SEKOLAH BUKIT SION
IGCSE Mock Examination 2021

STUDENT NAME	

EXAM NUMBER		CLASS	

0606 ADDITIONAL MATHEMATICS

Year 10

2 June 2021

2 hours

Additional Materials:
- Scientific Calculator
- Ruler

READ THESE INSTRUCTIONS FIRST

Write your name, exam number and grade on all the work you hand in.

Write in dark blue or black pen.

Use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, glue or correction fluid.

Answer **all** questions.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [ ] at the end of each question or part question.
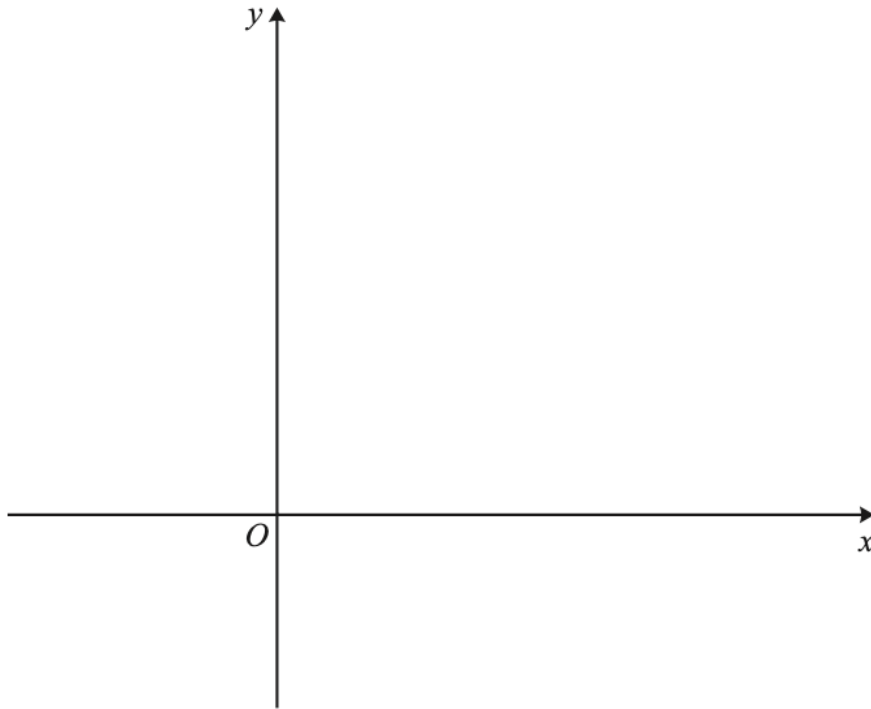
The total of the marks for this paper is 60.

PDF Filename format: *Class_Name_FinalExam*

Score :

This document consists of **7** printed pages including this page.

1

    (a) Sketch the graph of $y = |4x - 2|$ on the axes below, showing the coordinates of the points where the graph meets the axes.   [3]

    (b) Solve the equation $|4x - 2| = x$.   [3]

2

    (a) Derive $(8x + 5)^2$ with respect to x.   [2]

    (b) Find the equation of the tangent to the curve $y = (8x + 5)^2$ at the point where $x = \frac{1}{2}$. [3]

3

    Find the values of k for which the line $y = kx - 3$ and the curve $y = 2x^2 + 3x + k$ do not intersect.   [5]

4

Find the values of x for which $x(x+8) \geq 20$. [3]

5

(a) By finding $f^{-1}(x)$, show that $f(x) = \frac{3x-1}{2x-3}$ for $x \in \mathbb{R}$, $x \neq \frac{3}{2}$ is a self-inverse function.

[*A self-inverse function is such that* $f(x) = f^{-1}(x)$.] [3]

(b) Given that $f(x) = x^2 - 3$ for $x \in \mathbb{R}$ and $g(x) = 3x + 2$ for $x \in \mathbb{R}$.

Solve the equation $\mathbf{gf(x) = f^{-1}(x)}$. [3]

6

A curve has equation $y = (3x - 5)^3 - 2x$.

