Area

Practice set 15.1

Q. 1. If the base of a parallelogram is 18 cm and its height is 11 cm, find its area.

Answer : We know that,

Area of parallelogram = base × height

Given that base of parallelogram = 18cm

And, the height of parallelogram = 11cm

Area of parallelogram = 18 × 11

= **198 sq cm**

Q. 2. If the area of a parallelogram is 29.6 sq cm and its base is 8 cm, find its height.

Answer : We know that,

Area of parallelogram = base × height

$$\Rightarrow \text{height} = \frac{\text{area of parallelogram}}{\text{base}}$$

Given that area of parallelogram = 29.6cm

And, the base of parallelogram = 8cm

$$\Rightarrow \text{height} = \frac{29.6}{8}$$

= 3.7 cm

Q. 3. Area of a parallelogram is 83.2 sq cm. If its height is 6.4 cm, find the length of its base.

Answer : We know that,

Area of parallelogram = base × height

$$\Rightarrow \text{lenght of base} = \frac{\text{area of parallelogram}}{\text{height}}$$

Given that area of parallelogram = 83.2cm

And, the height of parallelogram = 6.4cm

$$\Rightarrow \text{lenght of base} = \frac{83.2}{6.4}$$

= 13 cm

Practice set 15.2

Q. 1. Lengths of the diagonals of a rhombus are 15cm and 24 cm, find its area.

Answer : We know that,

Area of rhombus = $\frac{1}{2}$×product of the length of diagonals

Given that length of one of the diagonals is 15cm

And the other is 24cm

⇒ Area of rhombus = 1/2×15×24

= 180 sq cm

Q. 2. Length of the diagonals of a rhombus are 16.5 cm and 14.2 cm, find its area.

Answer : We know that,

Area of rhombus = $\frac{1}{2}$ × product of the length of diagonals

Given that length of one of the diagonals is 16.5cm

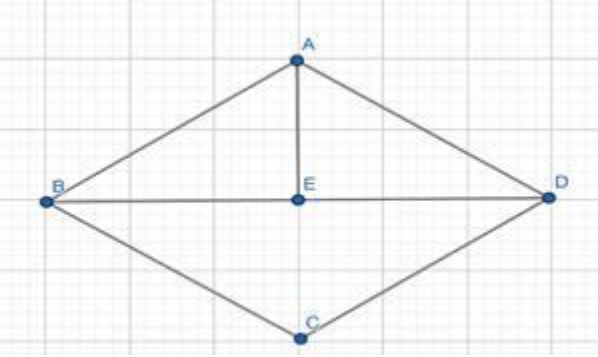
And the other is 14.2cm

$$\Rightarrow \text{ area of rhombus } = \frac{1}{2} \times 16.5 \times 14.2$$

= 117.5 sq cm

Q. 3. If the perimeter of a rhombus is 100 cm and length of one diagonal is 48 cm, what is the area of the quadrilateral?

Answer :



We know that perimeter of rhombus = 4 × side of the rhombus

Given perimeter of rhombus = 100cm

Side AB of rhombus = 100/4 = 25cm

Let BD be the diagonal given = 48cm

We know that diagonals of a rhombus bisect each other

∴ E is the midpoint of BD

⇒ BE = 24 cm

Now, ∆ABE is the right angle triangle at E

∴ Using Pythagoras theorem,

$AE^2 + BE^2 = AB^2$

$$AE = \sqrt{AB^2 - BE^2}$$

$= \sqrt{25^2 - 24^2}$

AE = 7cm

Area of rhombus = 4 × area of ∆ABE

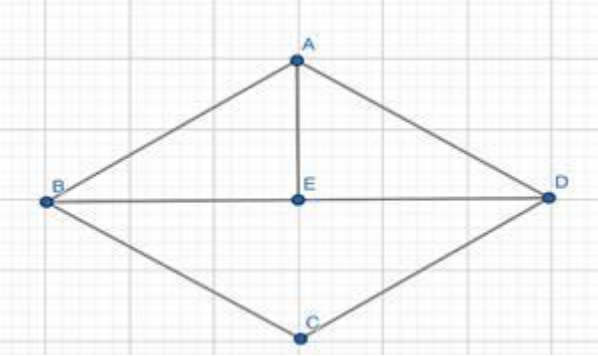
$= 4 \times \frac{1}{2} \times BE \times AE$

