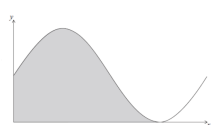


IB Calculus Problem 012

Let $f(x) = 6 + 6\sin x$.



if f is given below.

scale.

The shaded region is bounded by the curve of f , the x -axis, and the y -axis.

A. Solve, for $0 \leq x \leq 2\pi$

i. $6 + 6\sin x = 6$

ii. $6 + 6\sin x = 0$

B. Write down the exact value of the x -intercept of f , for $0 \leq x \leq 2\pi$.

C. The area of the shaded region is k . Find the value of k , giving your answer in terms of π .

Let $g(x) = 6 + 6\sin(x - \frac{\pi}{2})$. The graph of f is transformed into that of g .

D. Give a full geometric description of this transformation.

E. Given that $\int_p^{p + \frac{3\pi}{2}} g(x) dx = k$ and $0 \leq p < 2\pi$, find the two values of p .