SEKOLAH BUKIT SION
IGCSE Mock Examination 2021

<table>
<tr><td>STUDENT NAME</td><td></td></tr>
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0606 ADDITIONAL MATHEMATICS
(PAPER 1)

Year 10

10 April 2021

1 hour 30 minutes

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.

Score :

This document consists of **10** 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]
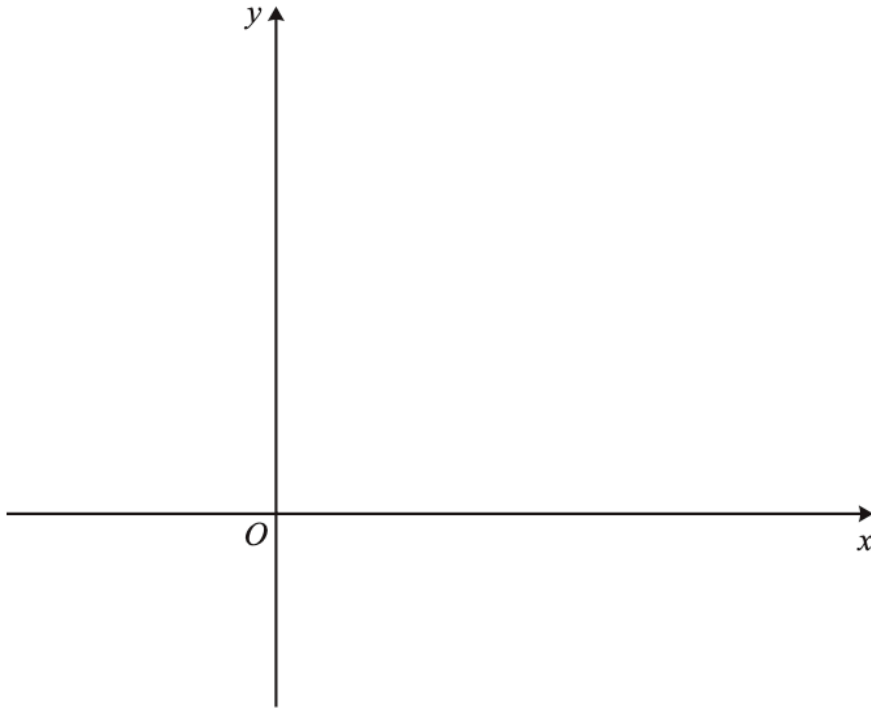
(b) Solve the equation $|4x - 2| = x$. [3]

2

2 Find the equation of the normal to the curve $y = \sqrt{8x + 5}$ at the point where $x = \frac{1}{2}$, giving your answer in the form of $ax + by + c = 0$, where a, b and c are integers.

[5]

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 $x(6x + 7) \geq 20$.   [3]

5   The functions f and g are defined for real values of x by

$f(x) = \sqrt{x-1} - 3$ for $x > 1$,

$g(x) = \dfrac{x-2}{2x-3}$ for $x > 2$.

(a) Find gf(37).   [2]

(b) Find an expression for $f^{-1}(x)$.   [2]

(c) Find an expression for $g^{-1}(x)$.   [2]

6   Solve.

(a) $2(5)^{2z} + 5^z - 1 = 0.$ [4]

(b) $\log_4 2 + \log_9(2x + 5) = \log_8 64$ [4]

7 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]

(c) Use the second derivative test to determine the nature of each of the stationary points. [2]

8   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.
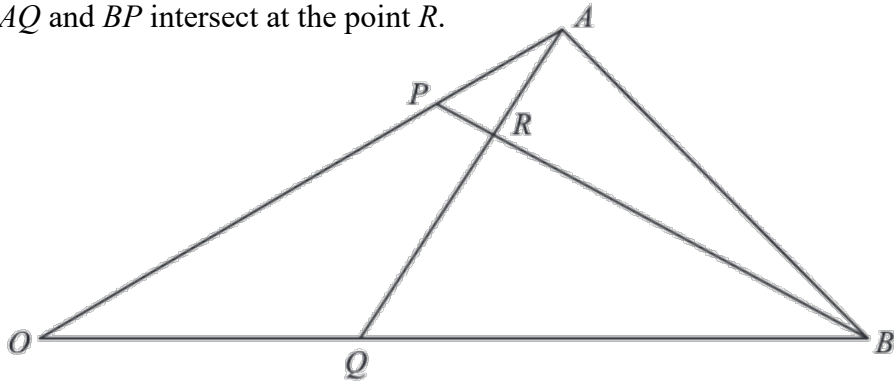
(a) Express $\overrightarrow{AQ}$ in terms of λ, **a** and **b**.   [1]

(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]

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

(b) Hence find the value of μ and λ.   [3]
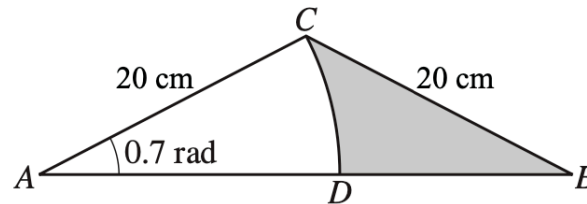
CHOOSE/ANSWER ONLY ONE.
EITHER

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

OR

9   The diagram shows an isosceles triangle ABC in which $BC = AC = 20$ cm, and angle $BAC = 0.7$ radians. DC is an arc of a circle, centre A.
Find the area of the shaded region, correct to 1 decimal place.   [4]

CHOOSE/ANSWER ONLY ONE.
EITHER

10 The polynomial $p(x) = (2x - 1)(x + k) - 12$, where k is a constant.

(a) Write down the value of $p(-k)$. [1]

(b) When $p(x)$ is divided by $(x + 3)$, the remainder is 23.
Find the value of k. [2]

(c) Using your value of k **in part (b)**, show that the equation $p(x) = -25$ has no real solutions. [3]

OR

10

(a) Show that the equation $3\cos^2 \theta = \sin \theta + 1$ can be written as $3\sin^2 \theta + \sin \theta - 2 = 0$. [2]

(b) Hence, solve $\quad 3\cos^2 \theta = \sin \theta + 1 \quad$ for $0° < \theta < 360°$. [4]

- END OF EXAMINATION -