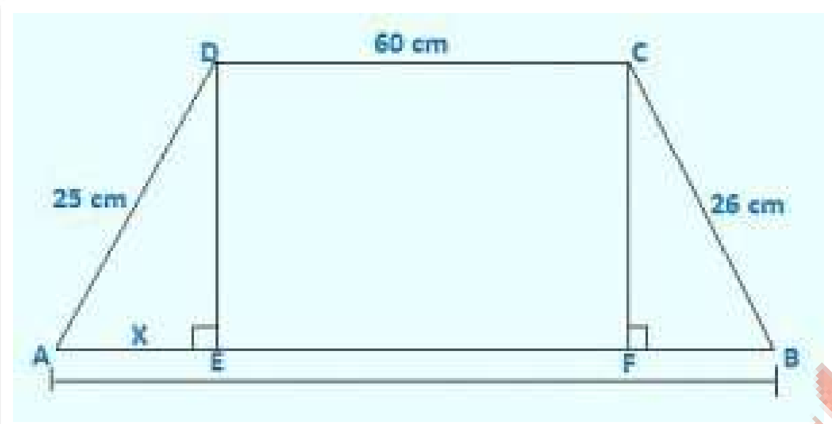
Area of quadrilateral ABCD = Area of triangle ABD + Area of triangle BCD

= (35.496 + 30) $m^2$

= $65.5 m^2$.

*Q5. Two parallel sides of a trapezium are 60 m and 77 m and the other sides are 25 m and 26 m. Find the area of the trapezium?*

Solution:




Given,

Two parallel sides of trapezium are AB = 77 m and CD = 60 m

The other two parallel sides of trapezium are BC = 26 m, AD = 25m

Join AE and CF

DE is perpendicular to AB and also, CF is perpendicular to AB

Therefore, DC = EF = 60 m

Let AE = x

So, BF = 77 − 60 − x

BF = 17 − x

In triangle ADE,

By using Pythagoras theorem,

$$DE^2 = AD^2 - AE^2$$

$$DE^2 = 25^2 - x^2$$

In triangle BCF,

By using Pythagoras theorem,

$$CF^2 = BC^2 - BF^2$$

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

Here, DE = CF

So, $DE^2 = CF^2$

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

$25^2 - x^2 = 26^2 - (17^2 - 34x + x^2)$

$25^2 - x^2 = 26^2 - 17^2 + 34x + x^2$

$25^2 = 26^2 - 17^2 + 34x$

x = 7

$DE^2 = 25^2 - x^2$

DE = $\sqrt{625 - 49}$

DE = 24 m

Area of trapezium = $\frac{1}{2} \times (60 + 77) \times 24$

Area of trapezium = $1644\ m^2$

*Q6. Find the area of a rhombus whose perimeter is 80 m and one of whose diagonal is 24 m.*

Solution:

