18-19 2nd TERM
F.4 U.T.
MATH CP

2018 – 2019
Form 4 Second Term Uniform Test

MATHEMATICS Compulsory Part

Question-Answer Book

26th March, 2019.
8:15 a.m. – 9:30 a.m. (1 hour 15 minutes)

This paper must be answered in English.

INSTRUCTIONS

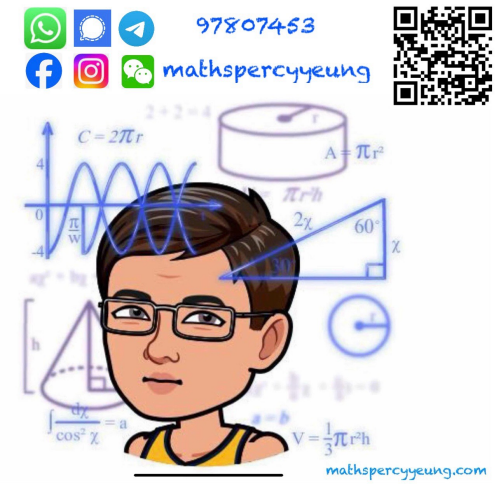
1. Write your name, class and class number in the spaces provided on this cover.

2. Answer ALL questions in Section A. You are advised to use an HB pencil to mark all the answers on the Answer Sheet, so that wrong marks can be completely erased with a clean rubber. You must mark the answers clearly; otherwise you will lose marks if the answers cannot be captured. You should mark only ONE answer for each question. If you mark more than one answer, you will receive NO MARKS for that question.

3. Attempt ALL questions in Sections B and C. Write your answers in the spaces provided in this Question – Answer Book.

4. Unless otherwise specified, all working must be clearly shown and numerical answers should be either exact or correct to 3 significant figures.

5. The diagrams in this paper are not necessarily drawn to scale.



Sections	Marks
A Total	**/ 24**
B (13 – 14)	/ 6
B (15 – 19)	/ 27
B Total	**/ 33**
C Total	**/ 13**
TOTAL	**/ 70**

Section A (24 marks)

Choose the best answer for each question.

1. Find a quadratic equation in x whose roots are $3+\sqrt{2}$ and $3-\sqrt{2}$.

A. $x^2 + 6x + 7 = 0$
B. $x^2 - 6x + 7 = 0$
C. $x^2 + 6x + 5 = 0$
D. $x^2 - 6x + 5 = 0$

2. Let k be a constant. If the quadratic equation $kx^2 - 2kx - 3 = 0$ has two equal real roots, find the value(s) of k .

A. $k = -3$ only
B. $k = 3$ only
C. $k = 0$ or -3
D. $k = 0$ or 3

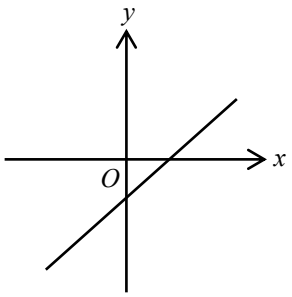
3. Find the largest possible domain of the function $f(x) = \log(3-x)$.

A. $x \le 3$
B. $x < 3$
C. $x \ge 3$
D. $x > 3$

4. If $f(x) = \dfrac{x+2}{x-2}$, $\dfrac{f(1)}{f(-1)}$ =

A. –9 .
B. –1 .
C. 1 .
D. 9 .

5. The figure shows the graph of the straight line $ax + by - 3 = 0$.



Which of the following is true?
A. $a > 0$ and $b > 0$
B. $a > 0$ and $b < 0$
C. $a < 0$ and $b > 0$
D. $a < 0$ and $b < 0$

6. A straight line L cuts the x-axis and y-axis at A and B respectively. If the centroid of ΔOAB is $(3, 4)$, where O is the origin, find the equation of L .

