

Questions

Geometry

1. The dimensions of a solid iron cuboid are $4.4\text{ m} \times 2.6\text{ m} \times 1.0\text{ m}$. It is melted and recast into a hollow cylindrical pipe of 30 cm inner radius and thickness 5 cm. Find the length of the pipe.
2. Prove that the lengths of two tangents drawn from an external point to a circle are equal.
3. In the given figure, XY and $X'Y'$ are two parallel tangents to a circle with centre O and another tangent AB with point of contact C , is intersecting XY at A and $X'Y'$ at B . Prove that $\angle AOB = 90^\circ$.

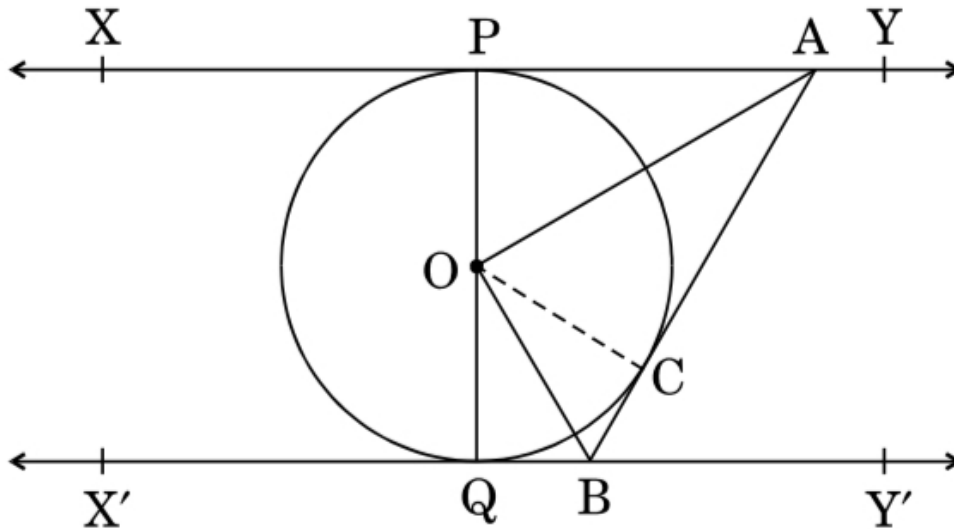


Figure 1

4. Construct a triangle ABC with side $BC = 7$ cm, $\angle B = 45^\circ$, $\angle A = 105^\circ$. Then construct another triangle whose sides are $\frac{3}{4}$ times the corresponding sides of the $\triangle ABC$.
5. If the points $A(k + 1, 2k)$, $B(3k, 2k + 3)$ and $C(5k - 1, 5k)$ are collinear, then find the value of k .
6. In the given figure, $ABCD$ is a rectangle of dimensions 21 cm \times 14 cm. A semicircle is drawn with BC as diameter. Find the area and the perimeter of the shaded region in the figure.

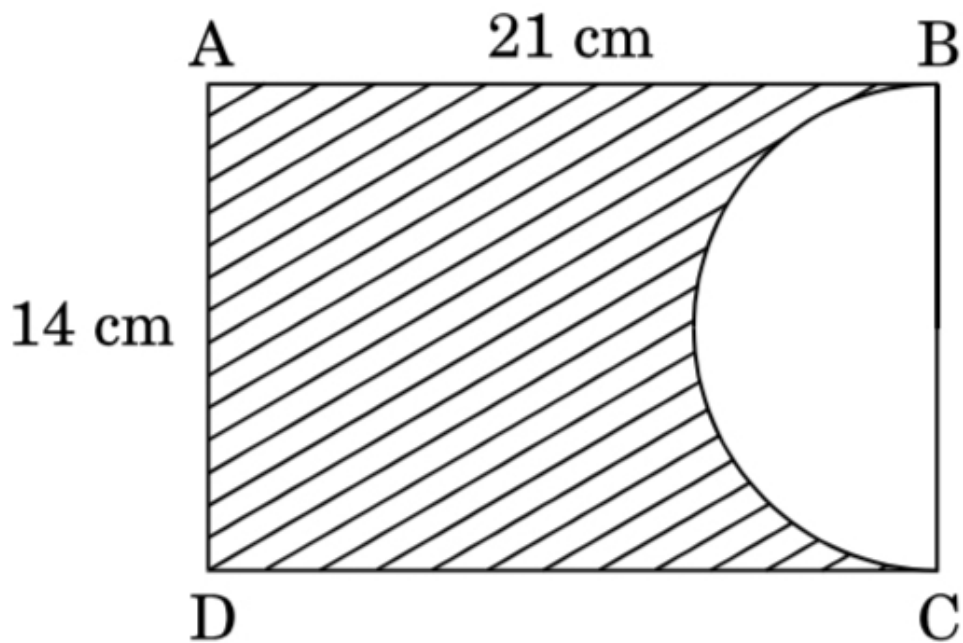


Figure 2

7. In a rain-water harvesting system, the rain-water from a roof of $22\text{ m} \times 20\text{ m}$ drains into a cylindrical tank having diameter of base 2 m and height 3.5 m . If the tank is full, find the rainfall in cm . Write your views on water conservation.

Algebraic equations

1. Solve for x : $\frac{1}{x+1} + \frac{3}{5x+1} = \frac{5}{x+4}$, $x \neq -1, -\frac{1}{5}, -4$

Work and Time

1. Two taps running together can fill a tank in $3\frac{1}{13}$ hours. If one tap takes 3 hours more than the other to fill the tank, then how much time will each tap take to fill the tank?

Sequence and Series

1. If the ratio of the sum of the first n terms of two A.Ps is $(7n + 1) : (4n + 27)$, then find the ratio of their 9^{th} terms.

Trigonometry

1. An aeroplane is flying at a height of 300 m above the ground. Flying at this height, the angles of depression from the aeroplane of two points on both banks of a river in opposite directions are 45° and 60° respectively. Find the width of the river. $[Use \sqrt{3} = 1.732]$

Probability

1. Two different dice are thrown together. Find the probability that the numbers obtained have
 - (a) an even sum, and
 - (b) an even product.