IYGB GCE

Core Mathematics C1

Advanced Subsidiary

Practice Paper X

Difficulty Rating: 3.9267/1.9293

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 9 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

Solve the following quadratic inequality

$$x^2 - 2x - 4 > 0 . \qquad (4)$$

Question 2

Show clearly that

$$\left(1+\sqrt{3}\right)^4 = 28 + 16\sqrt{3} . \qquad (5)$$

Question 3

$$f'(x) = 5 - \frac{8}{x^2}, \; x \neq 0 .$$

Find the value of $f(4)$, given that $2f(1) = 4 + f(2)$. (7)

Question 4

The points A, B and C have coordinates $(1,5)$, $(-2, y)$ and $(2,-3)$, respectively.

a) Find, in terms of y, the gradient of BC. (2)

The angle ABC is $90°$.

b) Determine the possible values of y. (5)

Question 5

Osama starts his new job on an annual salary of £18000 . His contract promises a pay rise of £1800 in each subsequent year until his salary reaches £36000 . When the salary reaches £36000 Osama will receive **no more** pay rises. Osama's salary first reaches the maximum salary of £36000 in year N .

a) Determine the value of N . **(2)**

b) Find Osama's total salary earnings during the first N years of his employment. **(2)**

Obama starts his new job at the same time as Osama on an annual salary of £A .

His contract promises a pay rise of £1000 in each subsequent year until his salary reaches £36000 . When the salary reaches £36000 Obama will receive **no more** pay rises. Obama's salary first reaches the maximum salary of £36000 in year 15 . **(4)**

c) Find the year when both Osama and Obama have the same annual salary.

d) Calculate the difference in the total salary earnings between Osama and Obama in the first 15 years of their employment. **(5)**

Question 6

The curve C has equation

$$y = \left(1+\sqrt{x}\right)^2 \ , \ x \geq 0 \ .$$

a) Find an expression for $\frac{dy}{dx}$. **(3)**

The straight line L with equation

$$2y = 3x + 6$$

is a tangent to C at the point P .

b) Use a calculus method to determine the coordinates of P . **(5)**

Question 7

In a clinical trial the concentration C, of a certain blood agent, is measured at one hour intervals since a trial drug was first administered to a patient.

The following readings were obtained

$$C_3 = 88,\ C_4 = 76 \text{ and } C_5 = 70,$$

where C_t denotes the reading t hours after the drug was first administered.

It is thought that C satisfies the relationship

$$C_{t+1} = a + bC_t,\ t \geq 0.$$

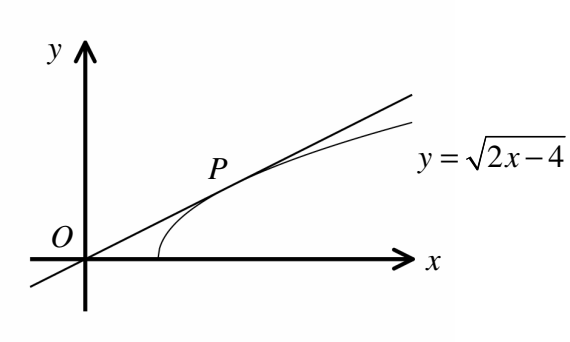
a) Find the value of a and the value of b. **(5)**

b) Determine the **initial** concentration of the blood agent, when the drug was first administered. **(3)**

The value of C converges to a limit L.

c) Find the value of L. **(2)**

Question 8



The figure above shows the graph of the curve C with equation

$$y = \sqrt{2x-4}\ ,\ x \geq 2\ .$$

The point P lies on C, so that the tangent to C at P passes through the origin O.

Determine the coordinates of P. **(9)**

You may not use calculus in this question

Question 9

Find the solutions of the quadratic equation

$$2\sqrt{3}\left(x^2+1\right) = 7x\ .$$

Give the answers in the form $k\sqrt{3}$, where k is a constant. **(6)**

Question 10

The curve with equation $y = f(x)$ is translated by the vector $\begin{bmatrix} 1 \\ 0 \end{bmatrix}$, followed by a horizontal stretch of scale factor $\frac{1}{2}$, to give the graph of the curve with equation

$$y = 8x^2 - 22x + 10.$$

Show clearly that

$$f(x) = 2x^2 - 7x + 1. \qquad \textbf{(6)}$$