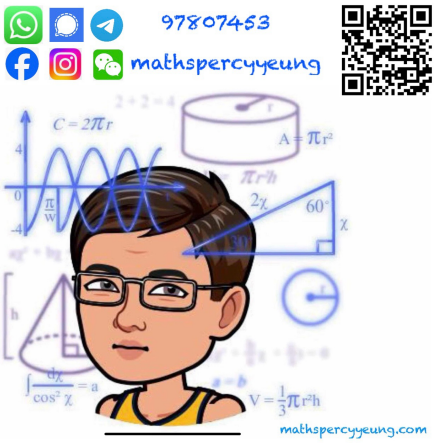
2024-2025 S4
2nd TERM UT
MATH CP

2024 – 2025
S4 Second Term Uniform Test

MATHEMATICS Compulsory Part

Question–Answer Book

21st March, 2025
9:45 am – 11:00 am (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 should 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	**/28**
B (15 – 16)	/7
B (17 – 21)	/22
B Total	**/29**
C Total	**/13**
TOTAL	**/70**

Section A (28 marks)

Choose the best answer for each question.

1. Factorize $x^4 - 16$.

   A. $(x^2-4)^2$

   B. $(x+2)(x-2)(x^2-2x+4)$

   C. $(x+2)(x-2)(x^2+4)$

   D. $(x+2)^3(x-2)$

2. $(-9^{1014})\left(\frac{1}{3}\right)^{2026} =$

   A. -9.

   B. $-\frac{1}{9}$.

   C. $\frac{1}{9}$.

   D. 9.

3. $\frac{-1}{4x+9}+\frac{1}{4x-9} =$

   A. $\frac{18}{81-16x^2}$.

   B. $\frac{18}{16x^2-81}$.

   C. $\frac{8x}{81-16x^2}$.

   D. $\frac{8x}{16x^2-81}$.

4. Given that $\sin\theta = \frac{5}{13}$ and $0^o < \theta < 90^o$, find the value of $\tan\theta$.

   A. $\frac{5}{12}$

   B. $\frac{12}{13}$

   C. $\frac{13}{12}$

   D. $\frac{12}{5}$

5. If $\sin(90°-\theta) = \frac{1}{2}$, then $\frac{1}{\cos\theta\sin^2\theta+\cos^3\theta} =$

   A. $\frac{1}{2}$.

   B. 1.

   C. $\frac{3}{2}$.

   D. 2.

6. If $x^{2025}+2025x+k$ is divisible by $x+1$, then $k =$

   A. –2026.

   B. –2024.

   C. 2024.

   D. 2026.

7. $\dfrac{x^{n+3}-x^n}{x^n}=$

A. $\dfrac{3}{n}$.

B. x^{n+3} .

C. x^3-1 .

D. $x^{n+3}-1$.

8. Give that two straight lines $4x-5y-k=0$ and $15x+ky-12=0$ are perpendicular to each other, where k is a constant. Find the value of k .

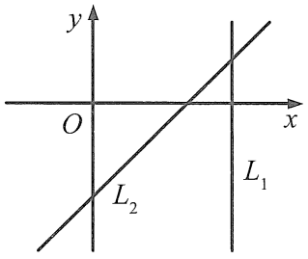
A. 12

B. –12

C. 8

D. –8

9. The figure shows the graph of the straight line $L_1: ax=1$ and $L_2: bx-cy-1=0$.



Which of the following are true?

I. $a>0$

II. $c>0$

III. $b>a$

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

10. Find the real root(s) of the equation $x-2\sqrt{x+4}-11=0$.

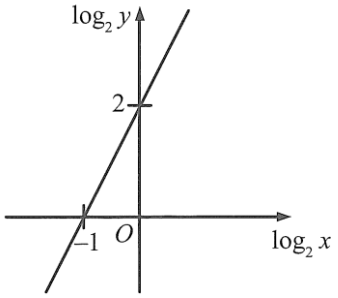
A. $x=5$

B. $x=21$

C. $x=5$ or $x=21$

D. $x=12$ or $x=5$

11. The following shows the graph of $\log_2 y$ and $\log_2 x$. Find the relation between x and y.



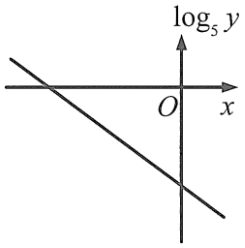
A. $y=4x^2$

B. $y=4^x$

C. $y=2x+2$

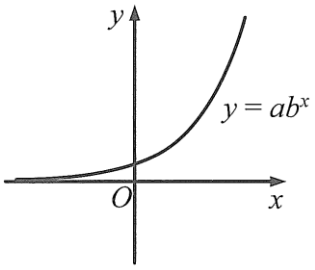
D. $y=2^x$

12.

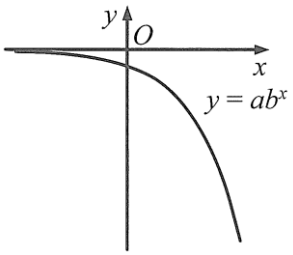


The graph shows the linear relation between x and $\log_5 y$. Which of the following graphs may represent the relation between x and y, where a and b are constants?

