

LC 2013 (SET D): PAPER 1

QUESTION 6 (25 MARKS)

Question 6 (a)

$$y = \sin x$$

$$x = 0 : y = \sin 0 = 0$$

$$x = \frac{\pi}{6} : y = \sin\left(\frac{\pi}{6}\right) = 0.500 \leftarrow \text{Use your calculator in radian mode.}$$

x	0	$\frac{\pi}{6}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{5\pi}{6}$	π
y	0	0.500	0.866	1.000	0.866	0.500	0

MARKING SCHEME NOTES

Question 6 (a) [Scale 5C* (0, 2, 4, 5)]

2: • One or two correct entries

4: • Three to six correct entries

Question 6 (b)

$$h = \frac{\pi}{6}$$

$$A = \frac{1}{2} \times \frac{\pi}{6} [0 + 0 + 2(0.5 + 0.866 + 1 + 0.866 + 0.5)]$$

$$= 1.95407$$

MARKING SCHEME NOTES

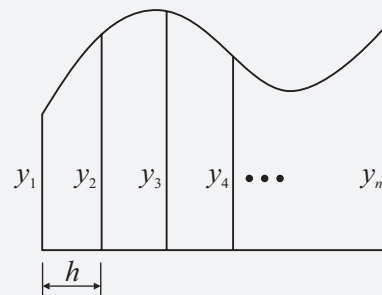
Question 6 (b) [Scale 10C (0, 3, 7, 10)]

3: • Correct formula.
• Substitutes in the formula, values from the domain of the function

7: • Correct substitution in the formula and stops

• Incorrect $\frac{h}{2}$ and finishes correctly

FORMULAE AND TABLES BOOK Area approximations [page 12]



Trapezoidal Rule:

$$A \approx \frac{h}{2} [y_1 + y_n + 2(y_2 + y_3 + y_4 + \dots + y_{n-1})]$$

Question 6 (c)

$$A = \int_0^{\pi} \sin x \, dx = [-\cos x]_0^{\pi}$$

$$= -[\cos \pi - \cos 0]$$

$$= -[-1 - 1]$$

$$= 2$$

FORMULAE AND TABLES BOOK

Calculus: Integrals [page 26]

$$\int \sin x \, dx = -\cos x + c$$

$$\int \sin(ax + b) \, dx = -\frac{1}{a} \cos(ax + b) + c$$

MARKING SCHEME NOTES

Question 6 (c) [Scale 5C (0, 2, 4, 5)]

- 2: • Correct limits
 • ‘c’ appears and no other correct work
- 4: • Correct integration

Question 6 (d)

FORMULA: % ERRORS

Absolute error in a quantity = |Measured value of quantity – Accepted value of quantity|

Percentage error in a quantity = $\frac{\text{Absolute error in quantity}}{\text{Accepted value of quantity}} \times 100\%$

$$\% \text{ error} = \frac{2 - 1.95407}{2} \times 100\% = 2.2965\% \approx 2.3\%$$

MARKING SCHEME NOTES

Question 6 (d) [Scale 5B (0, 2, 5)]

- 2: • Any correct relevant step