Chapter : 18. AREA OF A TRAPEZIUM AND A POLYGON

Exercise : 18A

Question: 1

Find the area of

Solution:

Given:

Length of parallel sides is 24cm and 20 cm

Height (h) = 15 cm

We know that area of trapezium is $\frac{1}{2}$ × (sum of parallel sides) × height

Therefore, Area of trapezium = $\frac{1}{2} \times (24 + 20) \times 15 = 330$ cm^2.

Question: 2

Find the area of

Solution:

Given

Length of parallel sides is 38.7cm and 22.3 cm

Height (h) = 16 cm

We know that area of trapezium is $\frac{1}{2}$ × (sum of parallel sides) × height

Therefore Area of trapezium = $\frac{1}{2} \times (38.7 + 22.3) \times 16 = 488$ cm^2.

Question: 3

The shape of the

Solution:

Given

Length of parallel sides is 1m and 1.4m

Height (h) = 0.9m

We know that area of trapezium is $\frac{1}{2}$ × (sum of parallel sides) × height

Therefore Area of trapezium = $\frac{1}{2} \times (1 + 1.4) \times 0.9$

$= 1.08$ m^2.

Question: 4

The area of a tra

Solution:

Given

Length of parallel sides is 55cm and 35 cm

Area of trapezium= 1080 cm^2

Let Height (h) =y cm

We know that area of trapezium is $\frac{1}{2}$ × (sum of parallel sides) × height

Therefore Area of trapezium is $\frac{1}{2} \times (55 + 35) \times y = 1080\ cm^2$.

$\therefore \frac{1}{2} \times (90) \times y = 1080$

$\Rightarrow 45 \times y = 1080$

$\Rightarrow y = \frac{1080}{22} = 24$

∴ Distance between the parallel lines is 24 cm.

Question: 5

A field is in the

Solution:

Given

Let length of parallel sides be 84cm and y cm

Area of trapezium= 1586 cm^2

Let Height (h) =26 cm

We know that area of trapezium is $\frac{1}{2}$ × (sum of parallel sides) × height

Therefore Area of trapezium is $\frac{1}{2} \times (84 + y) \times 26 = 1586\ cm^2$.

$\therefore \frac{1}{2} \times (84 + y) \times 26 = 1586$

$\Rightarrow (84 + y) \times 13 = 1586$

$\Rightarrow 84 + y = \frac{1586}{13}$

$\Rightarrow y = 122 — 84 = 38$

∴ Length of the other parallel side is 38 cm.

Question: 6

The area of a tra

Solution:

Given

Lengths of the parallel sides are in the ratio 4:5

Therefore let one of the side length be 4X and other side length be 5X

Area of trapezium= 405 cm^2

Let Height (h) =18 cm

We know that area of trapezium is $\frac{1}{2}$ × (sum of parallel sides) × height

Therefore Area of trapezium is $\frac{1}{2}$ x $(4X + 5X) \times 18 = 405\ cm^2$.

$\therefore \frac{1}{2} \times (4X + 5X) \times 18 = 405$

$\Rightarrow (9X) \times 9 = 405$

$\Rightarrow 81X = 405$

$\Rightarrow X = \frac{405}{81} = 5$

$\therefore$ Length of the parallel sides is 4X=4 × 5 =20 cm and 5X = 5 × 5 = 25 cm.

Therefore lengths of the parallel sides are 20 cm, 25 cm.

Question: 7

The area of a tra

Solution:

Given

Let length of first parallel side X

Length of other parallel side is X + 6

Area of trapezium= 180 cm^2

Let Height (h) =9 cm

We know that area of trapezium is $\frac{1}{2}$ × (sum of parallel sides) × height

Therefore Area of trapezium is $\frac{1}{2}$ × (X + 6 +X) × 9 =180 cm^2.

$\therefore \frac{1}{2} \times (X + 6 + X) \times 9 = 180$

$\Rightarrow \frac{1}{2} \times (2X + 6) \times 9 = 180$

$\Rightarrow 2X + 6 = \frac{180}{9} \times 2$

$\Rightarrow 2X + 6 = 40$

$\Rightarrow 2X = 40 - 6 = 34$

$\Rightarrow X = 17$

$\therefore$ Length of the parallel sides is X=17 cm and X + 6 = 17 + 6 = 23 cm.

Therefore lengths of the parallel sides are 17 cm, 23 cm.

