

RD SHARMA

Solutions

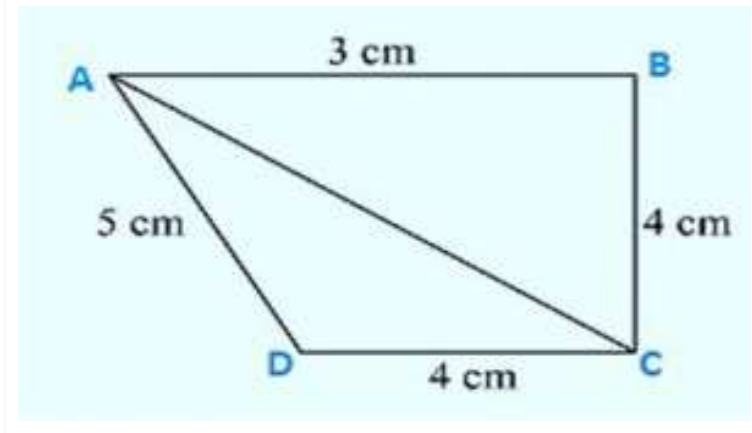
Class 9 Maths

Chapter 12

Ex 12.2

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 B

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

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

$$= 6 \text{ cm}^2$$

From triangle CAD

$$\text{Perimeter} = 2s = AC + CD + DA$$

$$2s = 5 \text{ cm} + 4 \text{ cm} + 5 \text{ cm}$$

$$2s = 14 \text{ cm}$$

$$s = 7 \text{ cm}$$

By using Heron's Formula

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

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

$$= 9.16 \text{ cm}^2$$

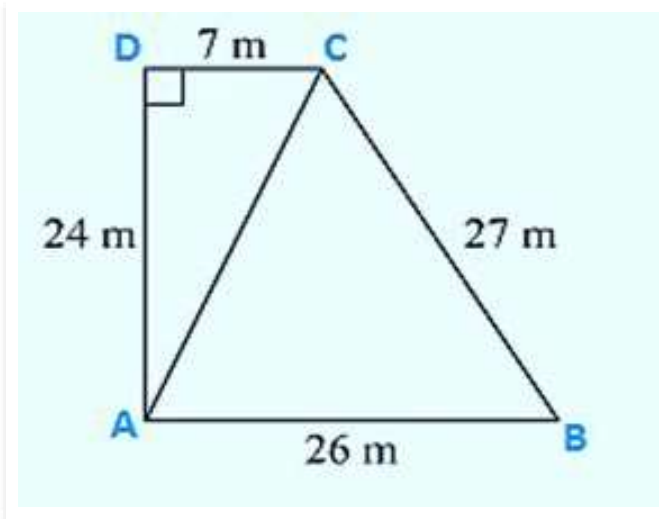
Area of ABCD = Area of ABC + Area of CAD

$$= (6 + 9.16) \text{ cm}^2$$

$$= 15.16 \text{ cm}^2$$

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

$AB = 26 \text{ m}$, $BC = 27 \text{ m}$, $CD = 7 \text{ m}$, $DA = 24 \text{ m}$

Diagonal AC is joined.

