Sino Bright School Chongqing

Midterm Exam, 2025-2026 T1

Class & Subject:	G10 C2 Math
Date:	Nov 2025
Time:	90 Minutes
Teacher:	Shi Feng

IMPORTANT: Read together before beginning the exam.

Students must complete the assessments to the best of their ability. Any students found cheating during an exam will be given a zero and referred to the Principal for further disciplinary measures. Cheating is a serious offense.

"Cheating" may include any of the following:

- Having course papers, notes, unapproved data sheets or other course-related materials in the exam room without the expressed permission of the subject class teacher in charge of the exam.
- Using or even having a cellphone or other electronic device in the exam room without the express permission of the subject class teacher in charge of the exam.
- Attempting to communicate, either verbally or non-verbally with other students during the exam.
- Having exam-related materials prior to the writing of the exam.

Mark Breakdown:	Student Name:
Part I: Multiple Choice Questions 2 Marks × 10 Part II: Short Answer Questions 2 Marks × 20 Part III: Long Answer Questions 29 Marks	
Total Marks: 99 Marks	Score: _____

Special Instructions/Materials Allowed:

- Pen, Calculator

Multiple Choice Questions (10 questions, 2 marks each)

Circle the correct answer for each question.

1. Simplify $\dfrac{x^3 \times x^4}{x^{-2}}$

   (a) x^5

   (b) x^9

   (c) x^{-1}

   (d) x^{24}

2. Which expression is equivalent to $(2x-3)(x+4)$?

   (a) $2x^2+5x-12$

   (b) $2x^2+11x-12$

   (c) $2x^2-5x-12$

   (d) $2x^2-11x-12$

3. Factorize completely: x^3-4x

   (a) $x(x-2)(x+2)$

   (b) $x(x-4)$

   (c) $(x^2-2)(x+2)$

   (d) $x(x-2)^2$

4. Simplify $\sqrt{75}+2\sqrt{12}-\sqrt{27}$

   (a) $4\sqrt{3}$

   (b) $6\sqrt{3}$

   (c) $8\sqrt{3}$

   (d) $10\sqrt{3}$

5. Solve the equation: $x^2-5x-14=0$

   (a) $x=2,7$

   (b) $x=-2,7$

   (c) $x=2,-7$

   (d) $x=-2,-7$

6. The quadratic function $f(x)=2x^2-8x+5$ can be written in completed square form as:

   (a) $2(x-2)^2-3$

   (b) $2(x-4)^2-11$

   (c) $(x-4)^2-11$

   (d) $2(x-2)^2+13$

7. Solve the simultaneous equations:

$$y = 2x - 1$$
$$x^2 + y^2 = 10$$

   (a) $(1, 1)$ and $(-3, -7)$
   (b) $(1, 1)$ and $(3, 5)$
   (c) $(-1, -3)$ and $(3, 5)$
   (d) $(2, 3)$ and $(-2, -5)$

8. Find the solution set for the inequality: $x^2 - 3x - 10 < 0$

   (a) $\{x : -2 < x < 5\}$
   (b) $\{x : x < -2\} \cup \{x : x > 5\}$
   (c) $\{x : -5 < x < 2\}$
   (d) $\{x : x < -5\} \cup \{x : x > 2\}$

9. The graph of $y = x^2$ is translated by the vector $\begin{pmatrix} 2 \\ -3 \end{pmatrix}$. What is the equation of the transformed graph?

   (a) $y = (x + 2)^2 - 3$
   (b) $y = (x - 2)^2 - 3$
   (c) $y = (x + 3)^2 + 2$
   (d) $y = (x - 3)^2 + 2$

10. A straight line passes through points $(1, 4)$ and $(3, 10)$. What is its gradient?

   (a) 2
   (b) 3
   (c) 4
   (d) 6

Short Answer Questions (20 questions, 2 marks each)

True/False

State whether each statement is True or False.

