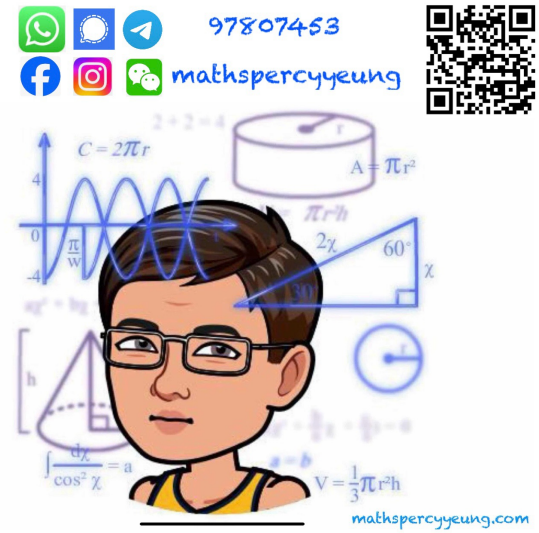
2024-2025 S4
1st TERM UT
MATH CP

2024 – 2025
S4 First Term Uniform Test

MATHEMATICS Compulsory Part

Question–Answer Book

28th October, 2024
9:45 am – 10:45 am (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. 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.

Section	Marks
A Total	**/24**
B (13 – 15)	/ 9
B (16 – 20)	/ 22
B Total	**/31**
C Total	**/15**
TOTAL	**/70**

Section A (24 marks)
Choose the best answer for each question.

1. Simplify $\sqrt{27a}-\sqrt{3a}+\sqrt{48a}$.

   A. $6\sqrt{3a}$
   B. $12\sqrt{3a}$
   C. $18\sqrt{3a}$
   D. $24\sqrt{3a}$

2. Which of the following is a rational number?

   A. $\dfrac{9}{\sqrt{3}}$
   B. $\dfrac{\sqrt{9}}{\sqrt{3}}$
   C. $\dfrac{\sqrt{3}}{27}$
   D. $\dfrac{\sqrt{3}}{\sqrt{27}}$

3. Solve the quadratic equation $x^2-6x+7=0$.

   A. $x=-3\pm\sqrt{2}$
   B. $x=-3\pm\sqrt{2}\,i$
   C. $x=3\pm\sqrt{2}$
   D. $x=3\pm\sqrt{2}\,i$

4. $ai^{11}+bi^{24}=$

   A. $a+bi$.
   B. $a-bi$.
   C. $b+ai$.
   D. $b-ai$.

5. The imaginary part of $\dfrac{5}{4+3i}$ is

   A. -3 .
   B. $-\dfrac{3}{5}$.
   C. $\dfrac{3}{5}$.
   D. 3 .

6. The base and the height of ΔABC are $(r+4)$ cm and $(8r-6)$ cm respectively. If the area of ΔABC is 104 cm^2, find the value of r . (Give your answer correct to the nearest integer if necessary.)

   A. 3
   B. 4
   C. 6
   D. 7

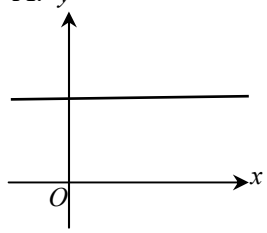
7. If $\alpha \neq \beta$ and $\begin{cases} \alpha^2 = 7 - 2\alpha \\ \beta^2 = 7 - 2\beta \end{cases}$, then $\alpha^2\beta + \alpha\beta^2 =$

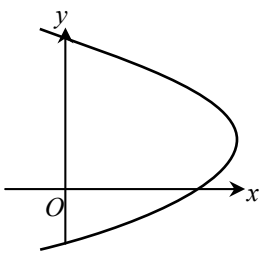
A. -14.
B. -7.
C. 7.
D. 14.

8. If the quadratic equation $x^2 + 7x + 12 = 3k$ has no real roots, find the range of values of k.

A. $k < -\dfrac{1}{12}$
B. $k < 12$
C. $k > \dfrac{1}{12}$
D. $k > 12$

9. Which of the following graphs represents that y is not a function of x?

A.


B.


