IYGB GCE

Core Mathematics C1

Advanced Subsidiary

Practice Paper M

Difficulty Rating: 3.1667/1.4118

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 11 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

$$y = 3x^2 - 6\sqrt{x} - \frac{1}{x^2} + 4, \ x > 0.$$

Find a fully simplified expression for

$$\int y \, dx. \qquad (4)$$

Question 2

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

a) $\left(\sqrt{7} + 2\right)\left(1 + \sqrt{7}\right)$. **(2)**

b) $\dfrac{\sqrt{50} + \sqrt{18}}{\sqrt{8}}$. **(2)**

Question 3

Evaluate the following expression, showing clearly all the relevant workings.

$$\sum_{r=1}^{20} (13r + 4). \qquad (4)$$

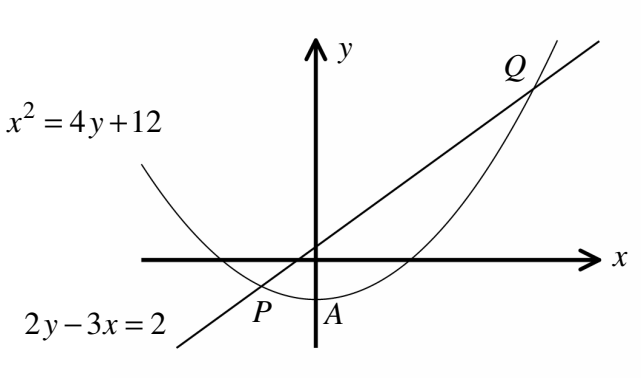
Question 4

The point $P(1,3)$ lies on the curve with equation $y = f(x)$, whose gradient function is given by

$$f'(x) = 6x^2 - 4x, \ x \in \mathbb{R}.$$

Find an equation for $f(x)$. **(5)**

Question 5



The figure above shows the curve C and the straight line L, with respective equations

$$x^2 = 4y + 12 \quad \text{and} \quad 2y - 3x = 2 .$$

C meets the y axis at the point A, while C and L intersect each other at the points P and Q.

a) Find the coordinates of P and the coordinates of Q. **(5)**

b) Show clearly that $\measuredangle PAQ = 90°$. **(3)**

Question 6

A rectangle is such so that its length is 6 cm greater than its width.

Given the area of the rectangle is at least 40 cm^2, determine the range of the possible values of the **length** of the rectangle. **(6)**

Question 7

Arnold is planning to save for the next 48 months in order to raise a deposit to buy a flat. He plans to save £300 this month and each successive month thereafter, to save an extra £5 compared to the previous month.

a) Find the amount he will save on the twelfth month. **(2)**

b) Find the total amount he will save at the end of the 48 months. **(2)**

Franco is also planning to save for the next 48 months in order to buy a car.

He plans to save £a this month and each successive month thereafter, to save an extra £15 compared to the previous month.

c) Find the value of a, if Franco saves the same amount of money as Arnold does in the next 48 months. **(4)**

Question 8

A curve C has equation

$$y = x^2 + 2mx + (3m + 4),$$

where m is a real constant.

The graph of C **touches** the x axis.

a) Determine the possible values of m. **(4)**

b) For each value of m found in part in part **(a)**, find the x coordinate of the point where the graph of C touches the x axis. **(3)**

Question 9

The curve C has equation $y = f(x)$ given by

$$f(x) = 2(x-2)^3, \quad x \in \mathbb{R}.$$

a) Sketch the graph of $f(x)$. **(2)**

b) Find an expression for $f'(x)$. **(3)**

The point $P(3,2)$ lies on C and the straight line l_1 is the tangent to C at P.

c) Find an equation of l_1. **(3)**

The straight line l_2 is another tangent at a different point Q on C.

d) Given that l_1 is parallel to l_2 show that an equation of l_2 is

$$y = 6x - 8.$$ **(5)**

Question 10

$$f(x) = 3x^2 + 5x - 2,\ x \in \mathbb{R}.$$

a) Solve the equation $f(x) = 0$. **(2)**

b) Sketch the graph of $f(x)$.
The sketch must include the coordinates of any points where the graph of $f(x)$ meets the coordinate axes. **(2)**

c) Find the coordinates of any points where the graph of the curve with equation $y = f\left(\frac{1}{3}x\right)$ meets the coordinate axes. **(2)**

The graph of $y = f(x)$ is translated by 1 unit in the negative x direction onto the graph of the curve with equation $y = ax^2 + bx + c$, where a, b and c are constants.

d) Determine the value of a, b and c. **(2)**

Question 11

The indicial equation

$$2^{x+1} + 2^{3-x} = 17,\ x \in \mathbb{R},$$

is to be solved by a suitable substitution.

a) Show clearly that the substitution $y = 2^x$ transforms the above indicial equation into the quadratic equation

$$2y^2 - 17y + 8 = 0.$$ **(4)**

b) Solve the quadratic equation by factorization and hence determine the two solutions of the indicial equation. **(4)**
