IYGB GCE

Core Mathematics C1

Advanced Subsidiary

Practice Paper Q

Difficulty Rating: 3.5600/1.6393

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 10 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

$$\frac{\left(2+\sqrt{3}\right)^2-\left(1-\sqrt{3}\right)^2}{\sqrt{3}}.$$

Write the above surd expression in the form $a+b\sqrt{3}$, where a and b are integers. **(5)**

Question 2

$$\frac{dy}{dx}=4+\frac{1}{x^2},\ x\neq 0.$$

Given that $y=5$ when $x=1$, express y in terms of x. **(5)**

Question 3

$$x^2-1.6x-3.36=0$$

Solve the above equation giving the answers in decimal form. **(4)**

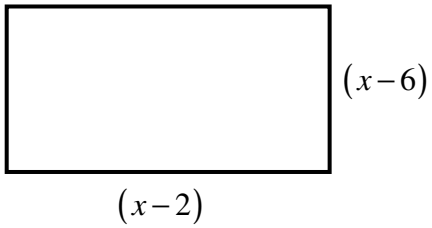
Question 4

The sum of the third, sixth and ninth term of an arithmetic progression is 90.

The sum of its first twelve terms is 408.

Determine the first term and the common difference of the progression. **(6)**

Question 5



The rectangle shown above measures $(x-2)$ cm by $(x-6)$ cm.

Given the area of the rectangle is at most 60 cm^2, and its perimeter at least 14 cm, determine the range of the possible values of x. **(8)**

Question 6

A cubic curve C has equation

$$y=(3-x)(4+x)^2.$$

a) Sketch the graph of C. **(3)**

The sketch must include any points where the graph meets the coordinate axes.

b) Sketch in separate diagrams the graph of …

i. … $y=(3-2x)(4+2x)^2$. **(2)**

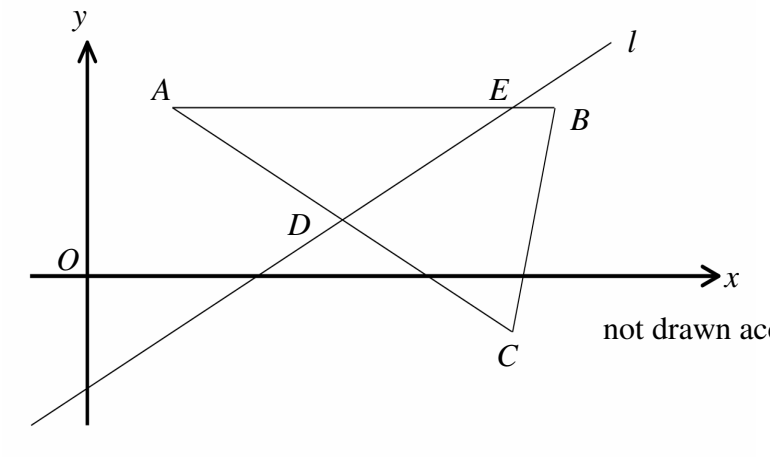
ii. … $y=(3+x)(4-x)^2$. **(2)**

iii. … $y=(2-x)(5+x)^2$. **(2)**

Each of the sketches must include any points where the graph meets the coordinate axes.

Question 7

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The figure above shows a triangle with vertices at $A(2,6)$, $B(11,6)$ and $C(p,q)$.

a) Given that the point $D(6,2)$ is the midpoint of AC, determine the value of p and the value of q. **(2)**

The straight line l, passes through D and is perpendicular to AC.

The point E is the intersection of l and AB.

b) Find the coordinates of E. **(6)**

Question 8

Use the discriminant of a suitable quadratic equation to show that the graphs of the curves with equations

$$y = 2 - \frac{1}{x} \quad \text{and} \quad y = \frac{1}{2-x},$$

touch each other. **(5)**

Question 9

A recurrence relation is defined for $n \geq 1$ by

$$u_{n+1} = k + (-1)^n u_n, \quad u_1 = 4,$$

where k is a non zero constant.

a) Show clearly that $u_5 = 4$. **(4)**

b) State, in terms of k, the value of u_{26}. **(1)**

c) Given further that

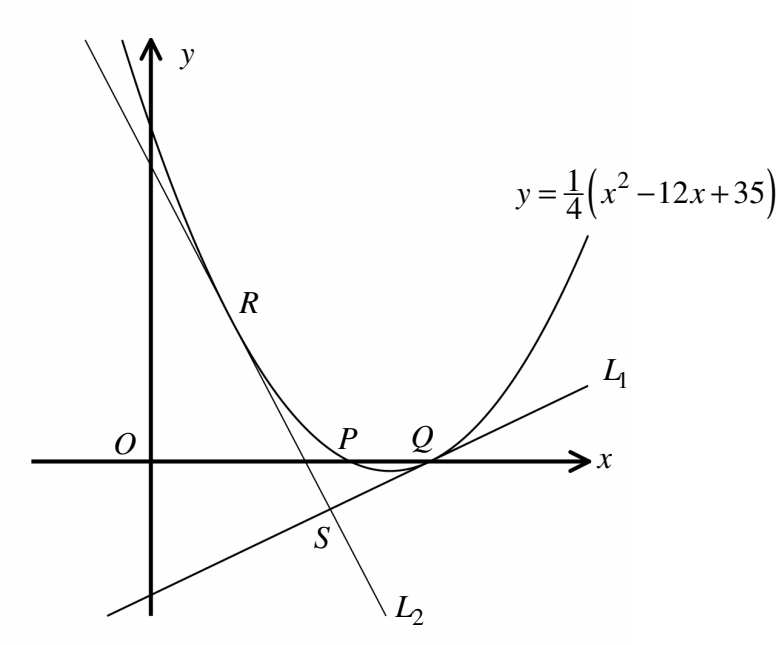
$$\sum_{r=1}^{4} u_r = 6 \ ,$$

find the value of k. **(2)**

d) Evaluate the sum

$$\sum_{r=1}^{26} u_r \ .$$ **(2)**

Question 10



The figure above shows the curve with equation

$$y=\frac{1}{4}\left(x^2-12x+35\right).$$

The curve crosses the x axis at the points $P\left(x_1,0\right)$ and $Q\left(x_2,0\right)$, where $x_2>x_1$.

The tangent to the curve at Q is the straight line L_1.

a) Find an equation of L_1. **(6)**

The tangent to the curve at the point R is denoted by L_2.

It is further given that L_2 meets L_1 at right angles, at the point S.

b) Find an equation of L_2. **(6)**

c) Determine the exact coordinates of S. **(4)**