Exercise 18B

Q1.

Answer:

$$\begin{aligned}\text{Area of quadrilateral ABCD} &= (\text{Area of } \triangle \text{ADC}) + (\text{Area of } \triangle \text{ACB})\\ &= \left(\tfrac{1}{2} \times \text{AC} \times \text{DM}\right) + \left(\tfrac{1}{2} \times \text{AC} \times \text{BL}\right)\\ &= \left[\left(\tfrac{1}{2} \times 24 \times 7\right) + \left(\tfrac{1}{2} \times 24 \times 8\right)\right] \text{ cm}^2\\ &= (84 + 96) \text{ cm}^2\\ &= 180 \text{ cm}^2\end{aligned}$$

Hence, the area of the quadrilateral is 180 cm^2.

Q2.

Answer:

$$\begin{aligned}\text{Area of quadrilateral ABCD} &= (\text{Area of } \triangle \text{ABD}) + (\text{Area of } \triangle \text{BCD})\\ &= \left(\tfrac{1}{2} \times \text{BD} \times \text{AL}\right) + \left(\tfrac{1}{2} \times \text{BD} \times \text{CM}\right)\\ &= \left[\left(\tfrac{1}{2} \times 36 \times 19\right) + \left(\tfrac{1}{2} \times 36 \times 11\right)\right] \text{ m}^2\\ &= (342 + 198) \text{ m}^2\\ &= 540 \text{ m}^2\end{aligned}$$

Hence, the area of the field is 540 m^2.

Q3.

Answer:

Area of pentagon ABCDE $= (\text{Area of } \triangle \text{AEN}) + (\text{Area of trapezium EDMN})$
$+ (\text{Area of } \triangle \text{DMC}) + (\text{Area of } \triangle \text{ACB})$

$= \left(\tfrac{1}{2} \times \text{AN} \times \text{EN}\right) + \left(\tfrac{1}{2} \times (\text{EN} + \text{DM}) \times \text{NM}\right) + \left(\tfrac{1}{2} \times \text{MC} \times \text{DM}\right) + \left(\tfrac{1}{2} \times \text{AC} \times \text{BL}\right)$
$= \left(\tfrac{1}{2} \times \text{AN} \times \text{EN}\right) + \left(\tfrac{1}{2} \times (\text{EN} + \text{DM}) \times (\text{AM} - \text{AN})\right) + \left(\tfrac{1}{2} \times (\text{AC} - \text{AM}) \times \text{DM}\right)$
$+ \left(\tfrac{1}{2} \times \text{AC} \times \text{BL}\right)$
$= \left[\left(\tfrac{1}{2} \times 6 \times 9\right) + \left(\tfrac{1}{2} \times (9 + 12) \times (14 - 6)\right) + \left(\tfrac{1}{2} \times (18 - 14) \times 12\right) + \left(\tfrac{1}{2} \times 18 \times 4\right)\right]$
cm^2
$= (27 + 84 + 24 + 36) \text{ cm}^2$
$= 171 \text{ cm}^2$

Hence, the area of the given pentagon is 171 cm^2.

Q4.

Answer :

Area of hexagon ABCDEF $=$ (Area of Δ AFP) $+$ (Area of trapezium FENP) $+$ (Area of Δ ALB)

$$= \left(\tfrac{1}{2} \times AP \times FP\right) + \left(\tfrac{1}{2} \times (FP + EN) \times PN\right) + \left(\tfrac{1}{2} \times ND \times EN\right) + \left(\tfrac{1}{2} \times MD \times CM\right)$$
$$+ \left(\tfrac{1}{2} \times (CM + BL) \times LM\right) + \left(\tfrac{1}{2} \times AL \times BL\right)$$
$$= \left(\tfrac{1}{2} \times AP \times FP\right) + \left(\tfrac{1}{2} \times (FP + EN) \times (PL + LN)\right) + \left(\tfrac{1}{2} \times (NM + MD) \times CM\right)$$
$$+ \left(\tfrac{1}{2} \times MD \times CM\right) + \left(\tfrac{1}{2} \times (CM + BL) \times (LN + NM)\right) + \left(\tfrac{1}{2} \times (AP + PL) \times BL\right)$$
$$=$$
$$\left[\left(\tfrac{1}{2} \times 6 \times 8\right) + \left(\tfrac{1}{2} \times (8 + 12) \times (2 + 8)\right) + \left(\tfrac{1}{2} \times (2 + 3) \times 12\right) + \left(\tfrac{1}{2} \times 3 \times 6\right)\right.$$
$$\left. + \left(\tfrac{1}{2} \times (6 + 8) \times (8 + 2)\right) + \left(\tfrac{1}{2} \times (6 + 2) \times 8\right)\right] \text{ cm}^2$$
$$= (24 + 100 + 30 + 9 + 70 + 32) \text{ cm}^2$$
$$= 265 \text{ cm}^2$$

Hence, the area of the hexagon is 265 cm^2.

