Past Paper Questions – Pack 2

1.

(i) Show that the equation $2\sin x = \dfrac{4\cos x - 1}{\tan x}$ can be expressed in the form

$$6\cos^2 x - \cos x - 2 = 0.$$ **[3]**

(ii) Hence solve the equation $2\sin x = \dfrac{4\cos x - 1}{\tan x}$, giving all values of x between 0° and 360°. **[4]**

2.

Solve each of the following equations, for $0° \leqslant x \leqslant 360°$.

(i) $\sin\frac{1}{2}x = 0.8$ **[3]**

(ii) $\sin x = 3\cos x$ **[3]**

3.

(i) Show that the equation

$$\sin x - \cos x = \frac{6\cos x}{\tan x}$$

can be expressed in the form

$$\tan^2 x - \tan x - 6 = 0.$$ **[2]**

(ii) Hence solve the equation $\sin x - \cos x = \dfrac{6\cos x}{\tan x}$ for $0° \leqslant x \leqslant 360°$. **[4]**

4.

One of the terms in the binomial expansion of $(4 + ax)^6$ is $160x^3$.

(i) Find the value of a. **[4]**

(ii) Using this value of a, find the first two terms in the expansion of $(4 + ax)^6$ in ascending powers of x. **[2]**

5.

(i) Find and simplify the first three terms in the expansion of $(2 + 5x)^6$ in ascending powers of x. **[4]**

(ii) In the expansion of $(3 + cx)^2(2 + 5x)^6$, the coefficient of x is 4416. Find the value of c. **[3]**

6.

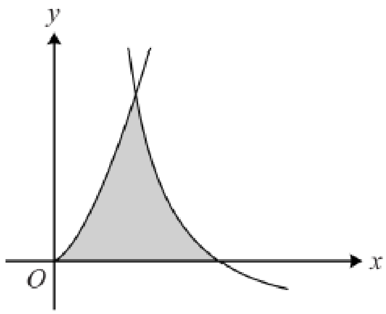
(i) Find the binomial expansion of $(2 + x)^5$, simplifying the terms. **[4]**

(ii) Hence find the coefficient of y^3 in the expansion of $(2 + 3y + y^2)^5$. **[3]**

7.

(a) Find $\int (x^2 + 4)(x - 6)\,dx$. **[3]**

(b)



The diagram shows the curve $y = 6x^{\frac{3}{2}}$ and part of the curve $y = \dfrac{8}{x^2} - 2$, which intersect at the point (1, 6). Use integration to find the area of the shaded region enclosed by the two curves and the x-axis. **[8]**

8.

The positive constant a is such that $\displaystyle\int_a^{2a} \frac{2x^3 - 5x^2 + 4}{x^2}\,dx = 0$.

(i) Show that $3a^3 - 5a^2 + 2 = 0$. **[6]**

(ii) Show that $a = 1$ is a root of $3a^3 - 5a^2 + 2 = 0$, and hence find the other possible value of a, giving your answer in simplified surd form. **[6]**

9.

(a) Find $\int (x^2 + 2)(2x - 3)\,dx$. **[3]**

(b) **(i)** Find, in terms of a, the value of $\int_1^a (6x^{-2} - 4x^{-3})\,dx$, where a is a constant greater than 1. **[4]**

(ii) Deduce the value of $\int_1^{\infty} (6x^{-2} - 4x^{-3})\,dx$. **[1]**
