

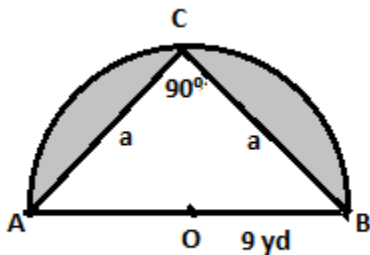
Answer to Question #84565 – Math – Geometry

Question

A triangle is placed in a semicircle with a radius of 9yd, as shown below. Find the area of the shaded region. Use the value 3.14 for π , and do not round your answer. Be sure to include the correct unit in your answer.

Solution

The shaded figure is:



Any triangle inscribed inside a semicircle must be a right triangle.

ABC is a right angled triangle inscribed in the semicircle, with sides $AC = BC = a$

AB is the hypotenuse of the triangle ABC.

The radius of the circle is given as 9 yd and O is the centre of the semicircle.

The diameter of the semicircle is $AB = 2 \times OB = 2 \times 9 = 18$ yd

Now by Pythagoras theorem, in the right triangle ABC we have:

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

$$a^2 + a^2 = 18^2$$

$$2a^2 = 18^2$$

$$a^2 = \frac{18^2}{2}$$

$$a^2 = 18 \times 9$$

$$a = \sqrt{2 \times 9 \times 9}$$

$$a = 9\sqrt{2}$$

Then the area of the triangle ABC is:

$$\text{Area} = \frac{1}{2} \times \text{Base} \times \text{Height}$$

$$\text{Area} = \frac{1}{2} \times 9\sqrt{2} \times 9\sqrt{2}$$

$$\text{Area} = 81 \text{ yd}^2$$

We see that the area of the circle is:

$$A = \pi \times \text{Radius}^2 = \pi \times 9^2 = 81\pi$$

Therefore the area of the semicircle is:

$$= \frac{1}{2} \times 81\pi = 40.5\pi = 40.5 \times 3.14 = 127.17 \text{ yd}^2 \quad (\pi = 3.14 \text{ given})$$

We see that,

Area of the shaded region

$$= \text{Area of semicircle} - \text{Area of triangle ABC}$$

$$= 127.17 - 81$$

$$= 46.17 \text{ yd}^2$$

Hence the area of the shaded region is 46.17 sq yd.

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