Now, in triangle ADC

By applying Pythagoras theorem

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

$$AC^2 = 24^2 + 7^2$$

$$AC = 25 \text{ m}$$

Now area of triangle ABC

$$\text{Perimeter} = 2s = AB + BC + CA$$

$$2s = 26 \text{ m} + 27 \text{ m} + 25 \text{ m}$$

$$s = 39 \text{ m}$$

By using Heron's Formula

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

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

$$= 291.84 \text{ m}^2$$

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

Now for area of triangle ADC

$$\text{Perimeter} = 2s = AD + CD + AC$$

$$= 25 \text{ m} + 24 \text{ m} + 7 \text{ m}$$

$$s = 28 \text{ m}$$

By using Heron's Formula

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

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

$$= 84\text{m}^2$$

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

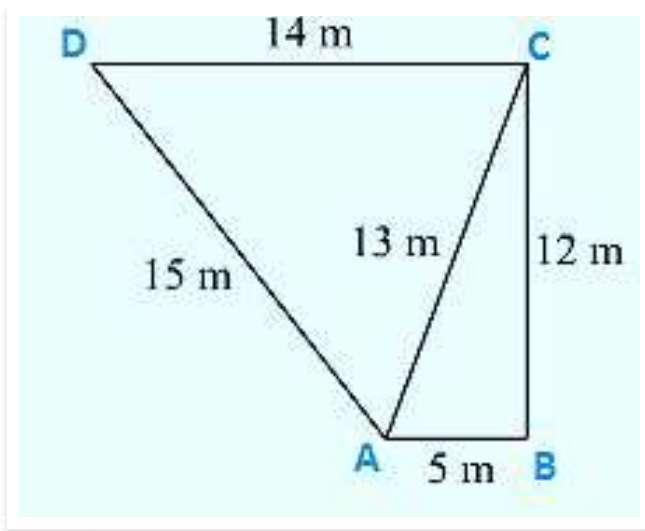
Therefore, Area of rectangular field ABCD

$$= \text{Area of triangle ABC} + \text{Area of triangle ADC}$$

$$= 291.84 + 84$$

$$= 375.8 \text{ m}^2$$

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

$$AB = 5 \text{ m}, BC = 12 \text{ m}, CD = 14 \text{ m} \text{ and } DA = 15 \text{ m}$$

Join AC

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

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

$$= 30 \text{ m}^2$$

In triangle ABC, By applying Pythagoras theorem

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

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

$$AC = 13 \text{ m}$$

Now in triangle ADC,

$$\text{Perimeter} = 2s = AD + DC + AC$$

$$2s = 15 \text{ m} + 14 \text{ m} + 13 \text{ m}$$

$$s = 21 \text{ m}$$

By using Heron's Formula,

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

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

$$= 84\text{m}^2$$

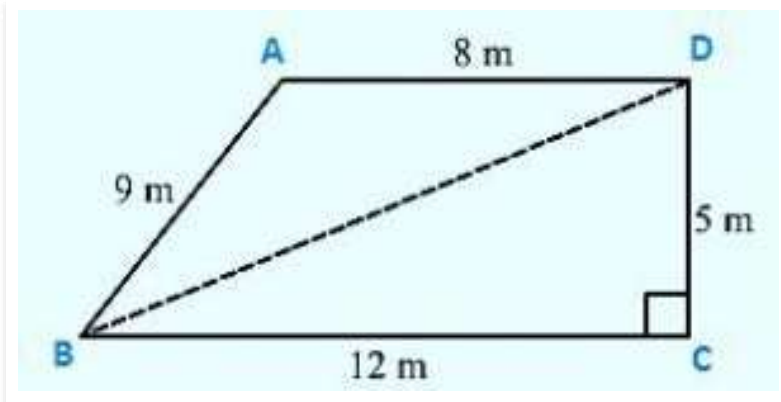
Area of quadrilateral ABCD = Area of triangle ABC + Area of triangle ADC

$$= (30 + 84) \text{ m}^2$$

$$= 114\text{m}^2$$

Q4. A park in the shape of a quadrilateral ABCD, has angle C = 90°, 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

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

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

$$BD = 13 \text{ m}$$

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

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

$$= 30 \text{ m}^2$$

Now, in triangle ABD

$$\text{Perimeter} = 2s = 9 \text{ m} + 8 \text{ m} + 13 \text{ m}$$

$$s = 15 \text{ m}$$

By using Heron's Formula,

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

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

$$= 35.49 \text{m}^2$$

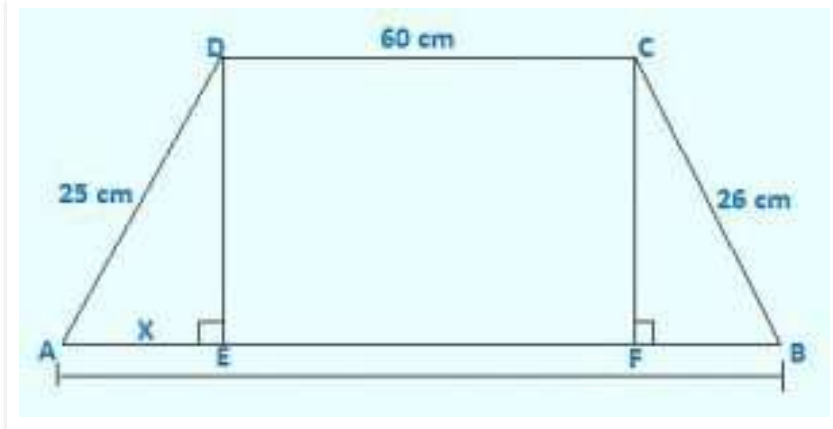
Area of quadrilateral ABCD = Area of triangle ABD + Area of triangle BCD

$$= (35.496 + 30) \text{ m}^2$$

$$= 65.5 \text{m}^2.$$

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 $AB = 77 \text{ m}$ and $CD = 60 \text{ m}$

