18-19 F. 4

MATH CP
PAPER 1

Form $41^{\text {st }}$ Term Examination

## MATHEMATICS Compulsory Part PAPER 1 Question-Answer Book

$4^{\text {th }}$ January, 2019.
8:15 a.m. - 9:15 a.m. (1 hour)
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.

Section A(1) (16 marks)

1. Simplify $\frac{a b^{5}}{a^{-2}\left(3 b^{4}\right)^{3}}$ and express your answer with positive indices.
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2. Make $x$ the subject of the formula $(2-x)(2-y)=x$.
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3. Simplify $\frac{6}{\sqrt{12}}-\sqrt{75}+7 \sqrt{3}$.
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Answers written in the margins will not be marked.
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4. Solve the quadratic equation $4 x^{2}-5=x(x+6)$ and express your answers in surd form if necessary.
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5. (a) Factorize $9 x^{2}-y^{2}$.
(b) Simplify $\frac{2 x+y}{3 x-y}+\frac{2 y(y-8 x)}{9 x^{2}-y^{2}}$.
(4 marks)
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Answers written in the margins will not be marked.
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Section A(2) (19 marks)
6. Let $f(x)=2 x^{3}+a x^{2}-5 x+b$. When $f(x)$ is divided by $x-2$, the remainder is 12 . $f(x)$ is divisible by $x+1$.
(a) Find the values of $a$ and $b$.
(4 marks)
(b) Factorize $f(x)$ completely. (2 marks)
(c) It is given that $g(x)=6 x^{3}-5 x^{2}+k x+3$, where $k$ is an integer. Is it possible that $f(x)$ and $g(x)$ have two common linear factors? If possible, factorize $g(x)$ completely.
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Answers written in the margins will not be marked.
7. In the figure, two straight lines $L_{1}: y=2 x+k$ and $L_{2}$ intersect at $A(2, a) . \quad L_{1}$ is perpendicular to $L_{2}$ and has $x$-intercept -1 .
(a) Find the values of $k$ and $a$.
(3 marks)
(b) Find the equation of $L_{2}$.
(2 marks)


Figure 1
8. It is given that $f(x)=-2 x^{2}+k x+7, g(x)=1-3 x$ and $f(3)=g(-2)$.
(a) Find the value of $k$.
(b) Bowie claims that $f(g(0))=g(f(0))$. Do you agree? Explain your answer.
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Section B ( 15 marks)
9. The quadratic equation $x^{2}-(2 k+3) x+k^{2}=0$ has real roots.
(a) Find the range of values of $k$.
(b) Let $\alpha$ and $\beta$ be the roots of the equation.
(i) Express the value of $\alpha^{2}+\beta^{2}$ in terms of $k$.
(ii) If $k=3$, form a quadratic equation in $x$ with roots $\alpha^{2}$ and $\beta^{2}$.
10. In Figure 2, the graph of $y=-(x-h)^{2}+k$ cuts the $x$-axis at the points $A$ and $B$, and passes through the point $C(0,-7)$. The axis of symmetry of the graph is $x=4$.
(a) Find the values of $h$ and $k$.
(3 marks)
(b) Find the coordinates of $A$ and $B$.
(2 marks)
(c) If $P$ is a point above the $x$-axis on the graph, is it possible that the area of $\triangle A B P$ is greater than that of $\triangle A B C$ ? Explain your answer. (2 marks)


Figure 2
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