2021-2022 S4
$\mathbf{2}^{\text {nd }}$ TERM EXAM
MATH CP
PAPER 1
S4 Second Term Examination
MATHEMATICS Compulsory Part 2022

## PAPER 1

## Question-Answer Book

$20^{\text {th }}$ June, 2022
8:15 am - 9:45 am (1 hour 30 minutes)
This paper must be answered in English

## INSTRUCTIONS

1. Write your name, class and class number in the spaces provided on this cover.
2. This paper consists of THREE sections, $\mathrm{A}(1)$, $\mathrm{A}(2)$ and B .
3. Attempt ALL questions in this paper. Write your answers in the spaces provided in this Question - Answer Book. Do not write in the margins. Answers written in the margins will not be marked.
4. Unless otherwise specified, all working must be clearly shown.
5. Unless otherwise specified, numerical answers should be either exact or correct to 3 significant figures.
6. The diagrams in this paper are not necessarily drawn to scale.


| Sections | Marks |
| :---: | ---: |
| $\mathrm{A}(1-4)$ |  |
| $\mathrm{A}(5-10)$ |  |
| A Total | $/ \mathbf{4 4}$ |
| B Total | $/ \mathbf{2 6}$ |
| TOTAL |  |

## Section A(1) (21 marks)

1. Simplify $\frac{\left(5 x^{-3} y\right)^{3}}{\left(x^{0} y^{2}\right)^{2}}$ and express your answer with positive indices.
2. (a) Factorize $m^{2}-3 m-4$.
(b) Hence, factorize $m^{2}-3 m-4+m n^{2}-4 n^{2}$.
3. Make $x$ the subject of the formula $y=\frac{4 x-1}{3 x}$.
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Answers written in the margins will not be marked
4. Mr. Chan earned $\$ 26000$ last month. It is known that the amount earned by Mr. Chan this month increased by $5 \%$ from last month, but the amount earned next month will decrease by $5 \%$ from this month.
(a) Find the amount earned by Mr. Chan next month.
(b) Find the overall percentage change in the amount earned by Mr. Chan from last month to next month.
5. It is given that $g(x)=\frac{x}{a x+5}$ and $g(3)=-3$, where $a$ is a constant.
(a) Find the value of $a$.
(b) Hence, find the value of $g(-2)+2 g(5)$.
6. In the figure, $D B$ is a diameter of the circle, $\angle D A C=65^{\circ}$ and $\angle A B D=32^{\circ}$. Find $x$ and $y$.

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## Section A(2) (23 marks)

7. The figure shows the graph of $y=-x^{2}-x+k$. It cuts the $x$-axis at two points $A$ and $B$, and cuts the $y$-axis at the point $C(0,12)$.


Find
(a) the value of $k$,
(b) the coordinates of $A$ and $B$,
(c) the area of $\triangle A B C$.
8. In the figure, the straight line $L_{1}$ cuts the $y$-axis at $A(0,4)$ and the $x$-axis at $B$. The straight line $L_{2}$ cut the $y$-axis at $C$ and has slope 3 . The straight line $L_{3}: y=x-4$ passes through $B$ and $C$. $L_{1}$ and $L_{2}$ intersect at $D$.

(a) Find the $x$-intercept and the $y$-intercept of $L_{3}$.
(b) Find the equations of $L_{1}$ and $L_{2}$.
(c) Find the coordinates of $D$.
(d) Find the area of $\triangle B C D$.
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9. The polynomial $f(x)=6 x^{3}-a x^{2}+b x-2$ is divisible by $x-2$. When $f(x)$ is divided by $x+1$, the remainder is -36 .
(a) Find the values of $a$ and $b$.
(b) Factorize $f(x)$.
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Section B (26 marks)
10. Solve the logarithmic equation $\log _{3}(x+1)-\log _{3}(2 x-3)=2$.
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11. Solve the simultaneous equations $\left\{\begin{array}{l}6^{2 x-y}=\frac{1}{36} \\ 4\left(2^{x-2 y}\right)=32\end{array}\right.$.
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12. In the figure, the circle touches the quadrilateral $P Q R S$ at the points $A, B, C$ and $D . M P B Q$ and $N S D R$ are straight lines. $\angle A P M=80^{\circ}, \angle A S N=116^{\circ}$ and $B A=B C$.

(a) Find $\angle S A D$.
(b) Hence or otherwise, find $\angle B A D$.
(c) Find $\angle A D C$.
(d) Is $P Q R S$ a cyclic quadrilateral? Explain your answer.
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13. (a) Simplify and express $\frac{4+i}{2+i}$ in the form of $a+b i$.
(2 marks)
(b) Let $z=\frac{4+i}{2+i}(p-2 i)$, where $p$ is a real number. If the real part of $z$ is equal to $2 p-1$, find the imaginary part of $z$.

## END OF PAPER