(a) Find $\dfrac{dy}{dx}$ and $\dfrac{d^2y}{dx^2}$. [4]

(b) Find the exact value of the x-coordinate of each of the stationary points of the curve. [2]

7

(a) Express $5x^2 - 15x + 1$ in the form of $p(x + q)^2 + r$, where p, q and r are constants. [3]

(b) Hence, state the least value of $5x^2 - 15x + 1$ and the value of x at which this occurs. [2]

8

Write $\dfrac{y \times (4x^3)^2}{\sqrt{8y^3}}$ in the form $2^a \times x^b \times y^c$, where a, b and c are constants. [3]

9

Do not use a calculator and **show all necessary steps.**

(a) Show that $\left(\sqrt{5} - 3\right)^2$ will simplify to $14 - 6\sqrt{5}$. [1]

(b) Hence, express $\dfrac{\left(\sqrt{5} - 3\right)^2}{\sqrt{5}+1}$ in the form of $p\sqrt{5} + q$, where p and q are integers. [4]

10

It is given that $y = (x^2 + 1)(2x - 3)^{\frac{1}{2}}$.

(a) Show that $\dfrac{dy}{dx} = \dfrac{Px^2 + Qx + 1}{(2x-3)^{\frac{1}{2}}}$, where P and Q are integers. [4]

(b) Hence find the equation of the normal to the curve $y = (x^2 + 1)(2x - 3)^{\frac{1}{2}}$
at the point $x = 2$, giving your answer in the form $ax + by + c = 0$,
where a, b, and c are integers. [4]

11

Given that $7^x \times 49^y = 1$ and $5^{5x} \times 125^{\frac{2y}{3}} = \dfrac{1}{25}$, **show that value of** $x = -\dfrac{1}{2}$ and $y = \dfrac{1}{4}$. [3]

(*Please be warned that **showing** means to solve for x and y values as if there are not known.
Showing is **NOT checking** by direct substitution of the given x and y values.*)

12

The position vectors of points A and B relative to an origin O are **a** and **b** respectively.
The point P is such that $\overrightarrow{OP} = \mu\overrightarrow{OA}$. The point Q is such that $\overrightarrow{OQ} = \lambda\overrightarrow{OB}$.
The lines AQ and BP intersect at the point R.
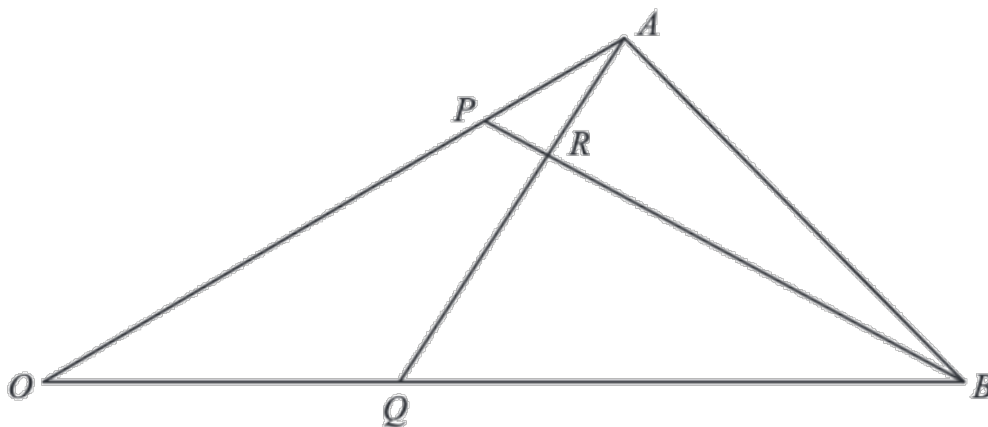
(a) Express $\overrightarrow{AQ}$ in terms of λ, **a** and **b**. [1]

(b) Express $\overrightarrow{BP}$ in terms of μ, **a** and **b**. [1]

It is given that $3\overrightarrow{AR} = \overrightarrow{AQ}$ and $8\overrightarrow{BR} = 7\overrightarrow{BP}$.

(c) Express $\overrightarrow{OR}$ in terms of λ, **a** and **b**. [2]

(d) Express $\overrightarrow{OR}$ in terms of μ, **a** and **b**. [2]

(c) Hence find the value of μ and λ. [3]