= 2 × 24 × 7

= 336 sq cm

Q. 4. If the length of a diagonal of a rhombus is 30 cm and its area is 240 sq cm, find its perimeter.

Answer :



We know that,

$\text{Area of rhombus} = \frac{1}{2} \times \text{product of the length of diagonals}$

Given that area of rhombus = 240 sq cm

And diagonal BD = 30cm

$240 = \frac{1}{2} \times 30 \times \text{other diagonal, AC}$

⇒ other diagonal, AC = 240 × 2 ÷ 30

AC = 16cm

We know that diagonals of a rhombus bisect each other,

So let E be the midpoint of their point of intersection.

Now, AE = 16/2 = 8cm

And BE = 30/2 = 15cm

Now, ∆ABE is right angle triangle

∴ Using Pythagoras theorem,

$AE^2 + BE^2 = AB^2$

$$\Rightarrow AB = \sqrt{AE^2 + BE^2}$$

$$\Rightarrow AB = \sqrt{8^2 + 15^2}$$

⇒ AB = 17cm

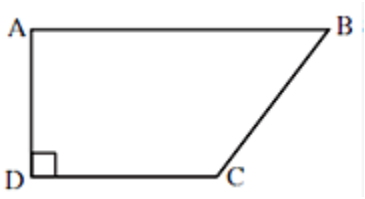
We know that perimeter of rhombus = 4 × side of rhombus

= 4 × 17

= 68 cm

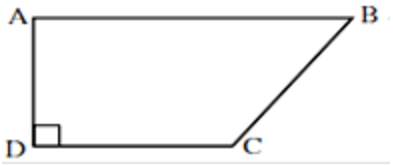
Practice set 15.3

Q. 1. In □ ABCD, l (AB) = 13 cm, l (DC) = 9 cm, l (AD) = 8 cm, find the area of□ABCD.



Answer : We know that,

$$\text{area of trapezium} = \frac{1}{2} \times \text{sum of lenght of parallel sides} \times \text{distance between parallel sides}$$



From the fig. it is clear that AB and CD are the 2 parallel sides

Given that AB = 13cm, CD = 9cm and AD = 8cm

Here sum of parallel sides, i.e., AB + CD = 13 + 9 = 22

Hence,

$$\text{area of trapezium} = \frac{1}{2} \times \text{sum of lenght of parallel sides} \times \text{distance between parallel sides}$$

$$\text{area of trapezium ABCD} = \frac{1}{2} \times 22 \times 8$$

= 88 sq cm

Q. 2. Length of the two parallel sides of a trapezium is 8.5 cm and 11.5 cm respectively and its height is 4.2 cm, find its area.

Answer : We know that,

$$\text{area of trapezium} = \frac{1}{2} \times \text{sum of lenght of parallel sides} \times \text{distance between parallel sides}$$

Given that length of 2 parallel sides = 8.5cm and 11.5cm

⇒ Sum of parallel sides = 8.5 + 11.5 = 20

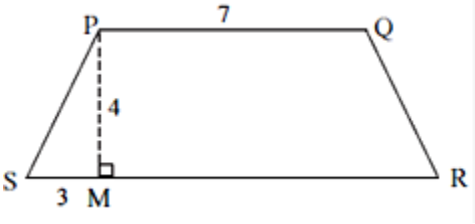
And, distance between them = 4.2cm

$$\text{area of trapezium ABCD} = \frac{1}{2} \times 20 \times 4.2$$

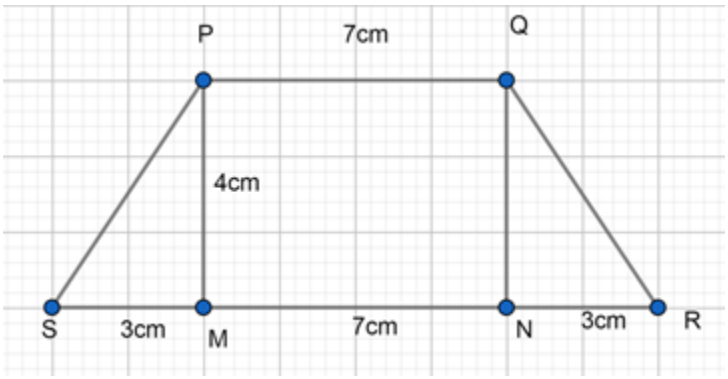
= 42 sq cm

Q. 3. □PQRS is an isosceles trapezium l (PQ) = 7 cm. seg PM ⊥ seg SR, l(SM) = 3 cm,

Distance between two parallel sides is 4 cm, find the area of PQRS



Answer :