Given,

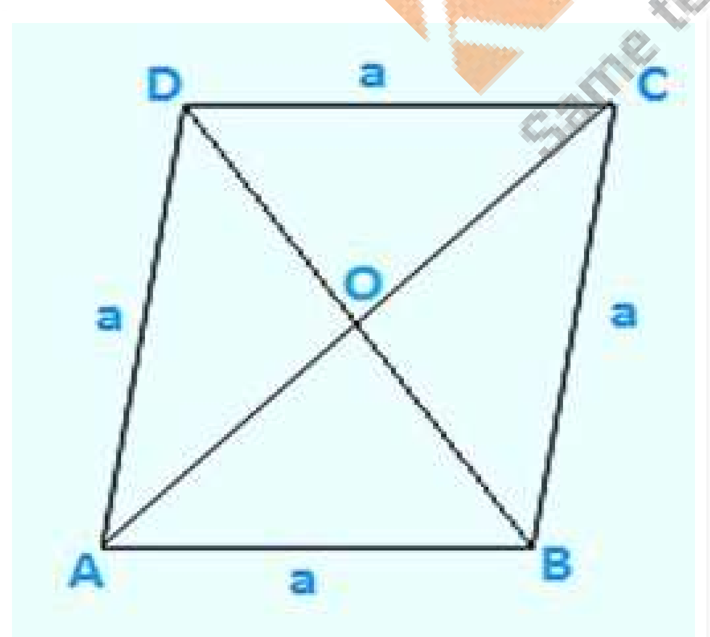
Perimeter of a rhombus = 80 m

As we know,

Perimeter of a rhombus = $4 \times$ side = $4 \times a$

$4 \times a$ = 80 m

a = 20 m




Let AC = 24 m

Therefore OA = $\frac{1}{2} \times \mathrm{AC}$

OA = 12 m

In triangle AOB

$\mathrm{OB}^2 = \mathrm{AB}^2 - \mathrm{OA}^2$

$\mathrm{OB}^2 = 20^2 - 12^2$

OB = 16 m

Also, OB = OD because diagonal of rhombus bisect each other at $90^\circ$

Therefore, BD = 2 OB = 2 x 16 = 32 m

Area of rhombus = $\frac{1}{2} \times \mathrm{BD} \times \mathrm{AC}$

Area of rhombus = $\frac{1}{2} \times 32 \times 24$

Area of rhombus = 384 $\mathrm{m}^2$

*Q7. A rhombus sheet, whose perimeter is 32 m and whose diagonal is 10 m long, is painted on both the sides at the rate of Rs 5 per meter square. Find the cost of painting.*

Solution:

