# IYGB GCE

## Core Mathematics C1

## Advanced Subsidiary

## Practice Paper J

Difficulty Rating: 3.2067/1.4320

## 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**

$$f(x) = 6x + 9\sqrt{x} - \frac{4}{x^2},\ x > 0.$$

Find a fully simplified expression for

$$\int f(x)\, dx. \qquad (3)$$

---

**Question 2**

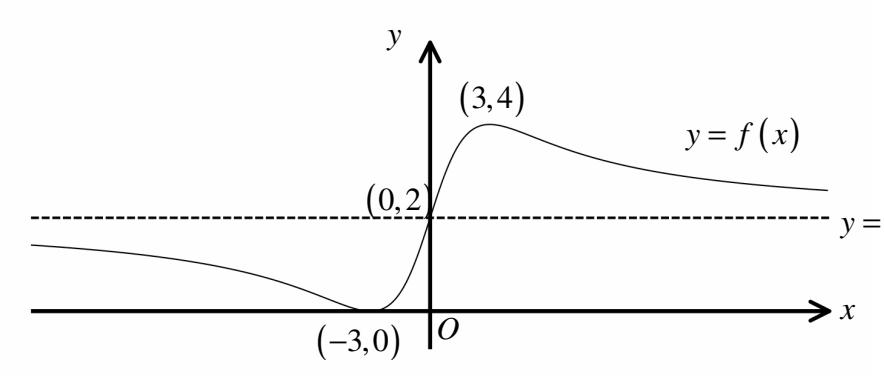
Write each of the following surd expressions as simple as possible.

**a)** $\left(\sqrt{3} - \sqrt{2}\right)^2$. (2)

**b)** $\sqrt{14} \times \sqrt{42}$. (2)

---

**Question 3**




The figure above shows the graph of a curve with equation $y = f(x)$. The curve meets the $x$ axis at $(-3,0)$ and the $y$ axis at $(0,2)$. The curve has a maximum at $(3,4)$ and a minimum at $(-3,0)$.

The line with equation $y = 2$ is a horizontal asymptote to the curve.

Sketch on separate diagrams the graph of …

**a)** … $y = f(x+3)$. **(3)**

**b)** … $y = f(x)-2$. **(3)**

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

Each of the sketches must include

- the coordinates of any points where the graph meets the coordinate axes.
- the coordinates of any minimum or maximum points of the curve.
- any asymptotes to the curve, clearly labelled.

**Question 4**

**a)** Solve the linear inequality

$$6-2(x+2)<10\,.$$ **(2)**

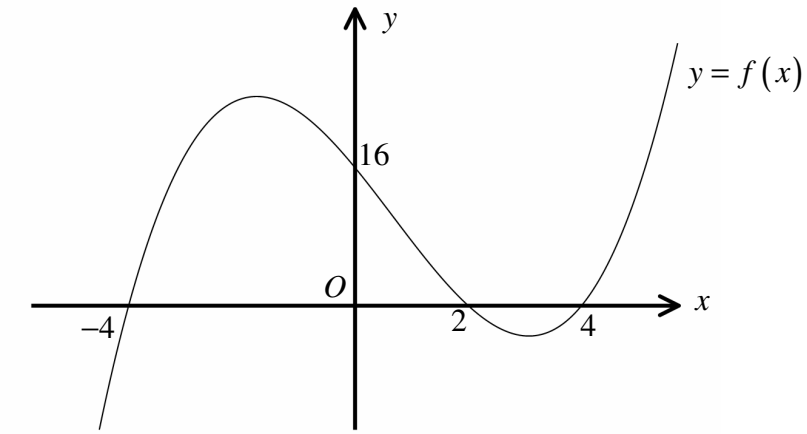
**b)** Solve the quadratic inequality

$$(x+1)^2 \geq 4x+9\,.$$ **(5)**

**c)** Hence determine the range of values of $x$ that satisfy both the inequalities of part (a) and part (b). **(2)**

---

**Question 5**




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

The curve crosses the $x$ axis at the points $(-4,0)$, $(2,0)$ and $(4,0)$, and the $y$ axis at the point $(0,16)$.

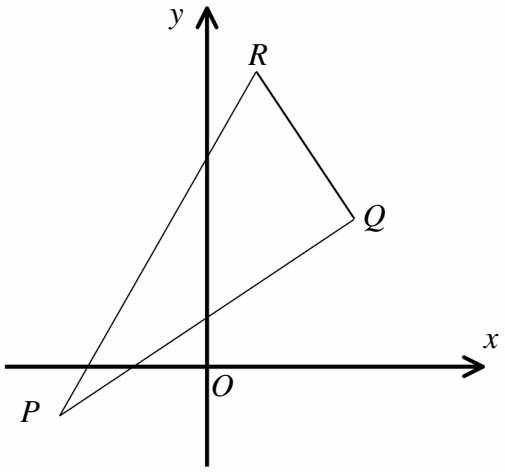
Determine the equation of $f(x)$ in the form **(5)**

$$f(x)\equiv ax^3+bx^2+cx+d\,,$$

where $a$, $b$, $c$ and $d$ are constants.

---

**Question 6**




The figure above shows the right angled triangle $PQR$, whose vertices are located at $P(-6,-2)$ and $Q(6,6)$.

It is further given that $\measuredangle PQR = 90°$.

**a)** Find an equation for the straight line $l$, which passes through $Q$ and $R$. **(4)**

The line $l$ meets the $x$ axis at the point $T$.

**b)** Given that $Q$ is the midpoint of $RT$, determine the coordinates of $R$. **(3)**

---

**Question 7**

A curve $C$ and a straight line $L$ have respective equations

$$y = x^2 - 4x - 5 \quad \text{and} \quad y = 2x - 14.$$

**a)** Find the coordinates of any points of intersection between $C$ and $L$. **(4)**

**b)** Sketch in the same diagram the graph of $C$ and the graph of $L$.

The sketch must include of any points of intersection between the graph of $C$ and the coordinate axes, and any points of intersection between the graph of $L$ and the coordinate axes. **(4)**

---

**Question 8**

The curve $C$ has equation

$$y = (x-1)\left(x^2+4x+5\right),\ x \in \mathbb{R}.$$

**a)** Show that $C$ meets the $x$ axis at only one point. **(2)**

The point $A$, where $x = -1$, lies on $C$.

**b)** Find an equation of the normal to $C$ at $A$. **(6)**

The normal to $C$ at $A$ meets the coordinate axes at the points $P$ and $Q$.

The point $O$ represents the origin.

**c)** Show further that the area of the triangle $OPQ$ is $12\frac{1}{4}$ square units. **(3)**

---

**Question 9**

The quadratic equation

$$4x^2+(16-p)x+13 = p,$$

where $p$ is a constant, has equal roots.

**a)** Determine the possible values of $p$. **(5)**

**b)** Solve the equation for each of the values of $p$ found in part (a). **(3)**

---

**Question 10**

$$19,\ 23,\ 27,\ 31,\ 35,\ ...$$

For the above arithmetic sequence, find …

**a)** … the thirtieth term. **(2)**

**b)** … the sum of its first thirty terms. **(2)**

The $n^{\text{th}}$ term of this sequence is less than $250$.

**c)** Determine the largest value of $n$. **(3)**

The sum of the first $k$ terms of this sequence exceeds $4000$.

**d)** Calculate the smallest value of $k$. **(4)**