Given that the trapezium is isosceles. Therefore from the fig. it is clear that SM = NR = 3cm

Also, PQ = MN = 7cm

Now, length of side SR = 3 + 7 + 3 = 13cm

Therefore, the sum of parallel sides of trapezium = 7 + 13 = 20

And the distance between them = 4 cm

$$\text{area of trapezium} = \frac{1}{2} \times \text{sum of lenght of parallel sides} \times \text{distance between parallel sides}$$

$$\text{area of trapezium ABCD} = \frac{1}{2} \times 20 \times 4$$

= 40 sq cm

Practice set 15.4

Q. 1. Sides of a triangle are cm 45 cm, 39 cm, and 42 cm, find its area.

Answer : To find the area of a triangle whose three sides are given we have the Heron's formula

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

Where, Δ is an area of a triangle.

$$s = \text{semi perimeter of triangle}$$

$$= \frac{a+b+c}{2}$$

And a, b, c are the three sides of the triangle

In this question, we have the three sides of the triangle which are 45cm, 39cm, and 42cm

$$\Rightarrow s = \frac{45+39+42}{2}$$

= 63m

S - a = 63 - 45 = 18

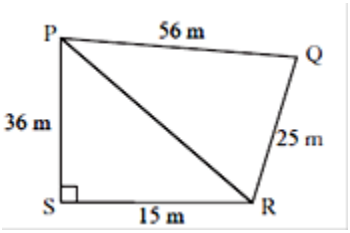
S - b = 63 - 39 = 24

S - c = 63 - 42 = 21

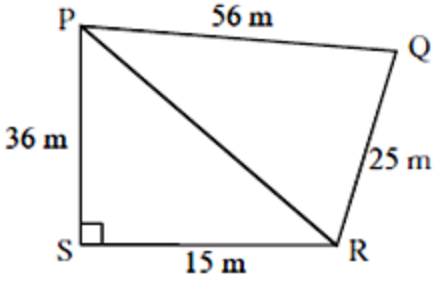
Hence $\text{area of triangle} = \sqrt{63 \times 18 \times 24 \times 21}$

= 756 sq m

Q. 2. Look at the measures shown in the adjacent figure and find the area of□PQRS.



Answer : In the given fig. Δ PRS is right angle triangle at S



Therefore, using Pythagoras theorem,

$PS^2 + SR^2 = PR^2$

$\Rightarrow 36^2 + 15^2 = PR^2$

$\Rightarrow PR = \sqrt{36^2 + 15^2}$

= 39m

Now,

Area of ∆PRS = $\frac{1}{2}$ × base × height

= $\frac{1}{2}$ × PS × SR

= $\frac{1}{2}$ × 36 × 15

= 270 sq m

Now the area of triangle PQR, using heron's formula

Here, sides are 56 cm, 25 cm, and 39 cm

Therefore,

$$s = \frac{56 + 25 + 39}{2}$$

S = 60

S – a = 60 – 56 = 4

S – b = 60 – 25 = 35

S – c = 60 – 39 = 35

$\text{area}, \Delta = \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{60 \times 35 \times 4 \times 21}$