Given that,

Perimeter of a rhombus = 32 m

We know that,

Perimeter of a rhombus = $4 \times \mathrm{side}$

$4 \times \mathrm{side}$ = 32 m

$4 \times \mathrm{a}$ = 32 m

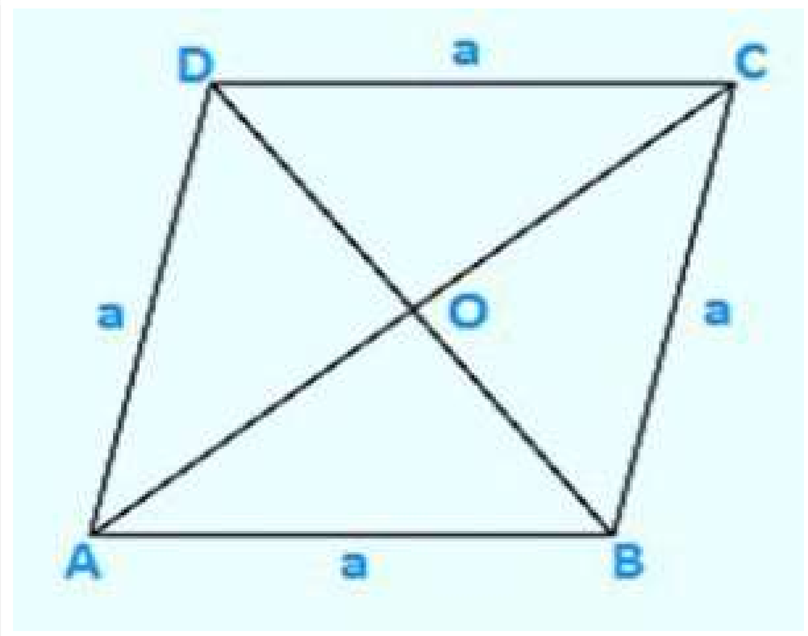
a = 8 m

Let AC = 10 m

OA = $\frac{1}{2} \times \mathrm{AC}$

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

OA = 5 m




By using Pythagoras theorem

$OB^2 = AB^2 - OA^2$

$OB^2 = 8^2 - 5^2$

OB = $\sqrt{39}$ m

BD = 2 x OB

BD = 2$\sqrt{39}$ m

Area of the sheet = $\frac{1}{2} \times BD \times AC$

Area of the sheet = $\frac{1}{2} \times 2\sqrt{39} \times 10$

Therefore, cost of printing on both sides at the rate of Rs. 5 per m$^2$

= Rs 2 x $10\sqrt{39}$x5

= Rs. 625

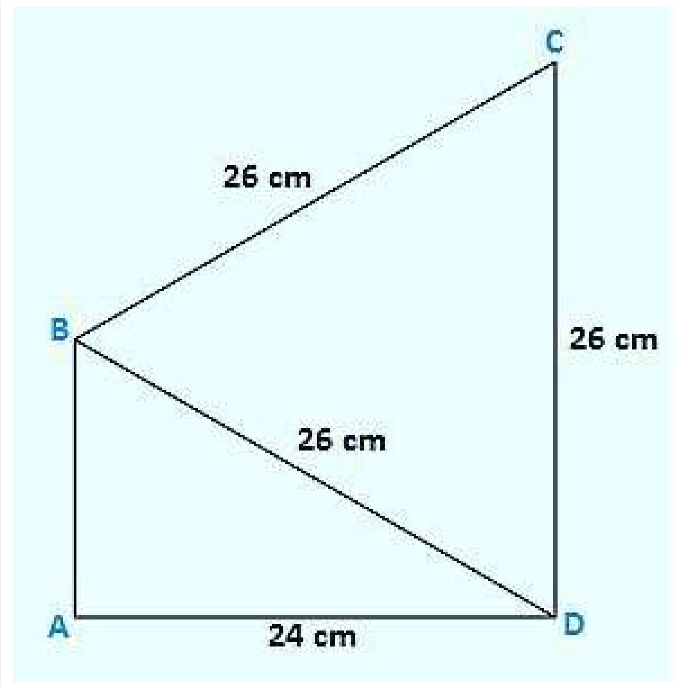
*Q8. Find the area of the quadrilateral ABCD in which AD = 24 cm, angle BAD = $90^\circ$ and BCD forms an equilateral triangle whose each side is equal to 26 cm. [Take $\sqrt{3}$ = 1.73]*

Solution:/p>

Given that, in a quadrilateral ABCD in which AD = 24 cm,

Angle BAD = $90^\circ$

BCD is an equilateral triangle and the sides BC = CD = BD = 26 cm




In triangle BAD, by applying Pythagoras theorem,

$BA^2 = BD^2 - AD^2$

$BA^2 = 26^2 + 24^2$

BA = $\sqrt{100}$

BA = 10 cm

Area of the triangle BAD = $\frac{1}{2} \times BA \times AD$

Area of the triangle BAD = $\frac{1}{2} \times 10 \times 24$

Area of the triangle BAD = 120 $cm^2$

Area of the equilateral triangle = $\frac{\sqrt{3}}{4} \times side$

Area of the equilateral triangle QRS = $\frac{\sqrt{3}}{4} \times 26$

Area of the equilateral triangle BCD = 292.37 $cm^2$

Therefore, the area of quadrilateral ABCD = area of triangle BAD + area of the triangle BCD

The area of quadrilateral ABCD = 120 + 292.37

= 412.37 $cm^2$

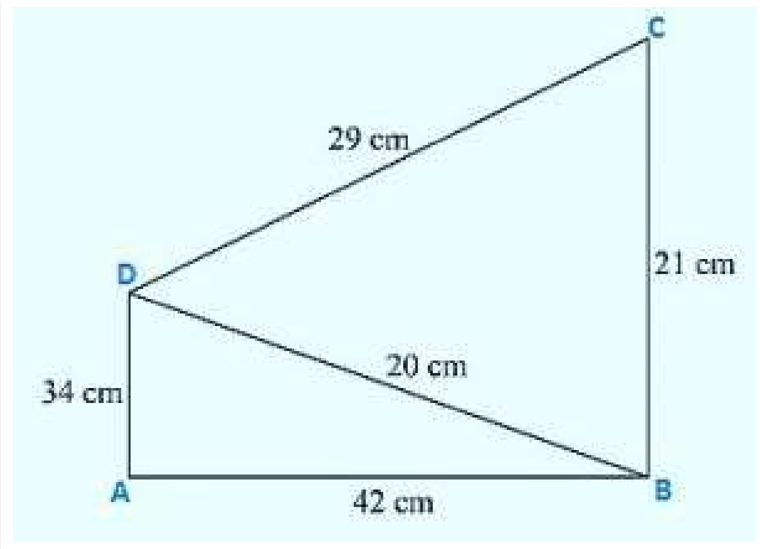
*Q9. Find the area of quadrilateral ABCD in which AB = 42 cm, BC = 21 cm, CD = 29 cm, DA = 34 cm and the diagonal BD = 20 cm.*

Solution:

Given

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

BD = 20 cm.