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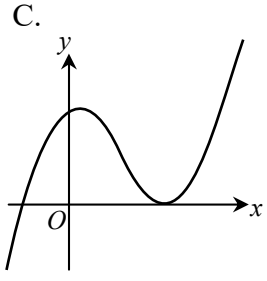

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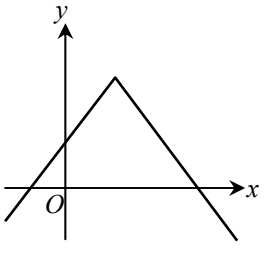
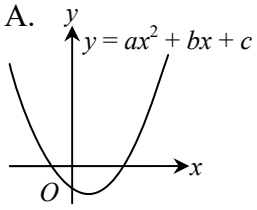
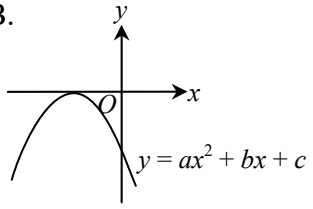


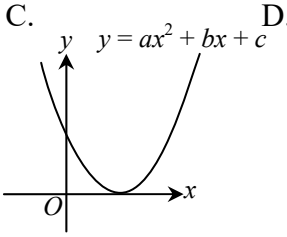
10. If $f(x) = x(3 + 2x)$, then $f(3 + 2x) =$

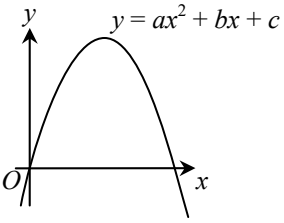
A. $(3 + 2x)^2$.
B. $(3 + 2x)^3$.
C. $(3 + 2x)(9 + 4x)$.
D. $(3 + 2x)(9 + 4x)^2$.

11. Which of the following graphs represents that $\dfrac{c}{a} < 0$?

A.


B.


C.


D.


12. If the vertex of the graph of $y = -2(x - h)^2 + k$ is $(-5, 8)$, find the y-intercept of the graph.

A. -133
B. -58
C. -42
D. 8

Section B(1) (14 marks)

13. Simplify $\dfrac{\left(x^2y^{-4}\right)^3}{2xy^{-3}}$ and express your answer with positive indices. (3 marks)

14. Factorize

(a) $9x^2-25y^2$,

(b) $9x^2-25y^2-9x+15y$. (3 marks)

15. Make x the subject of the formula $y=\dfrac{3x}{x+2y}$. (3 marks)

Answers written in the margins will not be marked

16. Convert $0.0\dot{4}\dot{2}$ into a fraction. Show your steps clearly. (2 marks)

17. Solve the quadratic equation $3x^2 - 4x = 3x + 2$. (Leave your answer in surd form if necessary.) (3 marks)

Answers written in the margins will not be marked

Section B(2) (17 marks)

18. (a) Solve the equation $3m^2 - 11m + 6 = 0$. (2 marks)

(b) Hence, solve the equation $3\left(\sqrt{y} - 1\right)^2 - 11\left(\sqrt{y} - 1\right) + 6 = 0$. (2 marks)

19. Let $f(x) = 9x^2 - 24x + k$, where k is a constant. The equation $f(x) = 0$ has equal roots. Find

(a) k , (3 marks)

(b) the x-intercept(s) of the graph of $y = f(x) - 4$. (2 marks)

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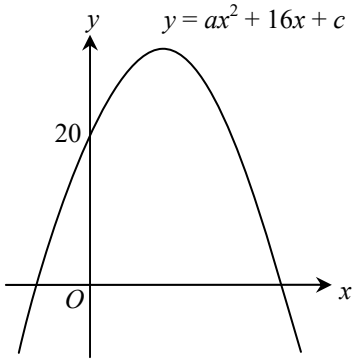
20. The figure shows the graph of $y = ax^2 + 16x + c$. The y-intercept of the graph is 20 and the graph passes through $(3, 32)$.



(a) Find the values of a and c . (3 marks)

(b) Find the x-intercepts of the graph. (2 marks)

(c) Find the equation of the axis of symmetry and the coordinates of the vertex of the graph. (3 marks)

Answers written in the margins will not be marked

Section C (15 marks)

21. Let α and β be the roots of the equation $2x^2 + 6x + k = 0$.

(a) Find, in terms of k ,

(i) $\alpha + \beta$,

(ii) $\alpha\beta$,

(iii) $(\alpha - 1)(\beta - 1)$,

(iv) $\alpha^2 + \beta^2$.

(5 marks)

(b) Given that $\alpha^2 + \beta^2 = 14$.

(i) Find the value of k .

(ii) Form a quadratic equation in x with integral coefficients whose roots are $\alpha - 1$ and $\beta - 1$.

(4 marks)

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22. Let $z = a(a-1+i)-3(2+i)$ where a is a real constant and $i^2 = -1$. If z is purely imaginary, find a. (3 marks)

23. Find the complex number z if $(7+5i)z = 53-15i$ and express your answer in the form $a + bi$. (3 marks)

END OF PAPER

Answers written in the margins will not be marked