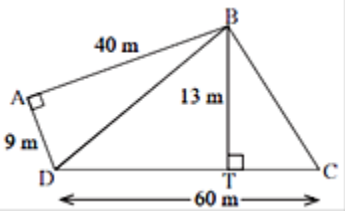
= 420 sq m

Hence, the area of the quadrilateral PQRS = area of ∆PQR + ∆PSR

= 420 + 270

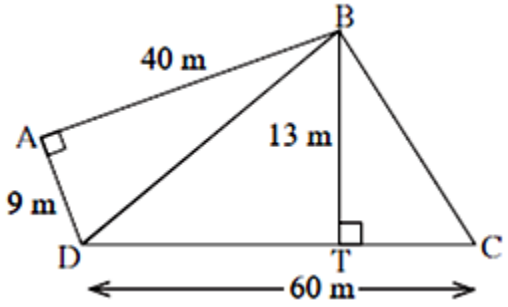
= 690 sq m

Q. 3. Some measures are given in the adjacent figure, find the area of□ ABCD.



Answer : In the given fig. ABD is right angled triangle at A,

Given that AB = 40cm, and AD = 9cm



Therefore, the area of triangle ABD

$= \frac{1}{2} \times \text{ base } \times \text{ height}$

$= \frac{1}{2} \times \text{AD} \times \text{AB}$

$$= \frac{1}{2} \times 40 \times 9$$

= 180 sq. m

Now, the area of triangle, ∆BCD

$$= \frac{1}{2} \times \text{ base } \times \text{ height}$$

$$= \frac{1}{2} \times CD \times BT$$

$$= \frac{1}{2} \times 60 \times 13$$

$$= 390 \text{ sq m}$$

Now area of quadrilateral ABCD,

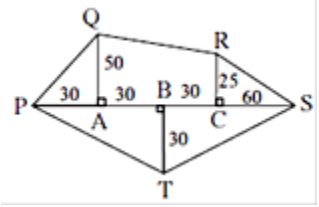
= 180 + 390

= 570 sq. m

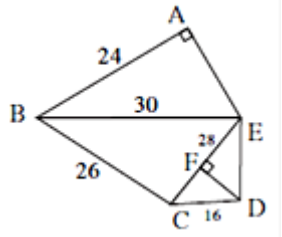
Practice set 15.5

Q. 1. Find the areas of given plots. (All measures are in meters.)

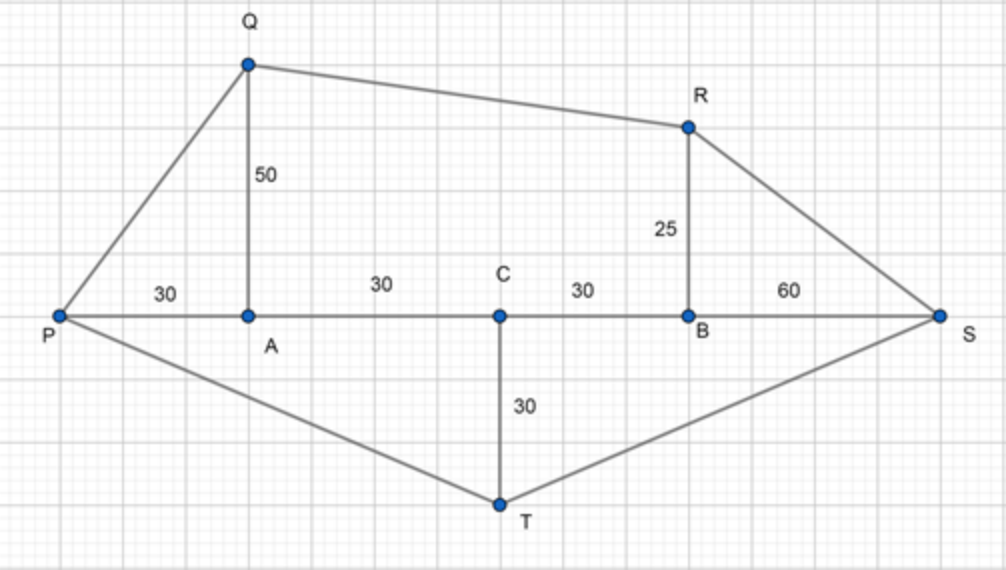
(1)



(2)



Answer : (1)



Given that,

PA = 30m, AC = 30m, and CT = 30m

PC = PA + AC = 30 + 30 = 60m

∆PCT is right angled triangle at C

Area of ∆PCT = 1/2 × PC × CT

$$= \frac{1}{2} \times 30 \times 60$$

= 900m……(1)

In, ∆SCT is right angled triangle at C

SB = 60m, BC = 30m, and CT = 30m

Area of ∆SCT = 1/2× base × height

$$= \frac{1}{2} \times SC \times CT$$

$= \frac{1}{2} \times 30 \times 90$

= 1350m…….(2)