Question: 8

In a trapezium-sh

Solution:

Given

Let length of first parallel side X

Length of other parallel side is 2X

Area of trapezium= 9450 m^2

Let Height (h) =84 m

We know that area of trapezium is $\frac{1}{2}$ × (sum of parallel sides) × height

Therefore Area of trapezium is $\frac{1}{2}$ × (X + 2X) × 84 =9450 cm^2.

$\therefore \frac{1}{2} \times (X + 2X) \times 84 = 9450$

$\Rightarrow (3X) \times 42 = 9450$

$\Rightarrow 126X = 9450$

$\Rightarrow 2X + 6 = \frac{9450}{126} = 75$

$\Rightarrow X = 17$

∴ Length of the parallel sides is X=75 m and 2X = 150 m.

Therefore length of the longest is 150 m.

Question: 9

The length of the

Solution:

Given

Length of parallel sides

AD = 42 m

BC = 54 m

Given that total length of fence is 130 m

That is AB + BC +CD +DA = 130

AB + 54 + 19 + 42 = 130

Therefore AB = 15

Height (AB) = 15 m

We know that area of trapezium is $\frac{1}{2}$ × (sum of parallel sides) × height

Therefore Area of trapezium = $\frac{1}{2} \times (42 + 54) \times 15 = 720\ m^2$

Question: 10

In the given figu

Solution:

Given

AD = 16 cm

BC = 40 cm

AC = 41 cm

$\angle ABC = 90$

Height = AB =?

Here in ΔABC using Pythagoras theorem

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

$41^2 = AB^2 + 40^2$

$AB^2 = 41^2 - 40^2$

$AB^2 = 1681 - 1600 = 81$

$\therefore AB = 9$

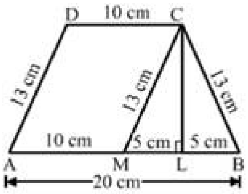
We know that area of trapezium is $\frac{1}{2}$ × (sum of parallel sides) × height

Therefore Area of trapezium = $\frac{1}{2} \times (16 + 40) \times 9 = 252\ cm^2$.

Question: 11

The parallel side

Solution:



Let ABCD be the given trapezium in which AB|| DC,

AB = 20 cm, DC = 10 cm and AD=BC=13cm

Draw CL ⊥ AB and CM || DA meeting AB at L and M, respectively.

Clearly, AMCD is a parallelogram.

Now,

AM = DC =10cm

MB = (AB-Am)

= (20-10) = 10 cm

Also,

CM = DA = 13cm

Therefore, ΔCMB is an isosceles triangle and CL ⊥ MB.

And L is midpoint of B.

⇒ML = LB = $\left(\frac{1}{2} \times MB\right)$ = $\left(\frac{1}{2} \times 10\right)$ = 5 cm

From right ΔCLM, we have:

CL^2 = (CM2 – ML^2)

CL^2 = (132 – 5^2)

CL^2 = (169 – 25)

CL^2 = 144

CL = 12

Therefore length of CL is 12 cm that is height of trapezium is 12 cm

There fore

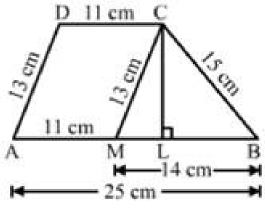
We know that area of trapezium is $\frac{1}{2}$ × (sum of parallel sides) × height

Therefore Area of trapezium = $\frac{1}{2}$ × (20 + 10) × 12 = 180 cm^2.

Question: 12

The parallel side

Solution:



Let ABCD be the given trapezium in which AB|| DC,

AB = 25 cm, CD = 11 cm and AD= 13 cm, BC=15cm

Draw CL ⊥ AB and CM || DA meeting AB at L and M, respectively.

Clearly, AMCD is a parallelogram.