A. $4x+3y=0$
B. $4x+3y-12=0$
C. $4x+3y-24=0$
D. $4x+3y-36=0$

7. $\dfrac{\sqrt{a\sqrt{a}}}{\sqrt[3]{a^2}} =$

A. $a^{-\frac{9}{2}}$.
B. $a^{\frac{1}{12}}$.
C. $a^{\frac{1}{3}}$.
D. $a^{\frac{5}{6}}$.

8. If $49^{x-\frac{1}{2}} = 63$, then $7^x =$

A. 3 .

B. $\frac{3\sqrt{7}}{2}$.

C. $3\sqrt{14}$.

D. 21 .

9. If $\begin{cases} 2^{x+3y} = \frac{1}{32} \\ 2^{3x+y} = 2 \end{cases}$, $x+y=$

A. -2 .

B. -1 .

C. 1 .

D. 2 .

10. $\log_{\frac{1}{a}} a^{\frac{1}{a}} =$

A. a .

B. $\frac{1}{a}$.

C. $-\frac{1}{a}$.

D. $\frac{1}{a^2}$.

11. If $a = \log 2$ and $b = \log 3$, $\log \frac{\sqrt{8}}{81} =$

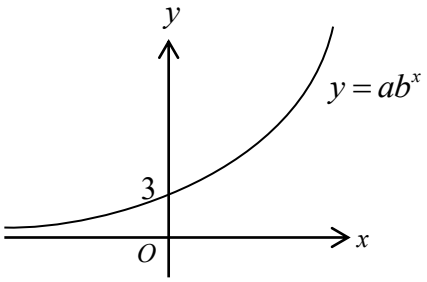
A. $\frac{3a}{8b}$.

B. $\frac{a^{\frac{3}{2}}}{b^4}$.

C. $a^{\frac{3}{2}} - b^4$.

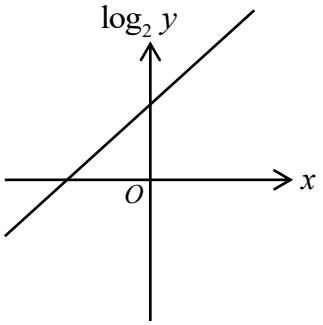
D. $\frac{3}{2}a - 4b$.

12. The figure shows the graph of $y = ab^x$, where a and b are constants.

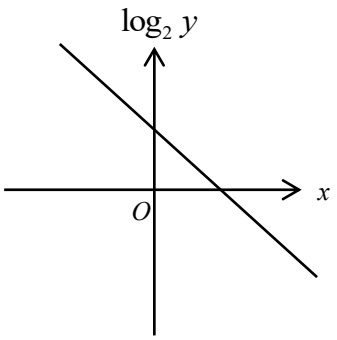


Which of the following graphs may represent the relation between x and $\log_2 y$?

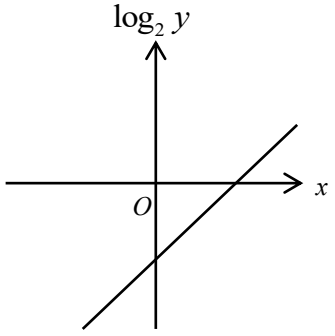
A.



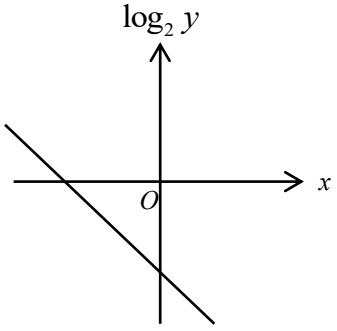
B.



C.



D.



Section B(1) (19 marks)

13. Factorize **(a)** $9a^2 - 4$.

(b) $9ax - 6x + 9a^2 - 4$. (3 marks)

14. Make v the subject of the formula $t = \dfrac{2s}{u+v}$. (3 marks)

Answers written in the margins will not be marked.

15. Simplify $\dfrac{\left(m^{-4}\right)^{\frac{1}{3}} n^2}{\left(\sqrt[3]{m}\, n^{-1}\right)^2}$ and express the answer with positive indices, where $m > 0$ and $n > 0$. (3 marks)

16. Let $f(x) = kx^2 - 3kx + 7$, where k is a constant. It is given that $f(2) = 1$.

(a) Find the value of k. (2 marks)

(b) If $g\left(\dfrac{x}{2}\right) = f(x)$, find the value of $g(5)$. (2 marks)

Answers written in the margins will not be marked.

