(5) $$\int_0^{\pi/7} \sin 5x \, dx = \left[-\frac{1}{5} \cos 5x \right]_0^{\pi/7}$$

$$= \left(\frac{1}{5} \cos \frac{5\pi}{7} \right) - \left(-\frac{1}{5} \cos 0 \right)$$

$$= 0.12469\ldots + \frac{1}{5} \times 1$$

$$= 0.32469\ldots$$

$$\approx 0.325$$ ■

Question	Generic scheme	Illustrative scheme	Max mark
5.	•1 integrate •2 substitute limits •3 evaluate integral	•1 $-\frac{1}{5}\cos 5x$ •2 $\left(-\frac{1}{5}\cos\left(5\times\frac{\pi}{7}\right)\right)-\left(-\frac{1}{5}\cos(5\times 0)\right)$ •3 0.3246…	**3**

Notes:

1. For candidates who differentiate throughout, make no attempt to integrate, or use another invalid approach (for example $\cos 5x^2$) award 0/3.
2. Do not penalise the inclusion of '$+c$' or the continued appearance of the integral sign after integrating.
3. Accept $\left(-\frac{1}{5}\cos 5\left(\frac{\pi}{7}\right)\right)-\left(-\frac{1}{5}\cos 5(0)\right)$ for •2.
4. •3 is only available where candidates have considered both limits within a trigonometric function.

Commonly Observed Responses:

Candidate A – integrated in part

$-\cos 5x$ •1 ✗

$-\cos\left(\frac{5\pi}{7}\right)-\left(-\cos(5\times 0)\right)$ •2 ✓1

1.623… •3 ✓1

Candidate B – insufficient evidence of integration

$\cos 5x$ •1 ✗

$\cos\left(\frac{5\pi}{7}\right)-\left(\cos(5\times 0)\right)$ •2 ✓2

−1.623 •3 ✓2

Candidate C – insufficient evidence of integration

$\frac{1}{5}\sin 5x$ •1 ✗

$\frac{1}{5}\sin\frac{5\pi}{7}-\frac{1}{5}\sin 0$ •2 ✓2

0.156… •3 ✓2

Candidate D – working in degrees before integrating

$\int_0^{25.7\ldots}\sin 5x\,dx$ •1 ✗

$-\frac{1}{5}\cos 5x$

$\left(-\frac{1}{5}\cos 128.57\ldots\right)-\left(-\frac{1}{5}\cos 0\right)$ •2 ✓1

0.3246… •3 ✓1