Now,

MC = AD = 13cm

AM = DC =11cm

MB = (AB—Am)

= (25—11) = 14 cm

Thus, in ΔCMB, we have:

CM = 13 cm

MB = 14 cm

BC = 15 cm

Here let ML = X, hence LB = 14 – X and let CL = Y cm

Now in ΔCML, using Pythagoras theorem

$CL^2 = (CM2 – ML^2)$

$Y^2 = (132 – X^2)$ eq – 1

Again in ΔCLB, using Pythagoras theorem

$CL^2 = (CB2 – LB^2)$

$Y^2 = (152 – (14—X)\ ^2)$ eq – 2

Sub eq 1 in 2, we get

$(132 – X^2) = (152 – (14—X)\ ^2)$

$169 – X^2 = 225 – (196 + X^2 – 28\ X)$

$169 – X^2 = 225 – 196 – X^2 + 28\ X$

$28X = 169 + 196 – 225 + X^2 – X^2$

28X = 140

X = 5 cm

Now substitute X value in eq –1

That is $Y^2 = (132 – X^2)$

$Y^2 = (132 – 5^2)$

$Y^2 = (169 – 25)$

$Y^2 = 144$

Y = 12 cm

Therefore CL = 12 cm that is height of the trapezium = 12 cm

Therefore

We know that area of trapezium is $\frac{1}{2}$ × (sum of parallel sides) × height

Therefore Area of trapezium = $\frac{1}{2} \times (25 + 11) \times 12 = 216\ cm^2$.

Exercise : 18B

Question: 1

In the given figu

Solution:

Given: A quadrilateral ABCD

$BL \perp AC$ and $DM \perp AC$

AC = 24 cm

BL = 8 cm

DM = 7 cm

Here,

Area (quad. ABCD) = area (ΔABC) + area (ΔADC)

Area of triangle = $\frac{1}{2}$ × (base) × (height).

Therefore

Area of quad ABCD = $\frac{1}{2}$ × (AC) × (BL) + $\frac{1}{2}$ × (AC) × (DM)

= $\frac{1}{2}$ × (24) × (8) + $\frac{1}{2}$ × (24) × (7) = 96 + 84 = 180 cm^2

Therefore area of the quadrilateral ABCD is 180 cm^2

Question: 2

In the given figu

Solution:

Given: A quadrilateral ABCD

$AL \perp BD$ and $CM \perp BD$

AL = 19 cm

BD = 36 cm

CM = 11 cm

Here,

Area (quad. ABCD) = area (ΔABD) + area (ΔACD)

Area of triangle = $\frac{1}{2}$ × (base) × (height).

Therefore

Area of quad ABCD = $\frac{1}{2}$ × (BD) × (AL) + $\frac{1}{2}$ × (BD) × (CM)

= $\frac{1}{2}$ × (36) × (19) + $\frac{1}{2}$ × (36) × (11) = 342 + 198 = 540 cm^2

Therefore area of the quadrilateral ABCD is 540 cm^2.

Question: 3

Find the area of

Solution:

Given: A pentagon ABCDE

$BL \perp AC$, $DM \perp AC$ and $EN \perp AC$

$AC = 18$ cm

$AM = 14$ cm

$AN = 6$ cm

$BL = 4$ cm

$DM = 12$ cm

$EN = 9$ cm

MC = AC – AM = 18 – 14 = 4 cm

MN = AM – AN = 14 – 6 = 8 cm

Here,

Area (Pent. ABCDE) = area (ΔAEN) + area (ΔDMC) + area (ΔABC) + area (Trap. DMNE)

Area of triangle = $\frac{1}{2}$ × (base) × (height).

Area of trapezium is $\frac{1}{2}$ × (sum of parallel sides) × height

Here,

Area (ΔAEN) = $\frac{1}{2}$ × (AN) × (EN) = $\frac{1}{2}$ × (6) × (9) = 27 cm^2.

Area (ΔDMC) = $\frac{1}{2}$ × (MC) × (DM) = $\frac{1}{2}$ × (4) × (12) = 24 cm^2.

Area (ΔABC) = $\frac{1}{2}$ × (AC) × (BL) = $\frac{1}{2}$ × (18) × (4) = 36 cm^2.

Area (Trap. DMNE) = $\frac{1}{2}$ × (DM + EN) × MN = $\frac{1}{2}$ × (12 + 9) × 8 = 84 cm^2.

∴ Area (Pent. ABCDE) = area (ΔAEN) + area (ΔDMC) + area (ΔABC) + area (Trap. DMNE)

= 27 + 24 + 36 + 84 = 171 cm^2.

∴ Area (Pent. ABCDE) = 171 cm^2.

