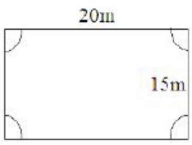
Mensuration-I area of a trapezium and a polygon Ex 20.1 Q4

Answer :

It is given that the length of the rectangular piece is 20 m and its width is 15 m.
And, from each corner a quadrant each of radius 3.5 m has been cut out.
A rough figure for this is given below :



$\therefore$ Area of the remaining part $=$ Area of the rectangular piece
$-\left(4 \times \text{Area of a quadrant of radius } 3.5\text{m}\right)$

Now, area of the rectangular piece $= 20 \times 15 = 300 \text{ m}^2$

And, area of a quadrant with radius 3.5 m $= \frac{1}{4}\pi r^2 = \frac{1}{4} \times \frac{22}{7} \times \left(3.5\right)^2$

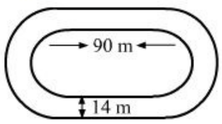
$= \frac{1}{4} \times \frac{22}{7} \times 3.5 \times 3.5$

$= 9.625 \text{ m}^2$

$\therefore$ Area of the remaining part $= 300 - \left(4 \times 9.625\right) = 261.5 \text{ m}^2$

Mensuration-I area of a trapezium and a polygon Ex 20.1 Q5

Answer :



It is given that the inside perimeter of the running track is 400 m. It means the length of the inner track is 400 m.
Let r be the radius of the inner semicircles.
Observe : Perimeter of the inner track $=$ Length of two straight portions of 90 m $+$ Length of two semicircles

$\therefore 400 = \left(2 \times 90\right) + \left(2 \times \text{Perimiter of a semicircle}\right)$

$400 = 180 + \left(2 \times \frac{22}{7} \times r\right)$

$400 - 180 = \left(\frac{44}{7} \times r\right)$

$\frac{44}{7} \times r = 220$

$r = \frac{220 \times 7}{44} = 35$ m

$\therefore$ Width of the inner track $= 2r = 2 \times 35 = 70$ m

Since the track is 14 m wide at all places, so the width of the outer track : $70 + \left(2 \times 14\right) = 98$ m

$\therefore$ Radius of the outer track semicircles $= \frac{98}{2} = 49$ m

Area of the outer track $= \Big($Area of the rectangular portion with sides 90 m and 98 m$\Big) + \Big(2 \times$ Area of two semicircles with radius 49 m$\Big)$

$= \left(98 \times 90\right) + \left(2 \times \frac{1}{2} \times \frac{22}{7} \times 49^2\right)$

$= \left(8820\right) + \left(7546\right)$

$= 16366\ \text{m}^2$

And, area of the inner track $= \Big($Area of the rectangular portion with sides 90 m and 70 m$\Big) + \Big(2 \times$ Area of the semicircle with radius 35 m$)$

$= \left(70 \times 90\right) + \left(2 \times \frac{1}{2} \times \frac{22}{7} \times 35^2\right)$

$= \left(6300\right) + \left(3850\right)$

$= 10150\ \text{m}^2$

$\therefore$ Area of the running track $=$ Area of the outer track $-$ Area of the inner track

$= 16366 - 10150$

$= 6216\ \text{m}^2$

And, length of the outer track $= \Big(2 \times$ length of the straight portion$\Big)$

$+ \Big(2 \times$ perimeter of the semicircles with radius 49 m$)$

$$= \left(2 \times 90\right) + \left(2 \times \frac{22}{7} \times 49\right)$$

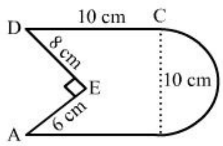
$$= 180 + 308$$

$$= 488\ \text{m}$$

Mensuration-I area of a trapezium and a polygon Ex 20.1 Q6

Answer :

The given figure is:



Construction : Connect A to D.

Then, we have : Area of the given figure $= \Big($Area of rectangle ABCD $+$ Area of the semicircle$\Big) - \Big($Area of $\triangle$ AED$\Big)$.

$\therefore$ Total area of the figure $= \Big($Area of rectangle with sides 10 cm and 10 cm$\Big)$

$+ \Big($Area of semicircle with radius $= \frac{10}{2} = 5$ cm$\Big)$

$- \Big($Area of triangle AED with base 6 cm and height 8 cm$)$

$= \left(10 \times 10\right) + \left(\frac{1}{2} \times \frac{22}{7} \times 5^2\right) - \left(\frac{1}{2} \times 6 \times 8\right)$

$= 100 + 39.3 - 24$

$= 115.3\ \text{cm}^2$

*********** END **********