Q5.

Answer :

Area of pentagon ABCDE $=$ (Area of Δ ABC) $+$ (Area of Δ ACD) $+$ (Area of Δ ADE)

$$= \left(\tfrac{1}{2} \times AC \times BL\right) + \left(\tfrac{1}{2} \times AD \times CM\right) + \left(\tfrac{1}{2} \times AD \times EM\right)$$
$$= \left[\left(\tfrac{1}{2} \times 10 \times 3\right) + \left(\tfrac{1}{2} \times 12 \times 7\right) + \left(\tfrac{1}{2} \times 12 \times 5\right)\right] \text{ cm}^2$$
$$= (15 + 42 + 30) \text{ cm}^2$$
$$= 87 \text{ cm}^2$$

Hence, the area of the pentagon is 87 cm^2.

Q6.

Answer :

Area enclosed by the given figure $=$ (Area of trapezium FEDC) $+$ (Area of square ABCF)

$$= \left[\left\{\tfrac{1}{2} \times (6 + 20) \times 8\right\} + (20 \times 20)\right] \text{cm}^2$$
$$= (104 + 400) \text{cm}^2$$
$$= 504 \text{ cm}^2$$

Hence, the area enclosed by the figure is 504 cm^2.

Q7.

Answer :

We will find the length of AC.

From the right triangles ABC and HGF, we have :

$$AC^2 = HF^2 = \left\{(5)^2 - (4)^2\right\} \text{ cm}$$
$$= (25 - 16) cm$$
$$= 9\ cm$$

$$AC = HF = \sqrt{9}\ cm$$
$$= 3\ cm$$

Area of the given figure ABCDEFGH $=$ (Area of rectangle ADEH) $+$ (Area of Δ ABC) $+$ (Area of Δ HGF)

$$= (\text{Area of rectangle ADEH}) + 2(\text{Area of } \Delta \text{ ABC})$$
$$= (AD \times DE) + 2(\text{Area of } \Delta \text{ ABC})$$
$$= \{(AC + CD) \times DE\} + 2\left(\tfrac{1}{2} \times BC \times AC\right)$$
$$= \{(3 + 4) \times 8\} + 2\left(\tfrac{1}{2} \times 4 \times 3\right) \text{ cm}^2$$
$$= (56 + 12) \text{ cm}$$
$$= 68 \text{ cm}^2$$

Hence, the area of the given figure is 68 cm^2.

Q8.

Answer :

Let $\mathrm{AL} = \mathrm{DM} = \mathrm{x\ cm}$

$\mathrm{LM} = \mathrm{BC} = 13\ \mathrm{cm}$

$\therefore\ x + 13 + x = 23$

$\Rightarrow 2x + 13 = 23$

$\Rightarrow 2x = (23 - 13)$

$\Rightarrow 2x = 10$

$\Rightarrow x = 5$

$\therefore\ \mathrm{AL} = 5\ \mathrm{cm}$

From the right $\Delta\,\mathrm{AFL}$, we have :

$FL^2 = AF^2 - AL^2$

$\Rightarrow FL^2 = \left\{\left(13^2\right) - (5)^2\right\}$

$\Rightarrow FL^2 = (169 - 25)$

$\Rightarrow FL^2 = 144$

$\Rightarrow FL = \sqrt{144}$

$\Rightarrow FL = 12\ cm$

$\therefore\ \mathrm{FL} = \mathrm{BL} = 12\ \mathrm{cm}$

Area of a regular hexagon $=$ ($Area$ of the trapezium ADEF)

Area of a regular hexagon $=$ ($Area$ of the trapezium ADEF)
$+$ ($Area$ of the trapezium ABCD)

$$= 2(Area\ of\ trapezium\ ADEF)$$

$$= 2\left\{\tfrac{1}{2} \times (AD + EF) \times FL\right\}$$

$$= 2\left\{\tfrac{1}{2} \times (23 + 13) \times 12\right\} cm^2$$

$$= 2\left(\tfrac{1}{2} \times 36 \times 12\right) cm^2$$

$$= 432\ cm^2$$

Hence, the area of the given regular hexagon is $432\ \mathrm{cm}^2$.

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