Question: 4

Find the area of

Solution:

Given: A Hexagon ABCDE

$BL \perp AD$, $CM \perp AD$, $EN \perp AD$ and $FP \perp AD$

$AP = 6$ cm

$PL = 2$ cm

$LN = 8$ cm

$NM = 2$ cm

$MD = 3$ cm

$FP = 8$ cm

$EN = 12$ cm

$BL = 8$ cm

$CM = 6$ cm

AL = AP + PL = 6 + 2 = 8 cm

PN = PL + LN = 2 + 8 = 10 cm

LM = LN + NM = 8 + 2 = 10 cm

ND = NM + MD =2 + 3 = 5 cm

Here,

Area (Hex. ABCDEF) = area (ΔAPF) + area (ΔDEN) + area (ΔABL) + area (ΔCMD)

+ area (Trap. PNEF) + area (Trap. LMCB)

Area of triangle = $\frac{1}{2}$ × (base) × (height).

Area of trapezium is $\frac{1}{2}$ × (sum of parallel sides) × height

Here,

Area (ΔAPF) = $\frac{1}{2}$ × (AP) × (FP) = $\frac{1}{2}$ × (6) × (8) = 24 cm^2.

Area (ΔDEN) = $\frac{1}{2}$ × (ND) × (EN) = $\frac{1}{2}$ × (5) × (12) = 30 cm^2.

Area (ΔABL) = $\frac{1}{2}$ × (AL) × (BL) = $\frac{1}{2}$ × (8) × (8) = 32 cm^2.

Area (ΔCMD) = $\frac{1}{2}$ × (MD) × (CM) = $\frac{1}{2}$ × (3) × (6) = 9 cm^2.

Area (Trap. PNEF) = $\frac{1}{2}$ × (FP + EN) × PN = $\frac{1}{2}$ × (8 + 12) × 10 = 100 cm^2.

Area (Trap. LMCB) = $\frac{1}{2}$ × (BL + CM) × LM = $\frac{1}{2}$ × (8 + 6) × 10 = 70 cm^2.

∴ Area (Hex. ABCDEF) = area (ΔAPF) + area (ΔDEN) + area (ΔABL) + area (ΔCMD)

+ area (Trap. PNEF) + area (Trap. LMCB) = 24 + 30 + 32 + 9 + 100 + 70 = 265 cm^2.

∴ Area (Hex. ABCDEF) = 265 cm^2

Question: 5

Find the area of

Solution:

Given: A pentagon ABCDE

$BL \perp AC$, $CM \perp AD$ and $EN \perp AD$

$AC = 10$ cm

$AD = 12$ cm

$BL = 3$ cm

$CM = 7$ cm

$EN = 5$ cm

Here,

Area (Pent. ABCDE) = area (ΔABC) + area (ΔACD) + area (ΔADE)

Area of triangle = $\frac{1}{2}$ × (base) × (height).

Here,

Area (ΔABC) = $\frac{1}{2}$ × (AC) × (BL) = $\frac{1}{2}$ × (10) × (3) = 15 cm^2.

Area (ΔACD) = $\frac{1}{2}$ × (AD) × (CD) = $\frac{1}{2}$ × (12) × (7) = 42 cm^2.

Area (ΔADE) = $\frac{1}{2}$ × (AD) × (EN) = $\frac{1}{2}$ × (12) × (5) = 30 cm^2.

∴ Area (Pent. ABCDE) = area (ΔABC) + area (ΔACD) + area (ΔADE) = 15 + 42 + 30 = 87 cm^2.

∴ Area (Pent. ABCDE) = 87 cm^2.

Question: 6

Find the area enc

Solution:

Given: A figure ABCDEF

AB = 20 cm

BC = 20 cm

ED = 6 cm

AF = 20 cm

AB || FC

FC = 20 cm

Let distance between FC and ED be h = 8 cm

FC || ED

Here,

From the figure we can see that ABCF forms a square and EFCD forms a trapezium.

Area of square = (side length) ^{2}

Area of trapezium = $\frac{1}{2}$ × (sum of parallel sides) × height

Therefore,

Area of the figure ABCDEF = Area of square (ABCF) + Area of trapezium (EFCD)

Here,

Area of square (ABCF) = $(AB)^2 = (20)^2 = 400\ cm^2$

Area of trapezium (EFCD) = $\frac{1}{2} \times (FC + ED) \times h = \frac{1}{2} \times (6 + 20) \times 8 = 104\ cm^2$

∴ Area (ABCDEF) = Area of square (ABCF) + Area of trapezium (EFCD) = 400 + 104 = 504 cm^2.