The other two parallel sides of trapezium are $BC = 26 \text{ m}$, $AD = 25 \text{ m}$

Join AE and CF

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

Therefore, $DC = EF = 60 \text{ m}$

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, $DE = CF$

$$\text{So, } DE^2 = CF^2$$

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

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

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

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

$$x = 7$$

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

$$DE = \sqrt{625 - 49}$$

$$DE = 24 \text{ m}$$

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

$$\text{Area of trapezium} = 1644 \text{ m}^2$$

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

Solution:

Given,

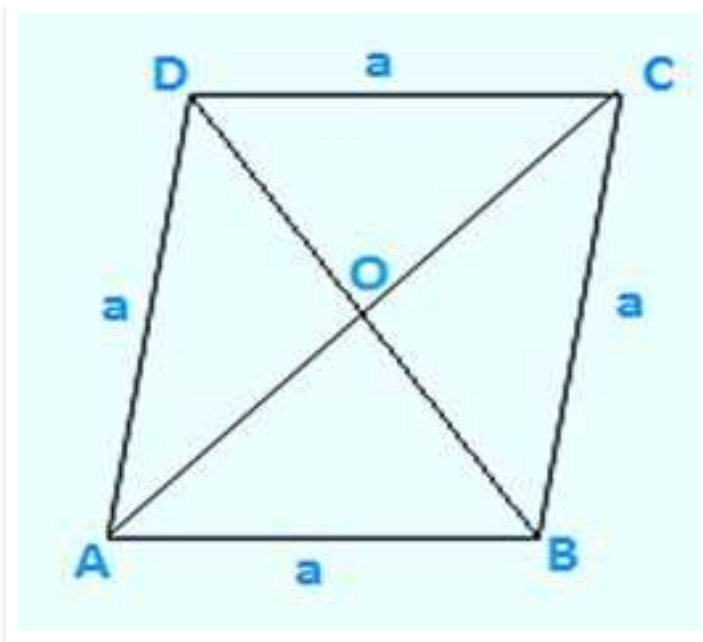
$$\text{Perimeter of a rhombus} = 80 \text{ m}$$