Now, for the area of triangle ABD

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

2s = 34 cm + 42 cm + 20 cm

s = 48 cm/p>

By using Heron's Formula,

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

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

= $336 cm^2$

Now, for the area of triangle BCD

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

2s = 29cm + 21cm + 20cm

s = 35 cm

By using Heron's Formula,

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

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

= $210 cm^2$

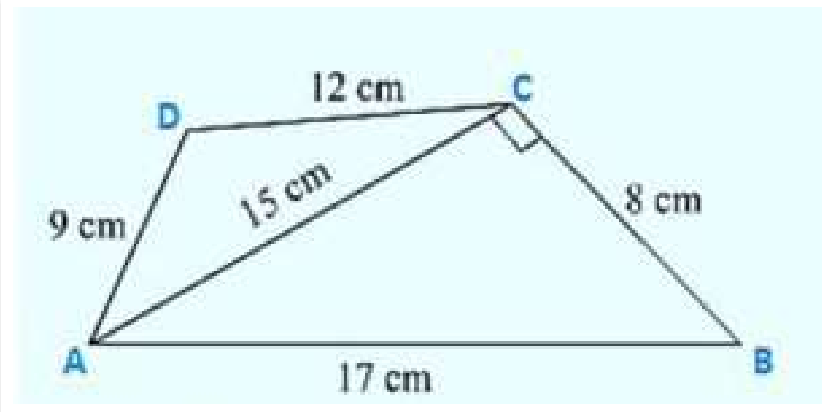
Therefore, Area of quadrilateral ABCD = Area of triangle ABD + Area of triangle BCD

Area of quadrilateral ABCD = 336 + 210

Area of quadrilateral ABCD = 546 $cm^2$

*Q10. Find the perimeter and the area of the quadrilateral ABCD in which AB = 17 cm, AD = 9 cm, CD = 12 cm, AC = 15 cm and angle ACB =* $90^\circ$.

Solution:




Given are the sides of the quadrilateral ABCD in which

AB = 17 cm, AD = 9 cm, CD = 12 cm, AC = 15 cm and an angle ACB = $90^\circ$

By using Pythagoras theorem

$BC^2 = AB^2 - AC^2$

$BC^2 = 17^2 - 15^2$

BC = 8 cm

Now, area of triangle ABC = $\frac{1}{2} \times AC \times BC$

area of triangle ABC = $\frac{1}{2} \times 8 \times 15$

area of triangle ABC = 60 $cm^2$

Now, for the area of triangle ACD

Perimeter of triangle ACD 2s = AC + CD + AD

2s = 15 + 12 +9

s = 18 cm

By using Heron's Formula,

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

= $\sqrt{18 \times (3) \times (6) \times (9)}$

= $54cm^2$

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

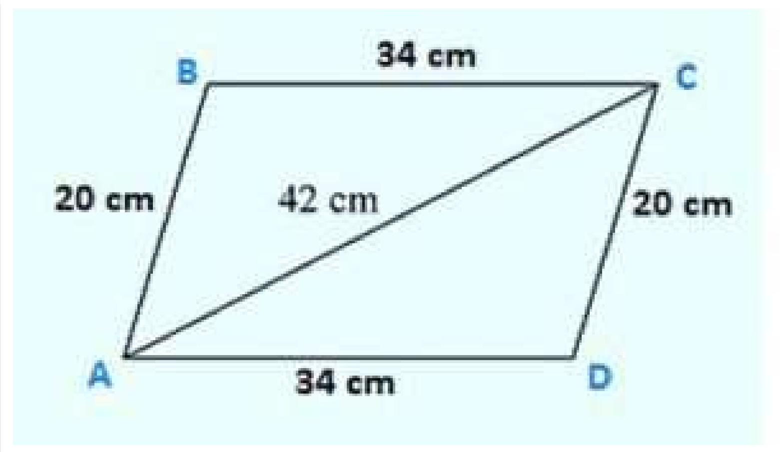
Area of quadrilateral ABCD = 60 $cm^2$ + $54cm^2$

Area of quadrilateral ABCD = 114 $cm^2$

*Q11. The adjacent sides of a parallelogram ABCD measure 34 cm and 20 cm, and the diagonal AC measures 42 cm. Find the area of parallelogram.*

Solution:

Given,




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

Area of the parallelogram = Area of triangle ADC + Area of triangle ABC

Note: Diagonal of a parallelogram divides into two congruent triangles

Therefore,

Area of the parallelogram = 2 × (Area of triangle ABC)

