The cable of a uniformly loaded suspension bridge hangs in the form of a parabola.

The road way which is horizontal and 100m long is supported by vertical wires attached

to the cable, the longest wire being 30m and the shortest being 6m. Find the length of

a supporting wire attached to the road way 18m from the middle.
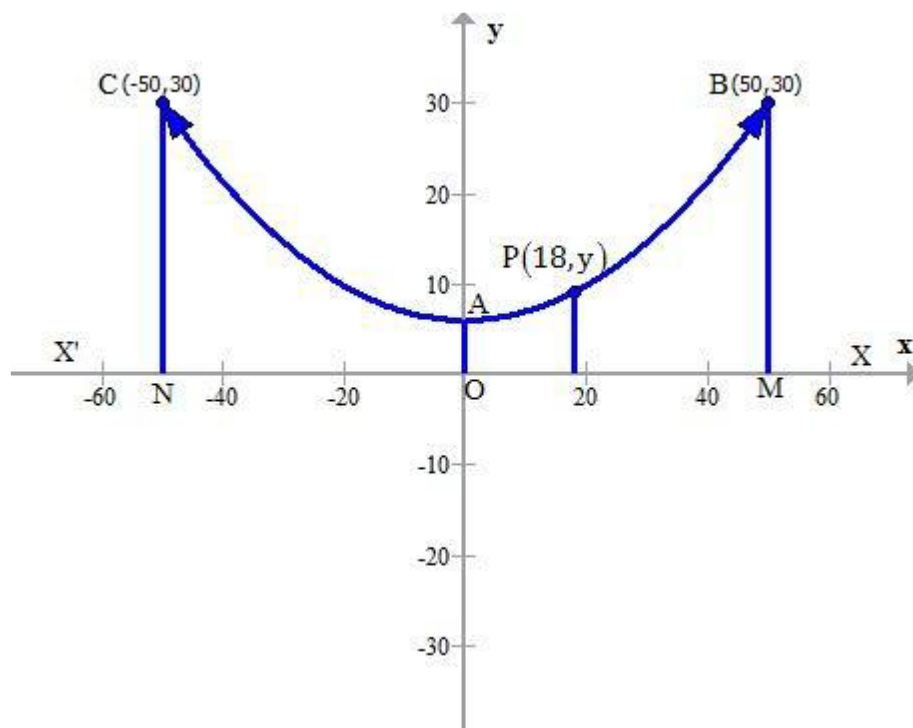
**Solution**



*Fig.1*

The equation of parabola is given by $y = ax^2 + bx + c$ (see Fig.1).

So, on the basis of symmetry obtain that $b = 0$. Plug in coordinates of point A into

equation and obtain that $y(0) = 6 \Rightarrow c = 6$

Plug in coordinates of points N and M into equation and obtain that

$y(\pm 50) = 30 \Rightarrow a \cdot (\pm 50)^2 + 6 = 30 \Rightarrow a = 24 / 2500$

Then the equation of the parabola is $y = \dfrac{24}{2500}x^2 + 6$

So, $y(18) - 0 = \dfrac{24}{2500} \cdot 18^2 + 6 - 0 = 9.11m$

**Answer:** 9.11m