IYGB GCE

Core Mathematics C1

Advanced Subsidiary

Practice Paper U

Difficulty Rating: 3.8867/1.8927

Time: 2 hours

Calculators may NOT be used in this examination.

Information for Candidates

This practice paper follows the Edexcel Syllabus.
The standard booklet "Mathematical Formulae and Statistical Tables" may be used.
Full marks may be obtained for answers to ALL questions.
The marks for the parts of questions are shown in round brackets, e.g. **(2)**.
There are 8 questions in this question paper.
The total mark for this paper is 75.

Advice to Candidates

You must ensure that your answers to parts of questions are clearly labelled.
You must show sufficient working to make your methods clear to the Examiner.
Answers without working may not gain full credit.
The examiner may refuse to mark any parts of questions if deemed not to be legible.

Question 1

$$f(x) = 2x^2 - 8x + 14,\ x \in \mathbb{R}.$$

a) Express $f(x)$ in the form $a(x+b)^2 + c$, where a, b and c are integer constants. **(4)**

b) Find the coordinates of the minimum point on the curve with equation …

i. … $y = f\left(\frac{1}{2}x\right)$. **(2)**

ii. … $y = f(x+1) - 4$. **(2)**

Question 2

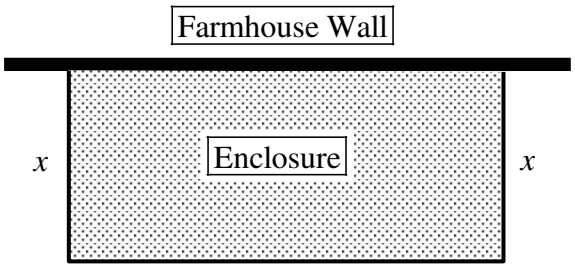
The council of Broxbourne undertook a housing development scheme which started in the year 2001 and is to finish in the year 2025. Under this scheme the council will build 760 houses in 2012 and 240 houses in 2025.

The number of houses the council builds every year, forms an arithmetic sequence.

a) Determine the number of houses built in 2001. **(5)**

b) Calculate the total number of houses that will be built under this scheme. **(4)**

Question 3



The figure above shows the plan of a rectangular enclosure to be built next to a farmhouse. One of the farmhouse's walls will form one of the sides of the enclosure and 25 metres of fencing will form the other three sides.

The width of the enclosure is x metres, as shown in the figure.

The area of the enclosure must be at most $75\ \text{m}^2$.

Given further that the width of the enclosure must be at least 3 metres but no more than 9 metres, determine the range of the possible values of x. **(9)**

Question 4

The curve C with equation $y = f(x)$ passes through the point $P(16,-5)$, and its gradient function $f'(x)$ is given by

$$f'(x) = \frac{x-6}{\sqrt{x}},\ x > 0.$$

a) Find an equation of the tangent to C at P. **(2)**

b) Determine an equation of C. **(7)**

The point Q lies on C and the gradient of C at that point is -1.

c) Find the coordinates of Q. **(6)**

Question 5

Solve the following system of simultaneous equations

$$\left(x+y\sqrt{3}\right)^2 = 56+12\sqrt{3}$$

$$y = 3x\,. \qquad \textbf{(6)}$$

Question 6

A sequence $u_1,\ u_2,\ u_3,\ u_4,\ \ldots$ is given by

$$u_{n+1} = \frac{u_n+1}{2},\quad u_1 = k\,,$$

where k is a non zero constant.

a) Given that $u_4 = 21$ find the value of u_3. **(2)**

b) Determine the value of k. **(2)**

Question 7

The straight line L has equation

$$y = kx-9\,,$$

where k is a constant.

The curve C has equation

$$y = 3\left(x+1\right)^2.$$

It is further given that L is a tangent to C at the point P.

Determine the possible coordinates of P. **(11)**

Question 8

The points A and B have coordinates $(0,-4)$ and $(3,-2)$, respectively.

a) Determine an equation for the straight line l which passes through the points A and B, giving the answer in the form $ax+by+c=0$, where a, b and c are integers. **(3)**

The point C lies on l, so that the distance AC is $3\sqrt{13}$ units.

b) Show, by a complete algebraic solution, that one possible set of coordinates for C are $(9,2)$ and find the other set. **(10)**