In ∆SBR is right angled triangle at B

SB = 60m, BR = 25m

Area of ∆SBR = 1/2 × base × height

$= \frac{1}{2} \times SB \times BR$

$= \frac{1}{2} \times 60 \times 25$

= 750m……..(3)

In ∆APQ is right angled triangle at A

AP = 30m, AQ = 50m

Area of ∆APQ = $\frac{1}{2}$ × base × height

$= \frac{1}{2} \times AP \times AQ$

$= \frac{1}{2} \times 50 \times 30$

= 750m……(4)

Now, in trapezium ABRQ

AQ and RB are the 2 parallel sides

Also, AQ = 50m and BR = 25m

⇒ AQ + BR = 75m

The distance between AQ and BR = 60m

Hence,

$$\text{area of trapezium ABRQ} = \frac{1}{2} \times \text{sum of lenght of parallel sides} \times \text{distance between parallel sides}$$

$$= \frac{1}{2} \times 60 \times 75$$

= 2250 sq. m…….(5)

Now area of quadrilateral PQRST = (1)+(2)+(3)+(4)+(5)

= 900+1350+750+750+2250

= 6000 sq m

(2) The data for this question is inadequate.

Practice set 15.6

Q. 1. Radii of the circles are given below, find their areas.

(1) 28 cm
(2) 10.5 cm
(3) 17.5 cm

Answer : (1) We know that

area of circle = πr^2

Here given that radius of the circle is 28cm

$\therefore \text{area of circle} = \pi(28^2)$

= 784π sq. cm

= 2464 sq. cm

(2) Here the radius of the circle = 10.5 cm

$\therefore \text{area of circle} = \pi(10.5^2)$

= 110.25π sq. cm

= 346.5 sq. cm

(3) Here the radius of the circle is 17.5cm

$\therefore \text{area of the circle} = \pi(17.5^2)$

= 306.25π sq. cm

= 961.625 sq. cm

Q. 2. Areas of some circles are given below find their diameters.

(1) 176 sq cm
(2) 394.24 sq cm
(3) 12474 sq cm

Answer : (1) We know that area of circle = πr^2

Here area of circle = 176cm

$$\Rightarrow 176 = \pi r^2$$

$$\Rightarrow r^2 = \frac{176}{\pi}$$

$$\Rightarrow r = \sqrt{56}\text{cm}$$

$$\Rightarrow d = 2r = 2\left(\sqrt{56}\right)\text{cm}$$

(2) Here area of circle = 394.24 sq. cm

$$\Rightarrow \pi r^2 = 394.24$$

$$\Rightarrow r^2 = 125.49$$

$\Rightarrow$ r = 11.2 cm

D = 2r = 2(11.20) = 22.4 cm

(3) Here area of circle = 12474 sq. cm

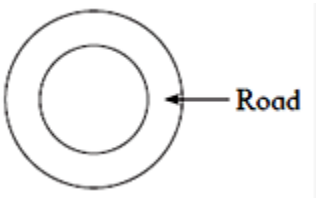
$$\Rightarrow \pi r^2 = 12474$$

$$\Rightarrow r^2 = 3970$$

$$\Rightarrow r = 63\text{cm}$$

D = 2r = 2(63) = 126cm

Q. 3. The diameter of the circular garden is 42 m. There is a 3.5 m wide road around the garden. Find the area of the road.



Answer : Given that the diameter of the garden (inner circle) = 42m

Therefore, inner radius, r = 21m

Also, given that road surrounds the garden and is 3.5 m wide.

Therefore, the diameter of the road (outer circle) will be = 42 + 2(3.5) = 49m

And then outer radius, R = 24.5m

Now, the area of road = area of the outer circle – area of the inner circle

Area of outer circle = πR^2

= $\pi(24.5)^2$

= 1885 sq. m

area of inner circle = πr^2

= $\pi(21)^2$

= 1385 sq. m

Hence, area of road = 1885-1385 = 500 sq. m

Q. 4. Find the area of the circle if its circumference is 88 cm.

Answer : We know that,

The Circumference of a circle = $2\pi r$

Given circumference = 88cm

$\Rightarrow 2\pi r = 88$

r = 14cm

Now, area of circle = πr^2

$= \pi(14)^2$

$= 615.75$ sq. cm