# IYGB GCE

## Core Mathematics C1

## Advanced Subsidiary

## Practice Paper N

Difficulty Rating: 3.4400/1.5625

## 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**

**a)** Simplify the following expression, writing the final answer in the form $a+b\sqrt{3}$, where $a$ and $b$ are integers.

$$\frac{3-\sqrt{3}}{3+\sqrt{3}}. \qquad (\mathbf{3})$$

**b)** Solve the equation

$$x^{-1}=\frac{x}{16}, \quad x\neq 0. \qquad (\mathbf{2})$$

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**Question 2**

Differentiate the following expression with respect to $x$

$$2x^3+\sqrt{x}+\frac{x^2+2x}{x^2},\ x>0. \qquad (\mathbf{5})$$

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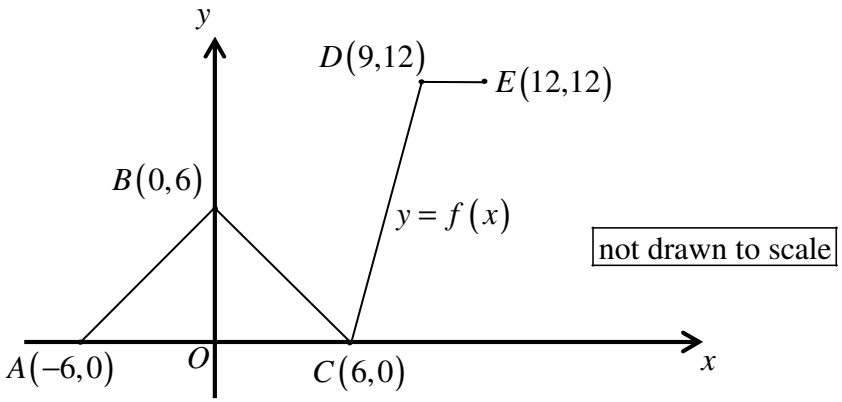
**Question 3**

$$f'(x)=(3x-1)^2.$$

Given that $f(3)=56$, find an expression for $f(x)$. $(\mathbf{6})$

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**Question 4**




The figure above shows the graph of a function with equation $y = f(x)$.

The graph consists of four straight line segments joining the points $A(-6,0)$, $B(0,6)$, $C(6,0)$, $D(9,12)$ and $E(12,12)$.

**a)** Write down, with some justification, the number of roots of the equation …

**i.** … $f(x) = 2$. **(2)**

**ii.** … $f(x) = x$ **(2)**

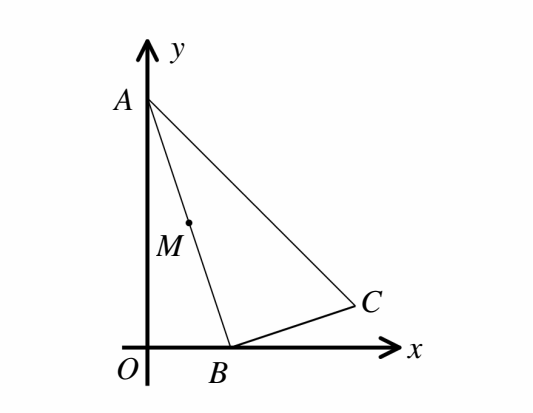
**b)** Sketch on separate diagrams the graph of …

**i.** … $y = f(-x)$. **(2)**

**ii.** … $y = \frac{1}{2} f(x)$. **(3)**

Each sketch must include the new coordinates of $A$, $B$, $C$, $D$ and $E$.

**Question 5**




The figure above shows the points $A(0,12)$, $B$, $C(10,2)$ and $M(2,6)$.

**a)** Given that $M$ is the midpoint of $AB$, state the coordinates of $B$. **(1)**

**b)** Find the exact length of $BC$. **(2)**

**c)** Given that $\measuredangle ABC = 90°$, find the area of the triangle $ABC$, giving the final answer as an integer. **(3)**

The straight line through $M$ and perpendicular to $AB$ meets $AC$ at the point $N$.