∴ Area (Fig. ABCDEF) = 504 cm^2.

Question: 7

Find the area of

Solution:

Given: A figure ABCDEFGH

BC = FG = 4 cm

AB = HG = 5 cm

CD = EF = 4 cm

ED = 8 cm

ED || AH

AH = 8 cm

Here

ΔABC and GHF are equal and right angled

AC = AH = ?

In ΔABC using Pythagoras theorem

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

$5^2 = 4^2 + AC^2$

$25 = 16 + AC^2$

$AC^2 = 25 - 16 = 9$

AC = 3

AH = 3

Area(ABCDEFGH) = area(Rect. ADEH) + 2 X area (ΔABC)

Area of rectangle = (length × breadth)

Area of triangle = $\frac{1}{2}$ × (base) × (height).

Area(Rect. ADEH) = (DE × AD) = (DE × (AC + AD)) = (8 × (3 + 4)) = 56 cm^2

Area(ΔABC) = $\frac{1}{2}$ × (BC) × (AC) = $\frac{1}{2}$ × (4) × (3) = 6 cm^2

∴ Area(ABCDEFGH) = area(Rect. ADEH) + 2 × area (ΔABC) = 56 + (2 × 6) = 68 cm^2

∴ Area(ABCDEFGH) = 68 cm^2.

Question: 8

Find the area of

Solution:

Given: a regular hexagon ABCDEF

AB = BC = CD = DE = EF = FA = 13 cm

AD = 23 cm

Here AL = MD

Therefore Let AL = MD = x

Here AD = AL + LM + MD

23 = 13 + 2x

2x = 23 – 13 = 10

x = 5

Now,

In ΔABL using Pythagoras theorem

$AB^2 = AL^2 + LB^2$

$13^2 = x^2 + LB^2$

$13^2 = 5^2 + LB^2$

$169 = 25 + LB^2$

$LB^2 = 169 - 25 = 144$

LB = 12

Here area (Trap. ABCD) = area (Trap. AFED)

Therefore,

Area (Hex. ABCDEF) = 2 × area (Trap. ABCD)

Area of trapezium = $\frac{1}{2}$ × (sum of parallel sides) × height

Area (Trap. ABCD) = $\frac{1}{2} \times (BC + AD) \times LB = \frac{1}{2} \times (13 + 23) \times 12 = 216\ cm^2$.

∴ Area(ABCDEFGH) = 2 × area (Trap. ABCD) = 2 × 216 = 432 cm^2

∴ Area(ABCDEFGH) = 432 cm^2.

Exercise : 18C

Question: 1

The parallel side

Solution:

Given

Length of parallel sides is 14cm and 18 cm

Height (h) = 9 cm

We know that area of trapezium is $\frac{1}{2}$ × (sum of parallel sides) × height

Therefore Area of trapezium = $\frac{1}{2} \times (14 + 18) \times 9 = 144\ cm^2$.

Question: 2

The length of the

Solution:

Given

Length of parallel sides is 19 cm and 13 cm

Area of trapezium= 128 cm^2

Let Height (h) =y cm

We know that area of trapezium is $\frac{1}{2}$ × (sum of parallel sides) × height

Therefore Area of trapezium is $\frac{1}{2} \times (19 + 13) \times y = 128\ cm^2$.

∴ $\frac{1}{2} \times (19 + 13) \times y = 128$

$\Rightarrow \frac{1}{2} \times (32) \times y = 128$

$\Rightarrow 16 \times y = 128$

$\Rightarrow y = \frac{128}{16} = 8$ cm

∴. Distance between the parallel lines is 8 cm.

Question: 3

The parallel side

Solution:

Given

Lengths of the parallel sides are in the ratio 3:4

Therefore let one of the side length be 3X and other side length be 4X

Area of trapezium= 630 cm^2

Let Height (h) =12 cm

We know that area of trapezium is $\frac{1}{2}$ × (sum of parallel sides) × height

Therefore Area of trapezium is $\frac{1}{2} \times (3X + 4X) \times 12 = 630\ cm^2$.

$\therefore\ \frac{1}{2} \times (3X + 4X) \times 12 = 630$

$\Rightarrow (7X) \times 6 = 630$

$\Rightarrow 42X = 630$

$\Rightarrow X = \frac{630}{42} = 15$

∴ length of the parallel sides is 3X = 3 × 15 =45 cm and 4X = 4 × 15 = 60 cm.