11. $a^m \times a^n = a^{m+n}$ for all real values of a, m, and n. True False

12. The expression $\frac{1}{\sqrt{3}}$ can be rationalized to $\frac{\sqrt{3}}{3}$. True False

13. The solutions to $x^2 + 4x + 4 = 0$ are $x = -2$ (repeated root). True False

14. The discriminant of $2x^2 - 5x + 3 = 0$ is positive. True False

15. The inequality $|x - 2| < 5$ is equivalent to $-3 < x < 7$. True False

16. The graphs of $y = \frac{1}{x}$ and $y = \frac{2}{x}$ have the same asymptotes. True False

17. The line $y = 3x - 2$ is perpendicular to $y = -\frac{1}{3}x + 4$. True False

18. The distance between points $(1, 2)$ and $(4, 6)$ is 5 units. True False

19. In any triangle, $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$ (Sine Rule). True False

20. $180°$ is equal to π radians. True False

Fill in the Blank Questions

Complete each statement.

21. Simplify: $8^{\frac{2}{3}} =$ _____

22. Expand and simplify: $(x - 3)^2 =$ _____

23. Factorize completely: $x^2 - 5x - 24 =$ _____

24. Rationalize the denominator: $\frac{3}{\sqrt{5}} =$ _____

25. Solve: $x^2 - 6x + 8 = 0$, $x =$ _____

26. Write $x^2 + 8x + 1$ in completed square form: _____

27. Solve the inequality: $2x - 5 > 7$, $x >$ _____

28. Find the gradient of the line perpendicular to $y = 2x + 5$: _____

29. The area of a triangle with sides 5 cm, 6 cm, and 7 cm is _____ cm^2

30. Convert $60°$ to radians: _____ radians

Long Answer Questions

1. Figure 1 shows a plot of the curve with equation $y = \sin\theta$, $0 \leq \theta \leq 360°$

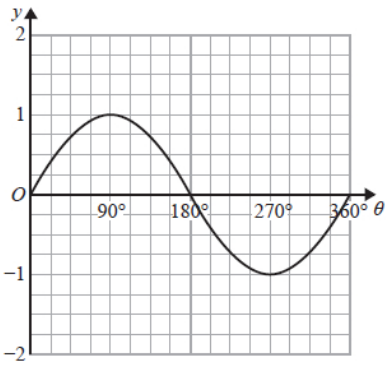

Figure 1

(a) State the coordinates of the minimum point on the curve with equation

$$y = 4\sin\theta, \quad 0 \leq \theta \leq 360^\circ$$

(2 marks)

(b) A copy of Figure 1, called Diagram 1, is shown here.
On Diagram 1, sketch and label the curves

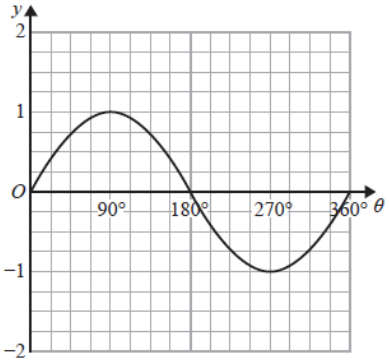

Diagram 1

i. $y = 1 + \sin\theta, \quad 0 \leq \theta \leq 360^\circ$ **(1 marks)**

ii. $y = \tan\theta, \quad 0 \leq \theta \leq 360^\circ$ **(1 marks)**

(c) Hence find the number of solutions of the equation

i. $\tan\theta = 1 + \sin\theta$ that lie in the region $0 \leq \theta \leq 2160^\circ$ **(1.5 marks)**

ii. $\tan\theta = 1 + \sin\theta$ that lie in the region $0 \leq \theta \leq 1980^\circ$ **(1.5 marks)**

(Total for question = 7 marks)