As we know,

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

$$4 \times a = 80 \text{ m}$$

$$a = 20 \text{ m}$$



Let $AC = 24 \text{ m}$

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

$$OA = 12 \text{ m}$$

In triangle AOB

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

$$OB^2 = 20^2 - 12^2$$

$$OB = 16 \text{ m}$$

Also, $OB = OD$ because diagonal of rhombus bisect each other at 90°

$$\text{Therefore, } BD = 2 OB = 2 \times 16 = 32 \text{ m}$$

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

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

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

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,

$$\text{Perimeter of a rhombus} = 32 \text{ m}$$

We know that,

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

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

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

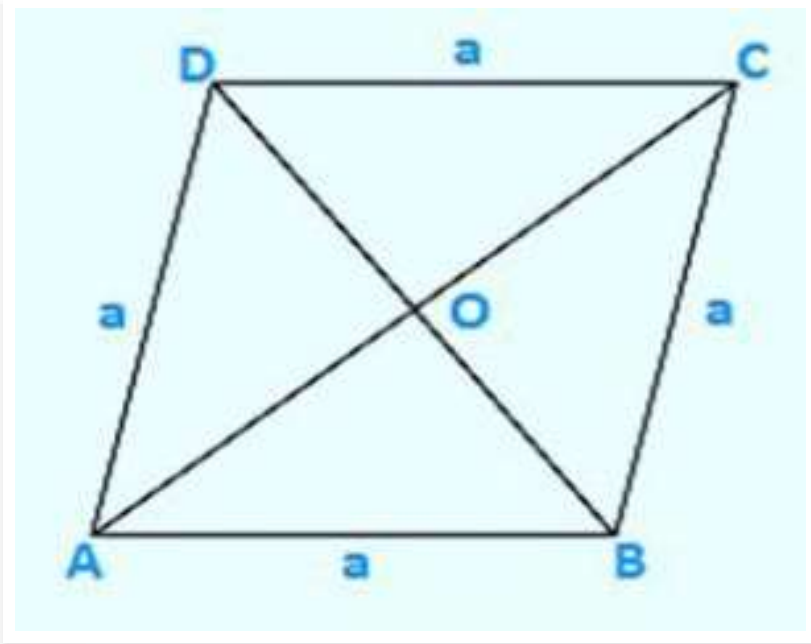
$$a = 8 \text{ m}$$

$$\text{Let } AC = 10 \text{ m}$$

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

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

$$OA = 5 \text{ m}$$



By using Pythagoras theorem

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

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

$$OB = \sqrt{39} \text{ m}$$

$$BD = 2 \times OB$$

$$BD = 2\sqrt{39} \text{ m}$$

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

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

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

$$= \text{Rs } 2 \times 10\sqrt{39} \times 5$$

$$= \text{Rs. } 625$$

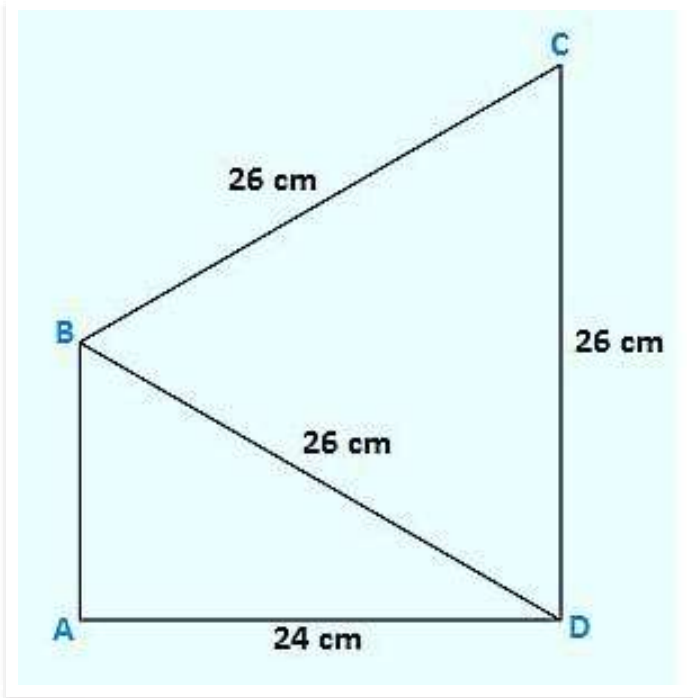
Q8. Find the area of the quadrilateral ABCD in which $AD = 24 \text{ cm}$, angle $BAD = 90^\circ$ and BCD forms an equilateral triangle whose each side is equal to 26 cm . [Take $\sqrt{3} = 1.73$]

Solution: /p>

Given that, in a quadrilateral ABCD in which $AD = 24 \text{ cm}$,

Angle $BAD = 90^\circ$

BCD is an equilateral triangle and the sides $BC = CD = BD = 26 \text{ cm}$



In triangle BAD, by applying Pythagoras theorem,

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

$$BA^2 = 26^2 - 24^2$$

$$BA = \sqrt{100}$$

$$BA = 10 \text{ cm}$$

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

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

$$\text{Area of the triangle BAD} = 120 \text{ cm}^2$$

$$\text{Area of the equilateral triangle} = \frac{\sqrt{3}}{4} \times \text{side}^2$$