Therefore shortest length of the parallel sides is 45 cm.

Question: 4

The area of a tra

Solution:

Given

Let length of first parallel side X

Length of other parallel side is X + 6

Area of trapezium= 180 cm^2

Let Height (h) =9 cm

We know that area of trapezium is $\frac{1}{2}$ × (sum of parallel sides) × height

Therefore Area of trapezium is $\frac{1}{2} \times (X + 6 + X) \times 9 = 180\ cm^2$.

$\therefore\ \frac{1}{2} \times (X + 6 + X) \times 26 = 180$

$\Rightarrow \frac{1}{2} \times (2X + 6) \times 9 = 180$

$\Rightarrow 2X + 6 = \frac{180}{9} \times 2$

$\Rightarrow 2X + 6 = 40$

$\Rightarrow 2X = 40 - 6 = 34$

$\Rightarrow X = 17$

∴ length of the parallel sides is X=17 cm and X + 6 = 17 + 6 = 23 cm.

Therefore length of the longer parallel side is 23 cm.

Question: 5

In the given figu

Solution:

Given:

AB||DC, DA ⊥ AB and CL ⊥ AB

$DC = 7$ cm

$BC = 10$ cm

$AB = 13$ cm

Therefore here AL = DC

That is AL = 7 cm

Hence LB = AB – AL = 13 – 7 = 6cm

In Δ LCB using Pythagoras theorem

$BC^2 = BL^2 + CL^2$

$10^2 = 6^2 + CL^2$

$100 = 36 + CL^2$

$CL^2 = 100 - 36$

$CL^2 = 64$

CL = 8

Here CL = AD = height of the trapezium

Therefore height = 8 cm

Now,

We know that area of trapezium is $\frac{1}{2}$ × (sum of parallel sides) × height

Therefore Area of trapezium = $\frac{1}{2} \times (7 + 13) \times 8 = 80\ cm^2$.

Exercise : CCE TEST PAPER-18

Question: 1

The base of a tri

Solution:

Given

Area of triangle = 1350 m^2

Let the length of the height of triangle be Y cm

Therefore its base is 3Y cm

Area of the triangle = $\frac{1}{2}$ × base × height = 1350

$\frac{1}{2} \times (3Y) \times (Y) = 1350$

$3Y^2 = 1350 \times 2 = 2700$

$Y^2 = \frac{2700}{3} = 900$

Y = 30 cm

Therefore height of triangle is 30 cm and base is 3×30 = 90cm

That is

Base = 90 m, Height = 30 m .

Question: 2

Find the area of

Solution:

Given

Side length of equilateral triangle is 6 cm

We know that area of the equilateral triangle is given by $\frac{\sqrt{3}}{4}a^2$,where a is side length

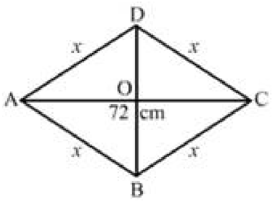
Therefore area of the triangle is

$\Rightarrow \frac{\sqrt{3}}{4} \times 6^2 = \frac{\sqrt{3}}{4} \times 36 = \sqrt{3} \times 9 = 9\sqrt{3}\text{ cm}^2$.

Question: 3

The perimeter of

Solution:



Given: A rhombus

Diagonal AC = 72 cm

Perimeter = 180 cm

Perimeter of the rhombus = 4x

Therefore 4x = 180

x= 45

hence, the side length of the rhombus is 45 cm

We know that diagonals of the rhombus bisect each other right angles.

$\therefore AO = \frac{1}{2} AC$

$\Rightarrow AO = (\frac{1}{2} \times 72)$ cm

$\Rightarrow AO = 36$ cm

From right ΔAOB, we have :

$BO^2 = AB^2 - AO^2$

$\Rightarrow BO^2 = AB^2 - AO^2$

$\Rightarrow BO^2 = 45^2 - 36^2$

$\Rightarrow BO^2 = 2025 - 1296$

$\Rightarrow BO^2 = 729$

BO = 27 cm

$\therefore BD = 2\times BO$

BD = 2 × 27 = 54 cm

Hence, the length of the other diagonal is 54 cm.

