



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.

<b>Mark Breakdown:</b>	
Part I: Multiple Choice Questions 2 Marks $\times$ 10	Student Name: _____
Part II: Short Answer Questions 2 Marks $\times$ 20	
Part III: Long Answer Questions 29 Marks	
Total Marks: 89 Marks	Score: _____

### **Special Instructions/Materials Allowed:**

- Pen, Calculator



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## Multiple Choice Questions (10 questions, 2 marks each)

Circle the correct answer for each question.

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

- (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 |



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- |  |      |       |
|--|------|-------|
| 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. $180^\circ$ is equal to $\pi$ 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 smallest angle of a triangle with sides 5 cm, 6 cm, and 7 cm is _____ radians |
| 30. Convert $60^\circ$ to radians: _____ radians                                      |

## Long Answer Questions

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

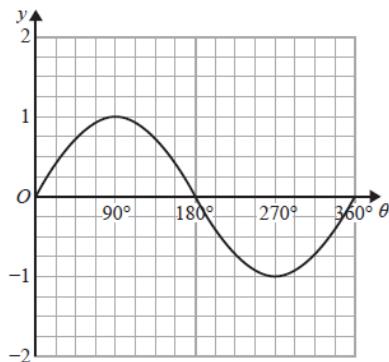


Figure 1



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

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

**(2 marks)**

- (b) A copy of Figure 1, called Diagram 1, is shown here.

On Diagram 1, sketch and label the curves

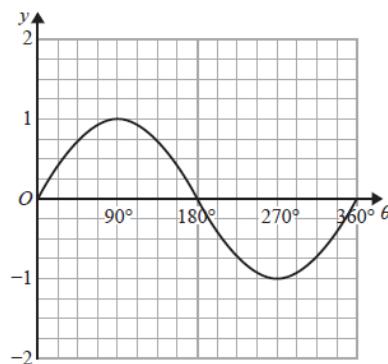


Diagram 1

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

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

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

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

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

**(Total for question = 7 marks)**

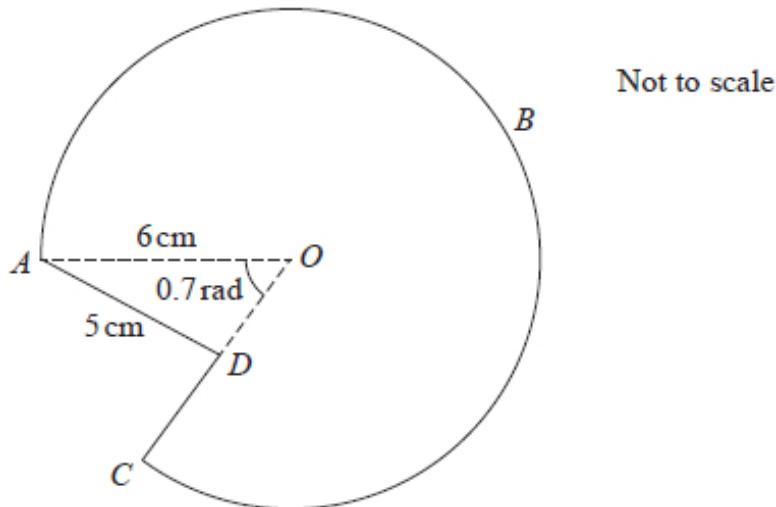


Figure 2

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.

- Find the area of the sector ABCOA, giving your answer to one decimal place. **(3 marks)**
- Given angle ADO is obtuse, find the size of angle ADO, giving your answer to 3 decimal places. **(3 marks)**
- 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)

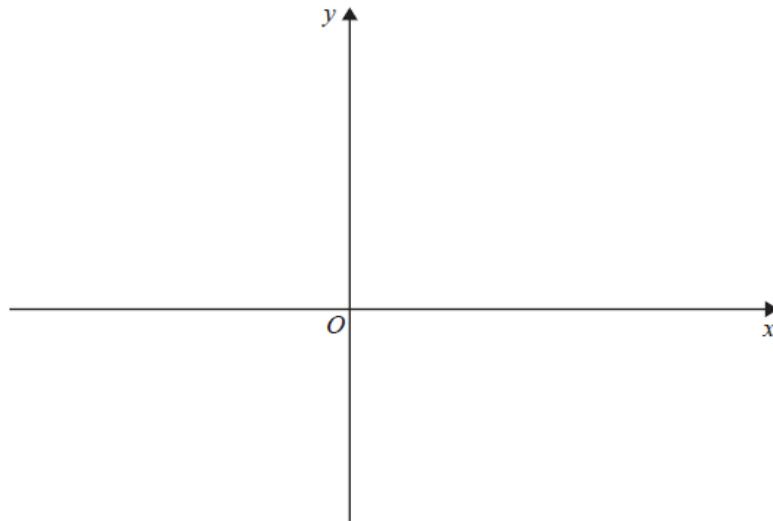


Diagram 2

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)