$$\text{Area of the equilateral triangle BCD} = \frac{\sqrt{3}}{4} \times 26^2$$

$$\text{Area of the equilateral triangle BCD} = 292.37 \text{ cm}^2$$

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

$$\text{The area of quadrilateral ABCD} = 120 + 292.37$$

$$= 412.37 \text{ cm}^2$$

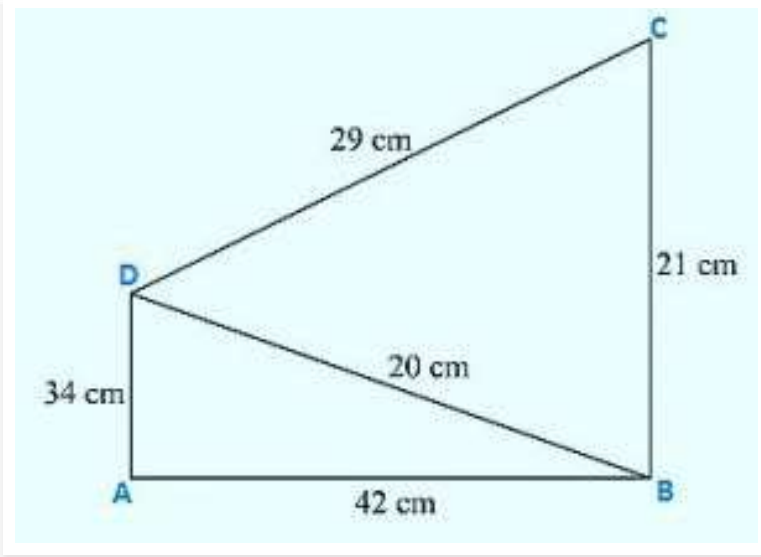
Q9. Find the area of quadrilateral ABCD in which AB = 42 cm, BC = 21 cm, CD = 29 cm, DA = 34 cm and the diagonal BD = 20 cm.

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 $2s = AB + BD + DA$

$$2s = 34 \text{ cm} + 42 \text{ cm} + 20 \text{ cm}$$

$$s = 48 \text{ cm}$$

By using Heron's Formula,

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

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

$$= 336 \text{ cm}^2$$

Now, for the area of triangle BCD

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

$$2s = 29 \text{ cm} + 21 \text{ cm} + 20 \text{ cm}$$

$$s = 35 \text{ cm}$$

By using Heron's Formula,

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

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

$$= 210 \text{ cm}^2$$

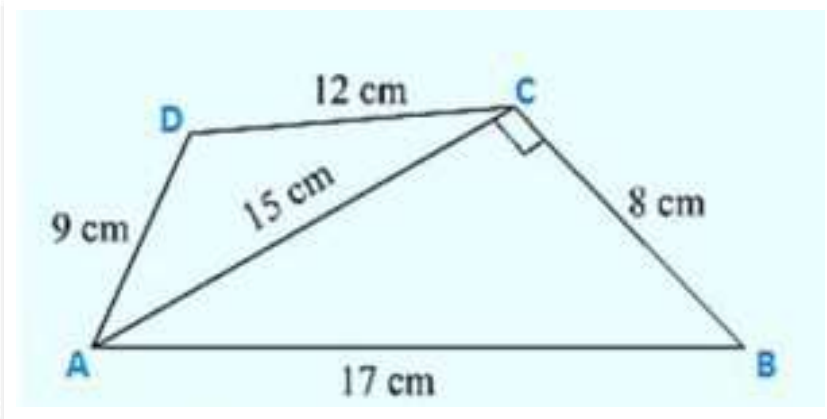
Therefore, Area of quadrilateral ABCD = Area of triangle ABD + Area of triangle BCD

$$\text{Area of quadrilateral ABCD} = 336 + 210$$

$$\text{Area of quadrilateral ABCD} = 546 \text{ cm}^2$$

Q10. Find the perimeter and the area of the quadrilateral ABCD in which $AB = 17 \text{ cm}$, $AD = 9 \text{ cm}$, $CD = 12 \text{ cm}$, $AC = 15 \text{ cm}$ 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

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

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

$$\text{area of triangle } ABC = 60 \text{ cm}^2$$

Now, for the area of triangle ACD

$$\text{Perimeter of triangle } ACD \ 2s = AC + CD + AD$$

$$2s = 15 + 12 + 9$$

$$s = 18$$
 cm

By using Heron's Formula,

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

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

$$= 54 \text{ cm}^2$$

$$\text{Area of quadrilateral } ABCD = \text{Area of triangle } ABC + \text{Area of triangle } ACD$$

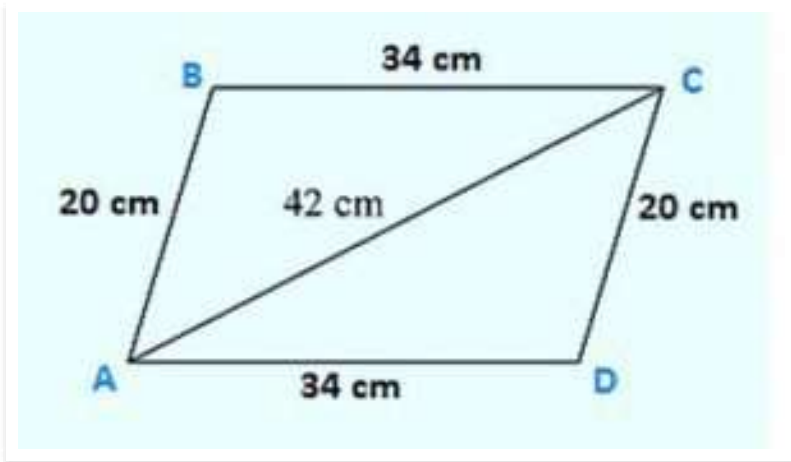
$$\text{Area of quadrilateral } ABCD = 60 \text{ cm}^2 + 54 \text{ cm}^2$$

$$\text{Area of quadrilateral } ABCD = 114 \text{ cm}^2$$

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 = $2 \times$ (Area of triangle ABC)

