Core Mathematics C1

Advanced Subsidiary

Practice Paper 1

Time: 1 hour 30 minutes

(1) (a) Simplify $\left(1+2\sqrt{a}\right)\left(2-\sqrt{a}\right)$ giving your answer in terms of a. *(3 marks)*

(b) Solve the equation $\left(1+2\sqrt{a}\right)\left(2-\sqrt{a}\right)=0$ *(4 marks)*

(2) Simplify fully $\left(25p^3q^{\frac{1}{2}}\right)^{-0.5}$ *(3 marks)*

(3) The line l passes through the points $A(-1,-1)$ and $B(5,p)$. The gradient of line l is -1.

(a) Find the value of p *(2 marks)*

(b) Line l crosses the x axis at the point C and the y axis at the point D. Find the area of the triangle DOC where O is the origin. *(6 marks)*

(4) (a) The sum of the first 10 terms of an arithmetic sequence is -95. Given the common difference of the sequence is -3 find the first term of the sequence. *(4 marks)*

(b) Find the 8th term of the sequence. *(2 marks)*

(5) The curve $y=\mathrm{f}(x)$ passes through the point $(2,20)$ and it's gradient function $\dfrac{dy}{dx}=3x^2+x+3$.

(a) Find $\mathrm{f}(x)$ *(6 marks)*

(b) Show that the gradient of $\mathrm{f}(x)$ is never negative. *(4 marks)*

(6) A sequence is defined by
$$a_{n+1}=2a_n-1,\ a\geq 1$$
$$a_1=3p$$

(a) Find an expression for a_2 and a_3 in terms of p. *(2 marks)*

(b) Given $\displaystyle\sum_{i=1}^{4}a_i=79$ find the value of p. *(4 marks)*

(7) $\mathrm{f}(x)=\dfrac{1}{3}x^3-x^2-8x+5$

(a) Draw the graph of $y=\mathrm{f}\,'(x)$ showing any points of intersection with the coordinate axis. *(4 marks)*

(b) Draw the graph of $y=2\mathrm{f}\,'(x)$ showing any points of intersection with the coordinate axis. *(2 marks)*

(c) Draw the graph of $y=-\mathrm{f}\,'(x)$ showing any points of intersection with the coordinate axis. *(2 marks)*

(8) Find the equation of the normal to the curve $y=\dfrac{2x+\sqrt{x}}{x^{0.5}}$ at the point where $x=4$ giving your answer in the form $ax+by+c=0$ where a,b and c are integers. *(6 marks)*

(9) (a) Solve the simultaneous equations
$$xy=6$$
$$x^2+y^2=13.$$
(8 marks)

(b) Draw the graph of $y=\dfrac{1}{x}$ stating the equations of any asymptotes. *(3 marks)*

(c) Hence draw the graph of $xy=6$ stating the equations of any asymptotes. *(2 marks)*

(10) (a) Given the line $y=2x-p$ is a tangent to the curve $y=x^2+4x-11$ find the value of p. *(5 marks)*

(b) Find the point where the line $y=2x-p$ meets the curve $y=x^2+4x-11$ *(3 marks)*

End of Questions