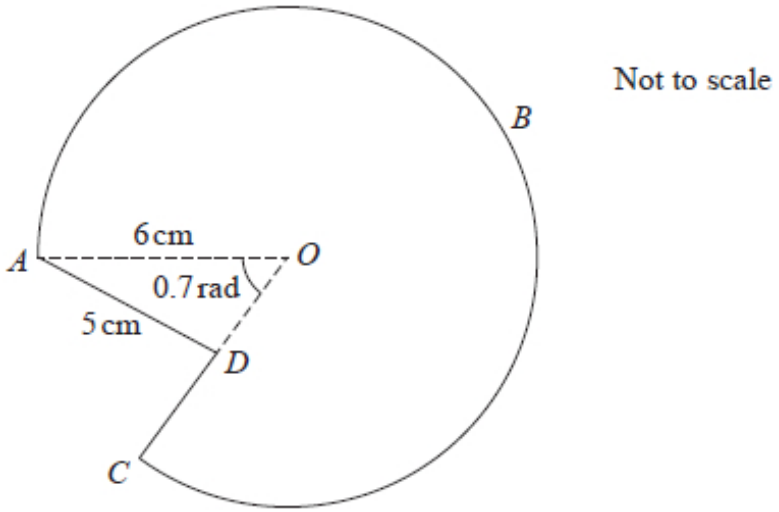

Figure 2

2. The shape ABCDA consists of a sector ABCOA of a circle, centre O, joined to a triangle AOD, as shown in Figure 2.
The point D lies on OC.
The radius of the circle is 6 *cm*, length AD is 5 *cm* and angle AOD is 0.7 radians.

   (a) Find the area of the sector ABCOA, giving your answer to one decimal place. **(3 marks)**

   (b) Given angle ADO is obtuse, find the size of angle ADO, giving your answer to 3 decimal places. **(3 marks)**

   (c) Hence find the perimeter of shape ABCDA, giving your answer to one decimal place. **(4 marks)**

(Total for question = 10 marks)

3. (a) On Diagram 2 sketch the graphs of

i. $y = x(3 - x)$ **(2 marks)**

ii. $y = x(x - 2)(5 - x)$ **(2 marks)**

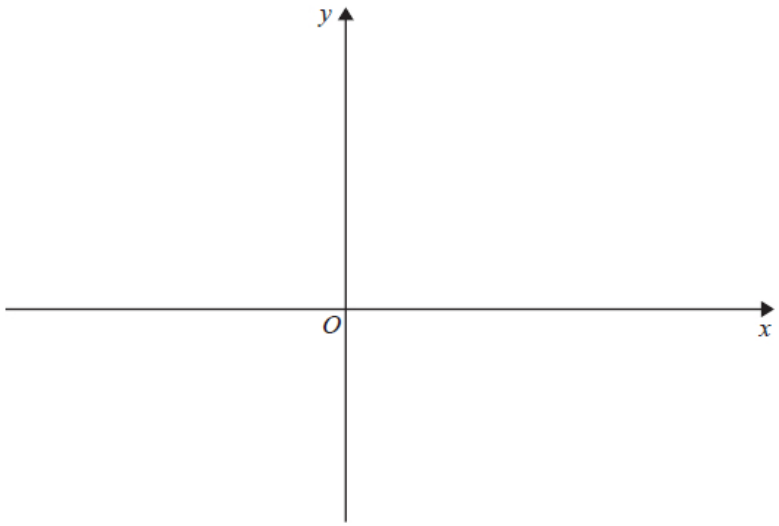

Diagram 2

showing clearly the coordinates of the points where the curves cross the coordinate axes.

(b) Show that the x coordinates of the points of intersection of

$$y = x(3 - x) \text{ and } y = x(x - 2)(5 - x)$$

are given by the solutions to the equation $x(x^2 - 8x + 13) = 0$ **(3 marks)**

(c) The point P lies on both curves. Given that P lies in the first quadrant, find, using algebra and showing your working, the exact coordinates of P. **(5 marks)**

(Total for question = 12 marks)