QUESTION 6 (25 MARKS)

Question 6 (a)

$y = \sin x$

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

$x = \dfrac{\pi}{6} : y = \sin\left(\dfrac{\pi}{6}\right) = 0 \cdot 500 \leftarrow$ Use your calculator in radian mode.

x	0	$\dfrac{\pi}{6}$	$\dfrac{\pi}{3}$	$\dfrac{\pi}{2}$	$\dfrac{2\pi}{3}$	$\dfrac{5\pi}{6}$	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)

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

$A = \dfrac{1}{2} \times \dfrac{\pi}{6}[0 + 0 + 2(0 \cdot 5 + 0 \cdot 866 + 1 + 0 \cdot 866 + 0 \cdot 5)]$

$= 1 \cdot 95407$

MARKING SCHEME NOTES
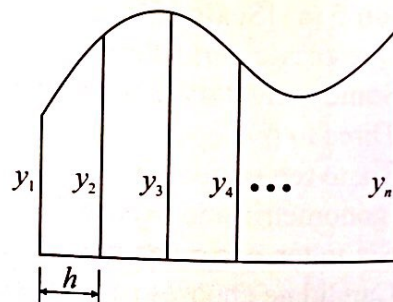**Question 6 (b) [Scale 10C (0, 3, 7, 10)]**
3: • Correct formula.
• Substitutes in the formula, values from the domain of the function
7: • Correct substitution in the formula and stops
• Incorrect $\frac{h}{2}$ and finishes correctly

FORMULAE AND TABLES BOOK
Area approximations [page 12]

Trapezoidal Rule:

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

Question 6 (c)

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

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

$= -[-1 - 1]$

$= 2$

FORMULAE AND TABLES BOOK
Calculus: Integrals [page 26]

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

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

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

$\% \text{ error} = \dfrac{2 - 1 \cdot 95407}{2} \times 100\% = 2 \cdot 2965\% \approx 2 \cdot 3\%$

MARKING SCHEME NOTES
Question 6 (d) [Scale 5B (0, 2, 5)]
2: • Any correct relevant step