Now, for area of triangle ABC

Perimeter = 2s = AB + BC + CA

2s = 34 cm + 20 cm + 42 cm

s = 48 cm

By using Heron's Formula,

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

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

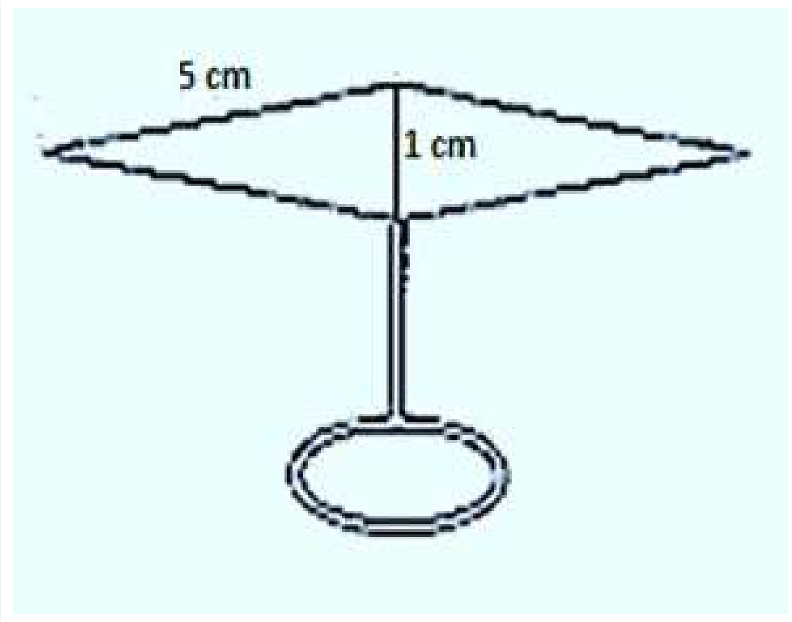
= $336 cm^2$

Therefore, area of parallelogram ABCD = 2 × (Area of triangle ABC)

Area of parallelogram = 2 × $336 cm^2$

Area of parallelogram ABCD = 672 $cm^2$

*Q12. Find the area of the blades of the magnetic compass shown in figure given below.*




Solution:

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 = 5 cm + 1 cm + 5 cm

s = 5.5 cm

By using Heron's Formula,

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

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

= $2.49 cm^2$

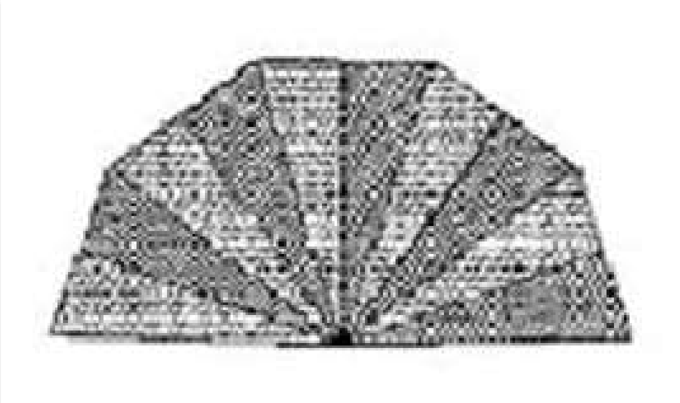
Also, area of triangle ADB = Area of triangle CDB

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

Area of the blades of the magnetic compass = 2 $\times$2.49

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

*Q13. 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 25 cm, 25 cm and 14 cm. Find the area of each type of paper needed to make the hand fan.*



Solution:

Given that,

The sides of AOB

AO = 25 cm

OB = 25 cm

BA = 14 cm

Area of each strip = Area of triangle AOB

Now, for the area of triangle AOB

Perimeter = AO + OB + BA

2s = 25 cm +25 cm + 14 cm

s = 32 cm

By using Heron's Formula,

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

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

= $168 cm^2$

Also, area of each type of paper needed to make a fan = 5 × Area of triangle AOB

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

Area of each type of paper needed to make a fan = $840 cm^2$

*Q14. 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 a parallelogram.*

Solution:

The sides of the triangle DCE are

DC = 15 cm,

CE = 13 cm,

ED = 14 cm

Let the h be the height of parallelogram ABCD

Now, for the area of triangle DCE

Perimeter = DC + CE + ED

2s = 15 cm + 13 cm + 14 cm

s = 21 cm

By using Heron's Formula,

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

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

= $84 cm^2$

Also, area of triangle DCE = Area of parallelogram ABCD=>$84 cm^2$

24 × h = $84 cm^2$

h = 6 cm.