17. Without using a calculator, solve the following equations.

(a) $\sqrt{27^x} \times 81 = \left(\frac{1}{3}\right)^{\frac{x-3}{2}}$ (3 marks)

(b) $2\left(2^{2x+1}\right) - 3\left(4^{x-1}\right) = 26$ (3 marks)

Answers written in the margins will not be marked.

Section B(2) (14 marks)

18. Let L_1 be the straight line passing through A (2, –3) and B (4, –7).

(a) Find the equation of L_1. (2 marks)

(b) If L_1 and $L_2 : 3x + 2y + 5 = 0$ intersects at C, find the coordinates of C. (3 marks)

Answers written in the margins will not be marked.

19. In Figure 1, the straight line $L_1: x + 2y + 30 = 0$ cuts the x-axis and the y-axis at P and Q respectively. The straight line L_2, passing through Q and perpendicular to L_1, cuts the x-axis at R. The straight line L_3 passes through the origin O, and cuts L_2 at S.

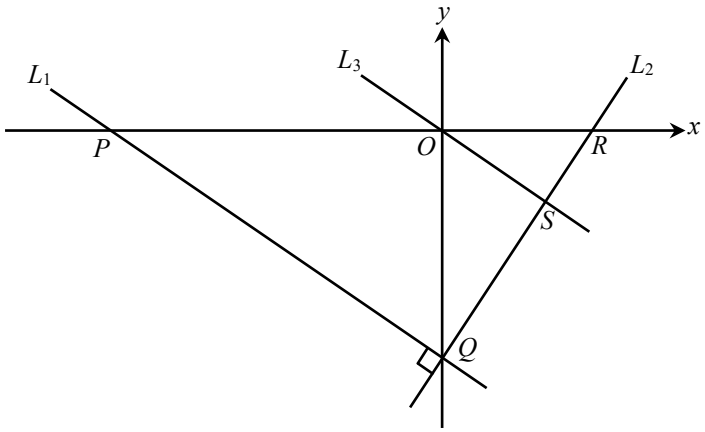


Figure 1

(a) Write down the coordinates of P and Q. (2 marks)

(b) **(i)** Find the equation of L_2.

(ii) Find the coordinates of R. (4 marks)

(c) It is given that the area of the quadrilateral $OPQS$ is 270. Is L_3 parallel to L_1? Explain your answer. (3 marks)

Answers written in the margins will not be marked.

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Section C (13 marks)

20. Let α and β be the roots of the equation $2x^2 - px + (p-2) = 0$.

(a) Express $\alpha + \beta$ and $\alpha\beta$ in terms of p.

(b) If $\alpha^2 + \beta^2 = 5$, find the value(s) of p.

(5 marks)

Answers written in the margins will not be marked.

21. Simplify the following.

(a) $\log 2x^3 + \log\frac{5}{x} - \log\frac{x^2}{10}$ (2 marks)

(b) $\dfrac{5\log_2\frac{1}{x} - \log_2 x^3}{\log_2 \sqrt[3]{x^4}}$ (3 marks)

Answers written in the margins will not be marked.

22. The graph in Figure 2 shows the linear relation between $\log_9 x$ and $\log_{27} y$. The slope of the graph is $\frac{1}{3}$ and the intercept on the horizontal axis of the graph is -3. Express the relation between x and y in the form $y = Ax^k$, where A and k are constants. (3 marks)

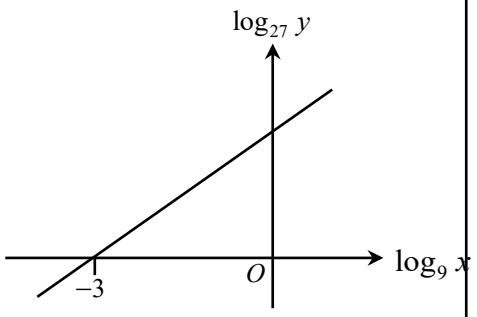

Figure 2

END OF PAPER

Answers written in the margins will not be marked.