SEKOLAH BUKIT SION

IGCSE Mock Examination 2021

STUDENT NAME			
EXAMINEE NUMBER		CENTRE ID	

0606 ADDITIONAL MATHEMATICS (PAPER 2)

Year 10

10 April 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 80.

Score :

1 **(a)** Differentiate $y = (3x^2 - 1)^{-\frac{1}{3}}$ with respect to x. [2]

(b) Find the approximate change in y as x increases from $\sqrt{3}$ to $\sqrt{3} + p$, where p is small. [1]

(c) Find the equation of the normal to the curve $y = (3x^2 - 1)^{-\frac{1}{3}}$ at the point where $x = \sqrt{3}$. [3]

2 Without using a calculator, express $\frac{(\sqrt{5} - 3)^2}{\sqrt{5}+1}$ in the form of $p\sqrt{5} + q$, where p and q are integers. [5]

3 Find the values of k for which the equation $(k - 1)x^2 + kx - k = 0$ has real distinct roots. [4]

4 Given that $4x^4 - 12x^3 - b^2x^2 - 7bx - 2$ is exactly divisible by $2x + b$,

(i) show that $3b^2 + 7b^2 - 4 = 0$, [2]

(ii) find the possible values of b. [5]

5 The points A and B have coordinates $(p, 3)$ and $(1, 4)$ respectively and the line L has equation $3x + y = 2$.

(a) Given that the gradient of AB is $\frac{1}{3}$, find the value of p. [2]

(b) Show that L is the perpendicular bisector of AB. [3]

(c) Given that $C(q, -10)$ lies on L, find the value of q. [1]

(d) Find the area of triangle ABC. [2]

6 Show that

(a) $\dfrac{\operatorname{cosec}\theta - \cot\theta}{\sin\theta} = \dfrac{1}{1 + \cos\theta}$. [4]

(b) $(1 + \sec\theta)\ (\operatorname{cosec}\theta - \cot\theta) = \tan\theta$. [4]

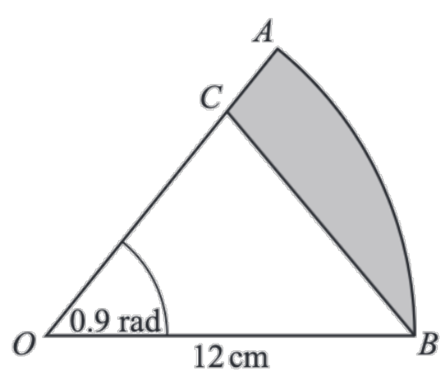
7 Solve $6 \sin^2 x - 13 \cos x = 1$ for $0° \leq x \leq 360°$. [4]

8 Solve.

(a) $1 + \lg(8 - x) = \lg(3x + 2)$ [4]

(b) $\log_4(3y^2 - 10) = 2\log_4 y - 1) + \frac{1}{2}$ [5]

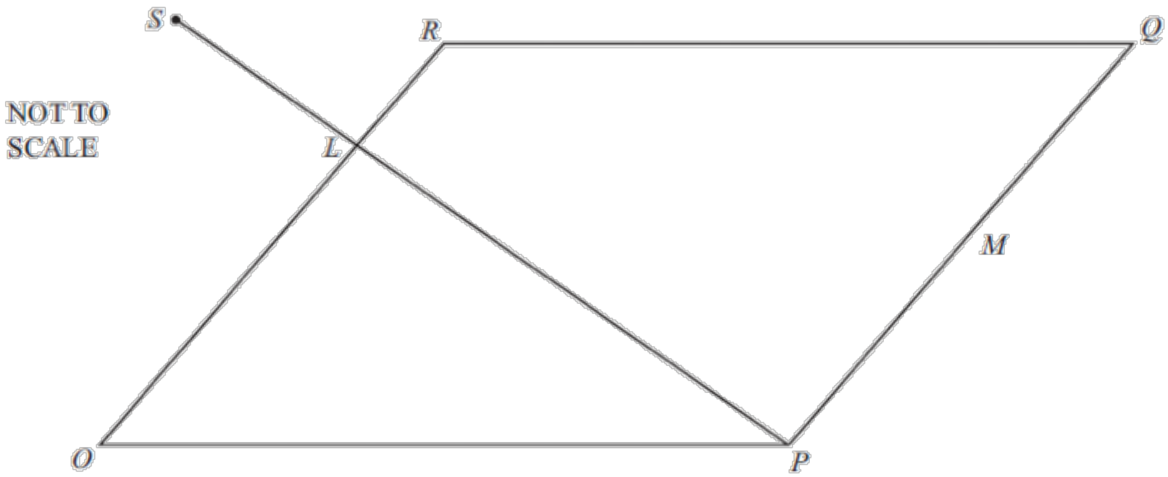
9



The diagram shows a sector, AOB, of a circle centre O, radius 12 cm.
Angle AOB = 0.9 radians.
The point C lies on OA such that $OC = CB$.

(a) Show that OC = 9.65 cm correct to 3 significant figures. [2]
(b) Find the perimeter of the shaded region. [3]
(c) Calculate the area of the shaded region. [3]

10



OPQR is a parallelogram.
O is the origin. $\overrightarrow{OP} = \mathbf{p}$ and $\overrightarrow{OR} = \mathbf{r}$.
M is the midpoint of *PQ* and *L* is on *OR* such that *OL* : *LR* = 2 : 1.

The line *PL* is extended to the point *S*.

(a) Find, in terms of **p** and **r,** in their simplest forms,

(i) $\overrightarrow{OQ}$, [1]

(ii) $\overrightarrow{PR}$, [1]

(iii) $\overrightarrow{PL}$, [2]

(iv) The position vector of *M*. [1]

(b) *PLS* is a straight line and $PS = \frac{3}{2}PL$.
Find, in terms of **p** and/or **r**, in their simplest forms,

(i) $\overrightarrow{PS}$, [1]

(ii) $\overrightarrow{QS}$ [1]

11 CHOOSE/ANSWER ONLY ONE.

EITHER

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

(a) Show that $\frac{dy}{dx} = \frac{Px^2 + Qx + 1}{(2x-3)^{\frac{1}{2}}}$, where P and Q are integers. [5]

(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]

OR

A closed cylinder has base radius r, height h and volume V. It is given that the total surface area of the cylinder is 600π and that V, r and h can vary.

(a) Show that $V = 300\pi r - \pi r^3$. [3]

(b) Find the stationary value of V and determine its nature. [5]

- END OF EXAMINATION -