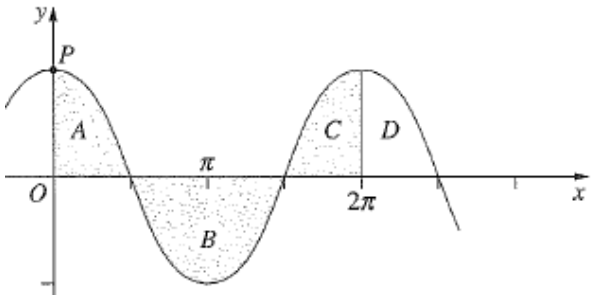
11 **6c** The diagram shows the graph $y = 2\cos x$.



(i) State the coordinates of P. **1**

(ii) Evaluate the integral **2**

$$\int_0^{\frac{\pi}{2}} 2\cos x \, dx.$$

(iii) Indicate which area in the diagram, A, B, C or D, is represented by the integral $\int_{\frac{3\pi}{2}}^{2\pi} 2\cos x \, dx$. **1**

(iii) Using parts (ii) and (iii), or otherwise, find the area of the region bounded by the curve $y = 2\cos x$ and the x-axis, between $x = 0$ and $x = 2\pi$. **1**

(v) Using the parts above, write down the value of $\int_{\frac{\pi}{2}}^{2\pi} 2\cos x \, dx$. **1**

(i) Subs $x = 0$ in $y = 2\cos x$

$y = 2\cos 0$

$= 2 \times 1$

$= 2 \quad \therefore P(0, 2)$

(ii) $\int_0^{\frac{\pi}{2}} 2\cos x \, dx = [2\sin x]_0^{\frac{\pi}{2}}$

$= 2(\sin\frac{\pi}{2} - \sin 0)$

$= 2(1 - 0)$

$= 2$

(iii) C

(iv) Area A = Area C

Area B is twice Area A

$\therefore$ Total area = 4 × Area A

$= 4 \times 2$

$= 8$

The area is 8 units^2

(v) Area B is 4 units^2 below x-axis,

Area C is 2 units^2.

$\therefore$ value of integral $= -4 + 2$

$= -2$

State Mean:
0.85/1
1.54/2
0.87/1
0.65/1
0.26/1

* These solutions have been provided by *projectmaths* and are not supplied or endorsed by the Board of Studies

Board of Studies: Notes from the Marking Centre

(i) Generally done well.

(ii) A common error was $-2\sin x$ as the primitive, indicating that the table of standard integrals was not consulted.

(iii) Generally done well.

(iv) Many responses showed three separate areas using integration rather than connecting parts (ii), (iii) and (iv). A number of candidates gave the area as zero.

(v) A common error was to find the area between $x = \frac{\pi}{2}$ and $x = 2\pi$ rather than the value of the integral over this domain, demonstrating a poor understanding of the difference between finding an area and evaluating an integral. The instruction 'Using the parts above' was completely overlooked by many.

Source: **http://www.boardofstudies.nsw.edu.au/hsc_exams/**