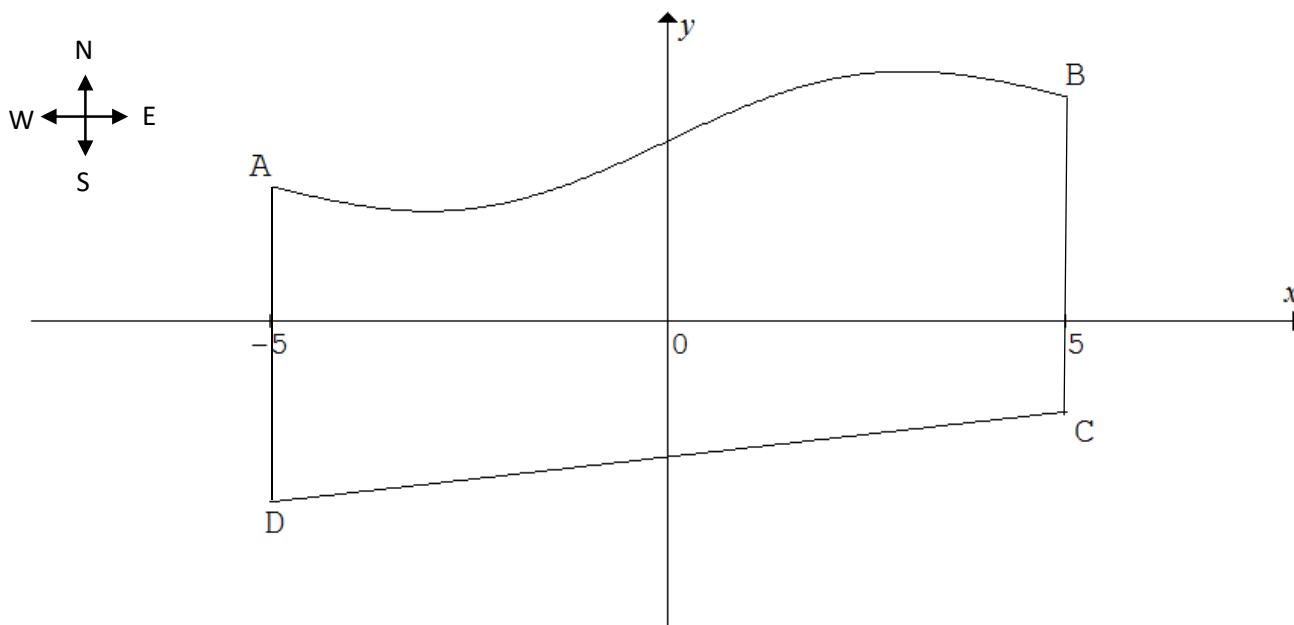


2018 SAC 2 PREP 2

Question 1 (13 marks)

The diagram shows a birds-eye view of a swimming pool ABCD at a hotel resort.

The x and y axes are shown, and are in the directions of east-west and north-south respectively. Dimensions are measured in metres. The length of the pool is 10 metres and the edges AD and BC are both 7 metres and run north-south.



The function connecting the points A and B is given by

$$f : [-5, 5] \rightarrow \mathbb{R}, f(x) = 4 + \frac{x}{5} + \sin\left(\frac{\pi x}{5}\right)$$

- a. Write down the co-ordinates of the points A and B. 1 mark

- b. Find co-ordinates of the northern most point of the swimming pool, giving your answer correct to three decimal places. 3 marks

- c. The swimming pool has a straight line segment joining the points C and D.

Write down the function $g(x)$ which defines this straight line segment. 1 mark

d. Find the maximum and minimum widths, measured north-south of the swimming pool.

3 marks

e. Write down a definite integral which gives the total cross-sectional area of the swimming pool.

1 mark

f. The swimming pool is filled with water to a constant depth of 1.5 metres.

Find the volume of water in the swimming pool in cubic metres.

2 marks

g. Find the average width of the swimming pool.

2 marks