IYGB GCE

Core Mathematics C1

Advanced Subsidiary

Practice Paper E

Difficulty Rating: 3.3933/1.5345

Time: 1 hour 30 minutes

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

Write each of the following surd expressions as simple as possible.

a) $\left(1+\sqrt{2}\right)^2$. **(2)**

b) $2\sqrt{75}+\dfrac{3+\sqrt{3}}{3-\sqrt{3}}-\sqrt{2}\times\sqrt{2}$. **(6)**

Question 2

A sequence of numbers is given by the recurrence relation

$$u_{n+1}=\frac{1}{1-u_n},\ \ n\geq 1,\ \ u_1=2.$$

a) Find the value of u_2, u_3 and u_4. **(3)**

b) State the value of u_{12}. **(1)**

c) Show clearly that

$$\sum_{r=1}^{12} u_r = 6. \quad \textbf{(3)}$$

Question 3

$$f(x)=x^2+6x+10,\ \ x\in\mathbb{R}.$$

a) Express $f(x)$ in the form $f(x)=(x+a)^2+b$, where a and b are integers. **(2)**

b) Describe geometrically the two transformations which map the graph of x^2 onto the graph of $f(x)$. **(4)**

Question 4

The curve C has equation

$$y = (x-4)^2 + 2 .$$

The line L has equation

$$y = 13 - 2x$$

a) Sketch on the same diagram the graph of C and the graph of L.
The sketch must include the coordinates of any points where these graphs meet the coordinate axes. **(5)**

b) Solve the equation

$$(x-4)^2 + 2 = 13 - 2x . \quad \textbf{(4)}$$

c) Hence find the range of values of x for which

$$(x-4)^2 + 2 < 13 - 2x . \quad \textbf{(2)}$$

Question 5

$f(x) = (k-1)x - 2 - 8x^2$, where k is a constant

The equation $f(x) = 0$ has equal roots.

Determine the possible values of k. **(6)**

Question 6

The curve C has equation

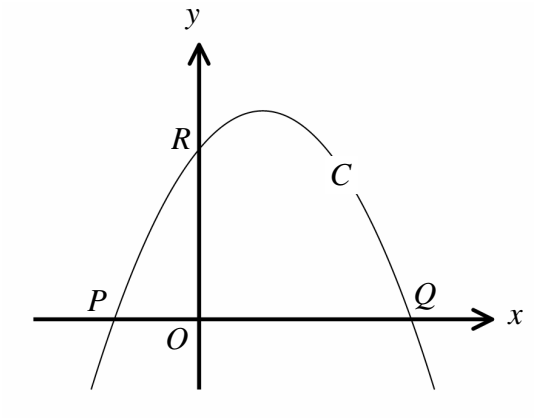
$$y = 4\sqrt{x^5} - 1,\ x \geq 0$$

Show clearly that

$$4x^2 \frac{d^2y}{dx^2} - 15y = k,$$

where k is an integer to be found. **(6)**

Question 7



The figure above shows the curve C which meets the coordinates axes at the points P, Q and R.

Given the gradient function of C is given by

$$f'(x) = 3 - 4x,$$

and that $f(1) = 2f(2)$, determine the coordinates of P, Q and R. **(8)**

Question 8

A company offers two pay schemes for its employees.

Scheme One

- Annual salary in Year 1 is $£X$.
- Annual salary increases every subsequent year by $£(2Y)$, forming an arithmetic series.

Scheme Two

- Annual salary in Year 1 is $£(X+2000)$.
- Annual salary increases every subsequent year by $£Y$, forming an arithmetic series.

a) Show that the total salary received by an employee under Scheme One, over a nine year period is

$$9(X+8Y).$$ **(2)**

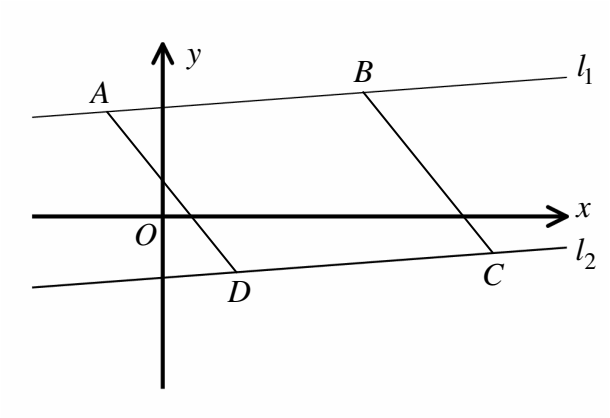
After nine years, the total salary received by an employee under Scheme One is £3600 larger than the total salary received by an employee under Scheme Two.

b) Show clearly that

$$Y=600.$$ **(5)**

c) Given further that an employee under the Scheme One earns £36000 in the eleventh year of his employment, determine the value of X. **(3)**

Question 9



The figure above shows a parallelogram $ABCD$.

The straight line l_1 passes through $A(-1,3)$ and $B(4,4)$.

a) Find an equation for l_1.

Give the answer in the form $ax+by+c=0$, where a, b and c are integers. **(3)**

The points C and D lie on the straight line l_2, which has equation

$$5y-x+10=0.$$

b) Show that the distance between l_1 and l_2 is $\sqrt{k}$, where k is an integer. **(8)**

c) Hence, find the area of the parallelogram $ABCD$. **(2)**