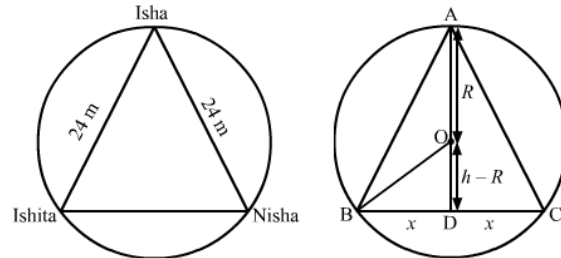




Circles Ex 16.3 Q1

Answer :

Using the data given in the question we can draw a diagram that looks like fig (1).



From the figure we see that it is an isosceles triangle that has been circumscribed in a circle of radius $R = 20$ m.

The equal sides of the isosceles triangle measure 24 m in length. The length of the base of the isosceles triangle is what we are required to find out.

Since it is an isosceles triangle the perpendicular dropped from the vertex A to the base will pass through the circumcentre of the triangle. Let ' h ' be the height of the triangle.

Since the triangle has been circumscribed by a circle of radius ' R ' the length of the distances from ' O ' to any of the three persons would be ' R '.

Let the positions of the persons Isha, Ishita and Nisha be replaced by ' A ', ' B ' and ' C ' respectively.

And let the length of the unknown base be, $BC = 2x$ m.

This is shown in the fig (2).

Now, consider the triangle $\triangle BOD$, we have

$$\begin{aligned} R^2 &= (h - R)^2 + x^2 \\ R^2 &= h^2 - 2hR + R^2 + x^2 \\ 2hR &= h^2 + x^2 \\ R &= \frac{h^2 + x^2}{2h} \end{aligned}$$

At the same time consider $\triangle ABD$, we have

$$\begin{aligned} h^2 + x^2 &= 24^2 \\ h^2 + x^2 &= 576 \end{aligned}$$

Substitute this value in equation we got for ' R ', we get

$$\begin{aligned} R &= \frac{h^2 + x^2}{2h} \\ &= \frac{576}{2h} \\ h &= \frac{576}{2R} \\ &= \frac{576}{(2)(20)} \\ &= 14.4 \end{aligned}$$

Now we have got the value of the height of the triangle as $h = 14.4$ m.

Substituting the value of h in the below equation,

$$h^2 + x^2 = 24^2$$

$$x^2 = 576 - h^2$$

$$x^2 = 576 - (14.4)^2$$

$$x^2 = 576 - 207.36$$

$$x^2 = 368.64$$

$$x = 19.2$$

Now we have the value of $x = 19.2$ m

We need the value of BC

$$BC = 2x$$

$$= 2(19.2)$$

$$= 38.4$$

Hence, the distance between Ishita and Nisha is 38.4 m .

***** END *****