Area of the rhombus = $\frac{1}{2} \times 72 \times 54 = 1944\text{ cm}^2$

Question: 4

The area of a tra

Solution:

Given

Let length of first parallel side X

Length of other parallel side is X – 14

Area of trapezium= 216 m^2

Let Height (h) =12 m

We know that area of trapezium is $\frac{1}{2}$ × (sum of parallel sides) × height

Therefore Area of trapezium is $\frac{1}{2}$ × (X – 14 +X) × 12 =216 m^2.

$\therefore \frac{1}{2} \times (X - 14 + X) \times 12 = 216$

$\Rightarrow \frac{1}{2} \times (2X - 14) \times 12 = 216$

$\Rightarrow 2X - 14 = \frac{216}{12} X\ 2$

$\Rightarrow 2X - 14 = 36$

$\Rightarrow 2X = 36 + 14 = 50$

$\Rightarrow X = 25$

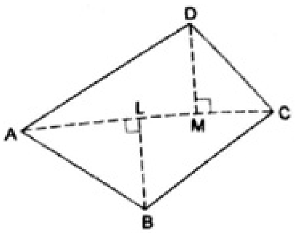
∴ length of the parallel sides is X=25 cm and X — 14 = 25 – 14 = m.

Therefore lengths of the parallel sides are 25 m, 11 m.

Question: 5

Find the area of

Solution:



Given : A quadrilateral

Diagonal AC = 40 cm

Perpendiculars to diagonal AC are: BL = 16 cm and DM = 12 cm

Now,

Area (quad. ABCD) = area (ΔABC) + area (ΔADC)

Area of triangle = $\frac{1}{2}$ × (base) × (height).

Therefore

Area of quad ABCD = $\frac{1}{2}$ × (AC) × (BL) + $\frac{1}{2}$ × (AC) × (DM)

$= \frac{1}{2} \times (40) \times (16) + \frac{1}{2} \times (40) \times (12) = 320 + 240 = 560\ cm^2$

Therefore area of the quadrilateral ABCD is 560 cm^2.

Question: 6

A field is in the

Solution:

Given

A right angled triangle with hypotenuse = 50 cm and one of the side = 30 cm

Let base = 30 cm

Height = Y cm

Area = ?

By using hypotenuse theorem

$Hypotenuse^2 = base^2 + height^2$

$50^2 = 30^2 + Y^2$

$Y^2 = 50^2 – 30^2 = 2500 – 900 = 1600$

Therefore $X^2 = 1600$

Y = 40cm

Area of the triangle = $\frac{1}{2} \times$ base $\times$ height

Area = $\frac{1}{2} \times 30 \times Y$

= $\frac{1}{2} \times 30 \times 40 = 600\ m^2$.

Question: 7

The base of a tri

Solution:

Given

Length of the base of the triangle = 14 cm

Length of the heigth of the triangle = 8 cm

Area of the triangle = $\frac{1}{2} \times$ base $\times$ height

Therefore area = $\frac{1}{2} \times$ base $\times$ height

= $\frac{1}{2} \times 14 \times 8 = 7 \times 8 = 56$ cm

Question: 8

The base of a tri

Solution:

Given

Area of triangle = $50\ m^2$

Let the length of the height of triangle be Y cm

Therefore its base is 4Y cm

Area of the triangle = $\frac{1}{2} \times$ base $\times$ height = 50

$\frac{1}{2} \times (4Y) \times (Y) = 50$

$4Y^2 = 50 \times 2 = 100$

$Y^2 = \frac{100}{4} = 25$

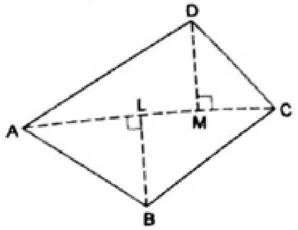
Y = 5 cm

Therefore length of base is $4 \times 5 = 20$ cm

Question: 9

The diagonal of a

Solution:



Given : A quadrilateral

Diagonal AC = 20 cm

Perpendiculars to diagonal AC are: BL = 11.5 cm and DM = 8.5 cm

Now,

Area (quad. ABCD) = area (ΔABC) + area (ΔADC)

Area of triangle = $\frac{1}{2}$ × (base) × (height).

