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4 **(a)** Given that $y = 4\sin 2x \cos 2x$, find the value of $\frac{dy}{dx}$ when $x = \frac{\pi}{6}$. [4]

(b) A curve has equation $y = 4\sin 2x \cos 2x$.

The normal to the curve at the point where $x = \frac{\pi}{6}$ meets the x-axis at the point P.

Find the exact coordinates of P. [5]

5 **(a)** A 4-digit number is to be formed using the digits 0, 2, 4, 5, 6 and 8.
The 4-digit number must **not** start with 0.
Any digit may be used at most once in the 4-digit number.

(i) Find how many 4-digit numbers can be formed. [1]

(ii) Find how many even 4-digit numbers can be formed. [2]

(iii) Find how many 4-digit numbers that are divisible by 5 can be formed. [2]

(b) Solve the equation $(n+1) \times {}^{n+1}\mathrm{C}_{12} = 33(n-10) \times {}^{n}\mathrm{C}_{10}$. [3]

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