**d)** Determine the area of the trapezium $MBCN$. **(2)**

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**Question 6**

$$107 + 114 + 121 + 128 + ... + 1500.$$

The above series has $200$ terms.

Find the sum of the **last** $40$ terms of the series. **(4)**

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**Question 7**

$$f(x) = x^2(x-4),\ x \in \mathbb{R}.$$

$$g(x) = x(10-x),\ x \in \mathbb{R}.$$

**a)** Determine the coordinates of the points of intersection between the graph of $f(x)$ and the graph of $g(x)$. **(5)**

**b)** Sketch the graph of $f(x)$ and the graph of $g(x)$ in the same diagram.

The sketch must include …

… the coordinates of any points where either of the two graphs meet the coordinate axes.

… the coordinates of the points of intersection between the graph of $f(x)$ and the graph of $g(x)$. **(5)**

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**Question 8**

The quadratic curves with equations

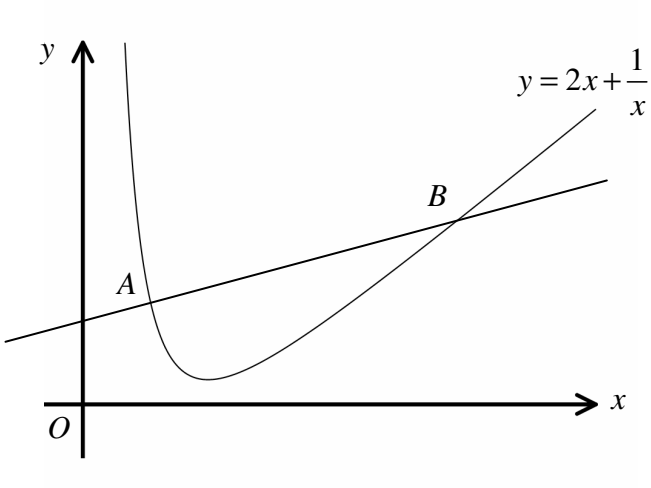
$$y = x^2 - 4x + 5 \quad \text{and} \quad y = m + 2x - x^2,$$

where $m$ is a constant, **touch** each other at the point $P$.

Determine the $x$ coordinate of $P$. **(6)**

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**Question 9**




The figure above shows part of the curve $C$, with equation

$$y = 2x + \frac{1}{x},\ x \neq 0$$

The point $A$ lies on $C$ where $x = \frac{1}{2}$.

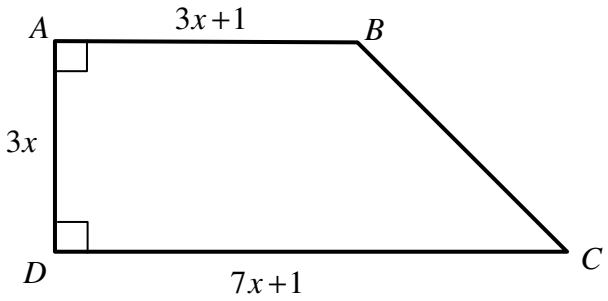
**a)** Find an equation of the normal to $C$ at $A$. **(5)**

The normal meets the curve again at the point $B$.

**b)** Determine the exact coordinates of $B$. **(5)**

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**Question 10**




The figure above shows a right angled trapezium $ABCD$ where $|AB| = 3x+1$, $|AD| = 3x$, $|DC| = 7x+1$ and $\measuredangle DAB = \measuredangle CDA = 90°$.

**a)** Express the perimeter of the trapezium in terms of $x$. **(4)**

**b)** Show that the area of the trapezium is $15x^2 + 3x$. **(2)**

The perimeter of the trapezium has to be less than $92$ and its area greater than $66$.

**c)** Determine the range of the possible values of $x$. **(6)**