Now, for area of triangle ABC

Perimeter = $2s = AB + BC + CA$

$2s = 34 \text{ cm} + 20 \text{ cm} + 42 \text{ cm}$

$s = 48 \text{ cm}$

By using Heron's Formula,

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

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

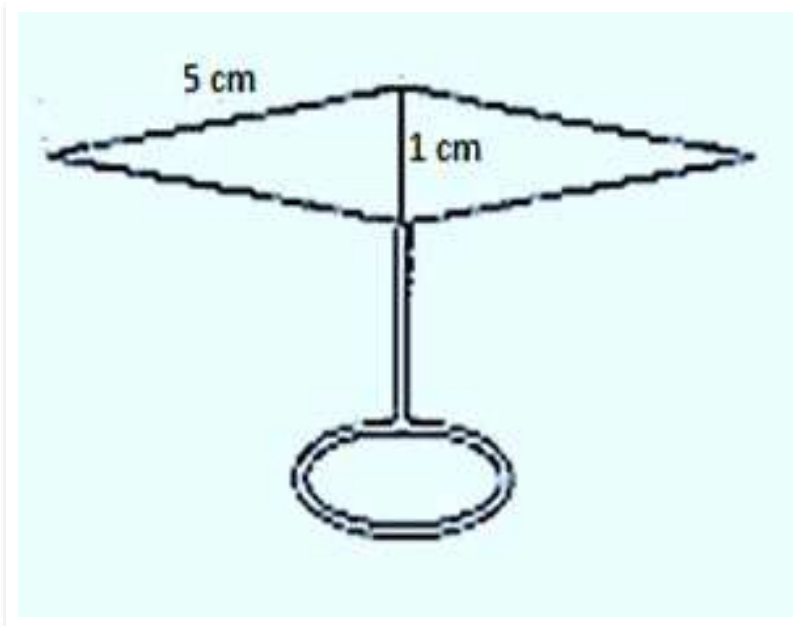
$= 336\text{cm}^2$

Therefore, area of parallelogram ABCD = $2 \times$ (Area of triangle ABC)

Area of parallelogram = $2 \times 336\text{cm}^2$

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 = $2s = AD + DB + BA$

$2s = 5 \text{ cm} + 1 \text{ cm} + 5 \text{ cm}$

$s = 5.5 \text{ cm}$

By using Heron's Formula,

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

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

$= 2.49 \text{ cm}^2$

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 = 2×2.49

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

$$AO = 25 \text{ cm}$$

$$OB = 25 \text{ cm}$$

$$BA = 14 \text{ cm}$$

Area of each strip = Area of triangle AOB

Now, for the area of triangle AOB

$$\text{Perimeter} = AO + OB + BA$$

$$2s = 25 \text{ cm} + 25 \text{ cm} + 14 \text{ cm}$$

$$s = 32 \text{ cm}$$

By using Heron's Formula,

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

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

$$= 168 \text{ cm}^2$$

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

$$\text{Area of each type of paper needed to make a fan} = 5 \times 168 \text{ cm}^2$$

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

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

$$DC = 15 \text{ cm},$$

$$CE = 13 \text{ cm},$$

$$ED = 14 \text{ cm}$$

Let the h be the height of parallelogram ABCD

Now, for the area of triangle DCE

$$\text{Perimeter} = DC + CE + ED$$

$$2s = 15 \text{ cm} + 13 \text{ cm} + 14 \text{ cm}$$

$$s = 21 \text{ cm}$$

By using Heron's Formula,

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

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

$$= 84\text{cm}^2$$

Also, area of triangle DCE = Area of parallelogram ABCD $\Rightarrow 84\text{cm}^2$

$$24 \times h = 84\text{cm}^2$$

$$h = 6 \text{ cm.}$$