Therefore

Area of quad ABCD = $\frac{1}{2}$ × (AC) × (BL) + $\frac{1}{2}$ × (AC) × (DM)

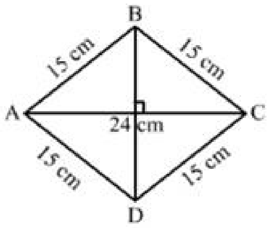
= $\frac{1}{2}$ × (20) × (11.5) + $\frac{1}{2}$ × (20) × (8.5) = 115 + 85 = 200 cm^2

Therefore area of the quadrilateral ABCD is 200 cm^2.

Question: 10

Each side of a rh

Solution:



Given: A rhombus ABCD

Diagonal AC = 24 cm

Side length : AB = BC = CD = DA = 15 cm

We know that diagonals of the rhombus bisect each other right angles.

∴ AO = $\frac{1}{2}$ AC

⇒AO = ($\frac{1}{2}$ × 24) cm

⇒AO = 12 cm

From right ΔAOB, we have :

$BO^2 = AB^2 - AO^2$

⇒$BO^2 = AB^2 - AO^2$

⇒$BO^2 = 15^2 - 12^2$

$\Rightarrow BO^2 = 225 - 144$

$\Rightarrow BO^2 = 81$

$\Rightarrow BO = 9$ cm

$\therefore BD = 2 \times BO$

$BD = 2 \times 9 = 18$ cm

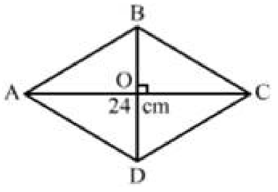
Hence, the length of the other diagonal is 18 cm.

Area of the rhombus = $\frac{1}{2} \times 24 \times 18 = 216$ cm^2

Question: 11

The area of a rho

Solution:



Given: A rhombus ABCD

Diagonal AC = 24 cm

Area = 120 cm^2

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

Therefore,

$\frac{1}{2} \times AC \times BD = \frac{1}{2} \times 24 \times BD = 120$

$24 \times BD = 120 \times 2$

$BD = \frac{240}{24} = 10$ cm

$OB = \frac{BD}{2} = \frac{10}{2} = 5$ cm

$OA = \frac{AC}{2} = \frac{24}{2} = 12$ cm

Now,

In Δ AOB using Pythagoras theorem

$AB^2 = OA^2 + OB^2$

$AB^2 = 12^2 + 5^2$

$AB^2 = 144 + 25$

$AB^2 = 169$

$AB = 13$

Therefore length of each side of the rhombus = 13 cm

Question: 12

The parallel side

Solution:

Given

Length of parallel sides is 54cm and 26 cm

Height (h) = 15 cm

We know that area of trapezium is $\frac{1}{2} \times$ (sum of parallel sides) $\times$ height

Therefore Area of trapezium = $\frac{1}{2} \times (54 + 26) \times 15 = 600\ cm^2$.

Question: 13

The area of a tra

Solution:

Given

Lengths of the parallel sides are in the ratio 5:3

Therefore let one of the side length be 5X and other side length be 3X

Area of trapezium= 384 cm^2

Let Height (h) =12 cm

We know that area of trapezium is $\frac{1}{2} \times$ (sum of parallel sides) $\times$ height

Therefore Area of trapezium is $\frac{1}{2} \times (5X + 3X) \times 12 = 384\ cm^2$.

$\therefore \frac{1}{2} \times (5X + 3X) \times 12 = 384$

$\Rightarrow (8X) \times 6 = 384$

$\Rightarrow 48X = 384$

$\Rightarrow X = \frac{384}{48} = 8$

$\therefore$ length of the parallel sides is $5X = 5 \times 8 = 40$ cm and $3X = 3 \times 8 = 24$ cm.

Therefore length of the longest side is 40 cm.

Question: 14

Fill in the blank

Solution:

(i) Area of triangle = $\frac{1}{2} \times$ (<u>base</u>) $\times$ (<u>height</u>).

(ii) Area of || gm = (<u>base</u>) $\times$ (<u>height</u>).

(iii) Area of trapezium is $\frac{1}{2} \times$ (<u>sum of parallel sides)</u> $\times$ (<u>height)</u>

(iv) Given

Length of parallel sides is 14cm and 18 cm

Height (h) = 8 cm

We know that area of trapezium is $\frac{1}{2} \times$ (sum of parallel sides) $\times$ height

Therefore Area of trapezium = $\frac{1}{2} \times (14 + 18) \times 8 = 128\ cm^2$.