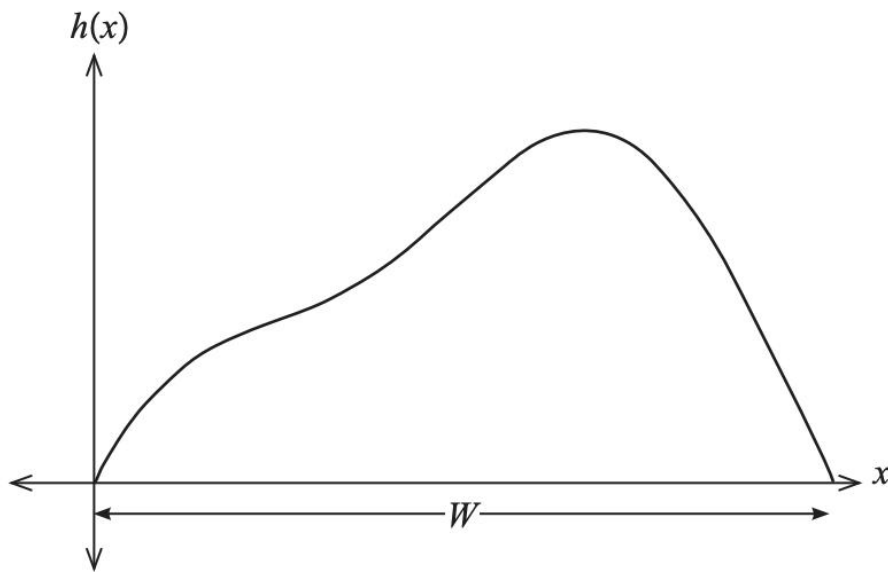


Question 9**(8 marks)**

The Interesting Architecture company has designed a building with a constant cross-section shown in the figure below.



With reference to the figure, the height $h(x)$ of the building at a point x along its width is given by

$$h(x) = 4 \sin\left(x - \frac{3\pi}{2}\right) - x^2 + 3\pi x - 4, \text{ where } h \text{ and } 0 \leq x \leq W \text{ are measured in metres.}$$

- (a) Determine the width W of the building to the nearest centimetre. (2 marks)
- (b) Determine $h'(x)$. (1 mark)
- (c) Determine, to the nearest centimetre, the value of x at which the height of the building is maximum and state this maximum height. (2 marks)

- (d) An adventure company allows tourists to climb from the ground on the left of the building, then along the outside of the building to the top. The company installs a platform that allows climbers to rest on their way up to the top. The platform is located on the second half of the climb, at the point where it is the steepest. How high off the ground, to the nearest centimetre, is it positioned? (3 marks)