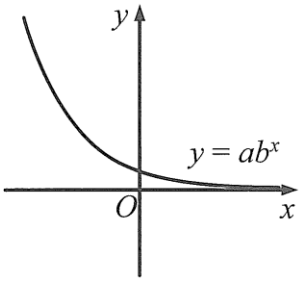
A.



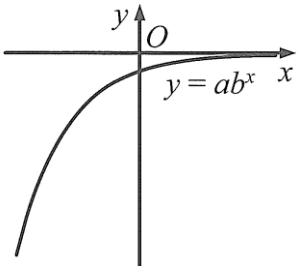
B.



C.



D.



13. If $\log(2x-7)+\log(3x+2)=2$, find x.

A. $x=-\dfrac{19}{6}$ or $x=6$

B. $x=6$

C. $x=-6$ or $x=\dfrac{19}{6}$

D. $x=\dfrac{19}{6}$

14. Which of the following is the best estimate of 7654^{12345}?

A. $10^{10\,000}$

B. $10^{20\,000}$

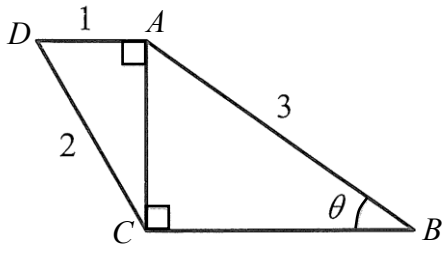
C. $10^{30\,000}$

D. $10^{50\,000}$

Section B(1) (7 marks)

15. Lily spent \$5500 on buying some towels. The costs of a brand *A* towel and a brand *B* towel are \$10 and \$20 respectively. If she sells all the brand *A* towels at \$20 each and all the brand *B* towels at \$30 each, she will gain a profit of \$3500. How many brand *A* towels and brand *B* towels did Lily buy? (4 marks)

16. In the figure, ΔABC and ΔACD are right-angled triangle with $\angle CAD = \angle ACB = 90°$. Find tan θ. (3 marks)



Section B(2) (22 marks)

17. Simplify $\left(\frac{\sqrt{a^4}}{\sqrt[6]{a^8}}\right)^{-\frac{3}{2}}$ and express your answer with positive indices. (3 marks)

18. Solve $2^{2x} - 2^{x+2} - 32 = 0$. (3 marks)

19. Sam deposits \$15 000 in a bank at 3% p.a. compounded yearly.

(a) In at least how many years will he receive a total amount of not less than \$23 000? (Give your answer correct to the nearest integer.) (4 marks)

(b) Suppose Sam wants to buy a necklace of \$3 000 using the interest received from depositing \$15 000 into the bank for 4 years. He claims that this goal can be achieved if the interest rate is increased by 2%. Do you agree? Explain your answer. (2 marks)

20. It is known that the polynomial $f(x) = 2x^3 + mx^2 + nx + 15$ is divisible by $x + 3$, where *m* and *n* are constants. When $f(x)$ is divided by $x - 2$, the remainder is – 45.

(a) Find *m* and *n*. (4 marks)

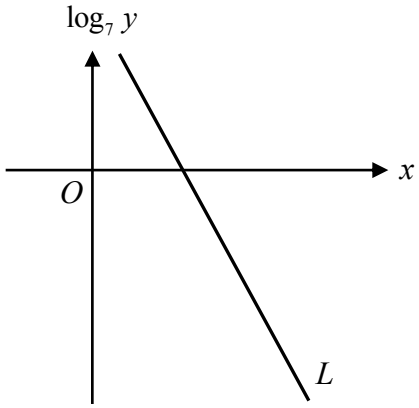
(b) Sue claims that there is only one rational root for the equation $f(x) = 0$. Do you agree? Explain your answer. (3 marks)

21. Simplify $\dfrac{\log x^4 - \dfrac{1}{2}\log x}{2\log x^4}$, where $x > 0$ and $x \neq 1$. (3 marks)

Section C (13 marks)

22. Solve the equation $\log_5 x + \log_{125} x = -4$, where $x > 0$ and $x \neq 1$. (3 marks)

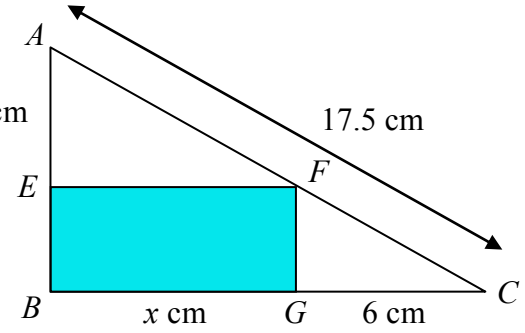
23. In the figure, straight line L shows a linear relation between x and $\log_7 y$. L passes through the points (1, 1) and (4, –5). It is given that $y = Ck^x$, where C and k are constants. Find C and k. (4 marks)



24. In the figure, a rectangle $EFGB$ is inscribed in a right-angled ΔABC, where $AC = 17.5$ cm and $AE = GC = 6$ cm. The area of $EFGB$ is 36 cm^2. Let $BG = x$ cm.

(a) Show that $\left(x+\frac{36}{x}\right)^2+12\left(x+\frac{36}{x}\right)-\frac{1225}{4}=0$. (2 marks)

(b) Find the perimeter of the rectangle $EFGB$. (4 marks)



END OF PAPER