2024-2025 S5
1st TERM EXAM
MATH CP
PAPER 2

MC

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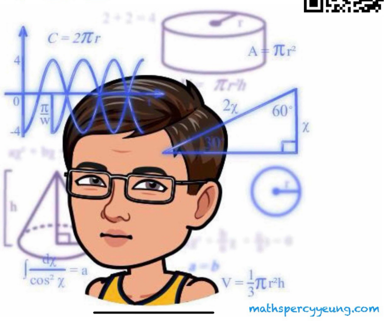


2024 – 2025
S5 First Term Examination

MATHEMATICS Compulsory Part

PAPER 2

6th January, 2025
10:30 am – 11:30 am (1 hour)
Total Marks : 36

INSTRUCTIONS

1. Read carefully the instructions on the Answer Sheet. After the announcement of the start of the examination, you should insert the information required in the spaces provided.

2. When told to open this book, you should check that all the questions are there. Look for the words '**END OF PAPER**' after the last question.

3. All questions carry equal marks.

4. **ANSWER ALL QUESTIONS**. You should use an HB pencil to mark all your 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.

5. You should mark only **ONE** answer for each question. If you mark more than one answer, you will receive **NO MARKS** for that question.

6. No marks will be deducted for wrong answers.

There are 18 questions in Section A and 18 questions in Section B.
The diagrams in this paper are not necessarily drawn to scale.
Choose the best answer for each question.

Section A

1. $\dfrac{2^{n+1} \bullet 4^{2n}}{8^{n+3}} =$

   A. 4^{n-2}.
   B. 4^{n-1}.
   C. 2^{2n-8}.
   D. 2^{2n-2}.

2. If $x = 6.24$ (correct to 2 decimal places), find the range of values of x.

   A. $6.23 < x \le 6.25$
   B. $6.23 \le x < 6.25$
   C. $6.235 < x \le 6.245$
   D. $6.235 \le x < 6.245$

3. $(x+3y)^2 - (x-3y)^2 =$

   A. $2x^2$.
   B. $6xy$.
   C. $12xy$.
   D. $2x^2 + 18y^2$.

4. Solve $3x - 4 \le 2x + 1 < 5x + 10$.

   A. $x < -3$ or $x \ge 5$
   B. $-3 < x \le 5$
   C. $x < -3$
   D. $x \ge 5$

5. Let m be a constant. Solve the equation $x^2 - 3x = (m-1)^2 - 3(m-1)$.

   A. $x = m-1$ or $x = m-4$
   B. $x = m-1$ or $x = 4-m$
   C. $x = 1-m$ or $x = m-4$
   D. $x = 1-m$ or $x = 4-m$

6. Let $f(x) = (x-h)(x+1) + k$, where h and k are constants. If $f(1) = f(6) = 10$, find the value of k.

   A. 4
   B. 8
   C. 16
   D. 24

7. Let $f(x) = 2x^2 + 3x - 7k$, where k is a positive constant. If $f(x)$ is divisible by $x-k$, find the remainder when $f(x)$ is divided by x.

   A. 0
   B. -2
   C. -9
   D. -14

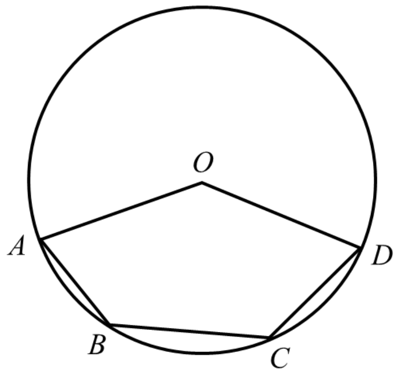
8. It is given that z varies directly as x^3 and inversely as $\sqrt{y}$. Which of the following must be a constant?

   A. $\dfrac{z^2\sqrt{y}}{x^3}$
   B. $\dfrac{z^2 y}{x^6}$
   C. $\dfrac{zy}{x^6}$
   D. $\dfrac{z^2 y}{x^3}$

9. Which of the following statements about the graph of $y = 4-(x+1)^2$ is true?

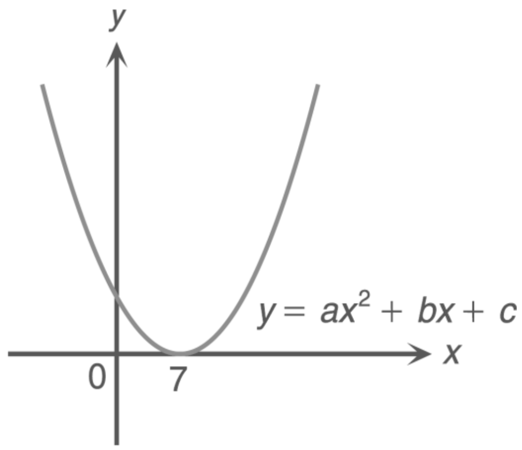
   A. The x-intercepts of the graph are -1 and 3.
   B. The y-intercept of the graph is 4.
   C. The graph opens upwards.
   D. The coordinates of the vertex are $(-1, 4)$.

10. In the figure, O is the centre of circle *ABCD*. If $\angle OAB = 67°$, $\angle ABC = 135°$ and $\angle ODC = 60°$, find $\angle BCD$.



A. 60°
B. 68°
C. 128°
D. 135°

11. Refer to the graph of $y = ax^2 + bx + c$.



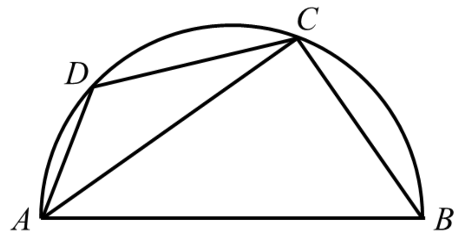
The solution(s) of $ax^2 + bx + c > 0$ is/are

A. all real values of *x* except $x = 7$.
B. all real values of *x*.
C. $x = 7$.
D. no solutions.

12. The sum of two integers is 8, and the larger number is *x*. If the product of the two integers is at least 12, the greatest possible value of *x* is

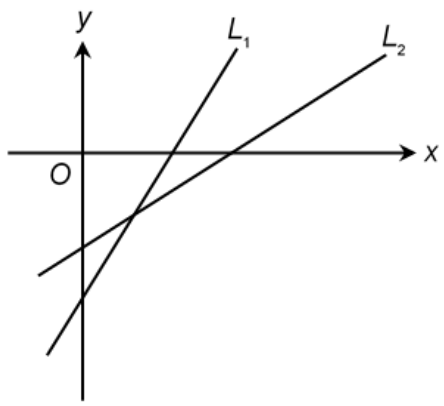
A. 3.
B. 4.
C. 5.
D. 6.

13. In the figure, *ABCD* is a semi-circle. If $BC = CD$ and $\angle ADC = 127°$, find $\angle ACD$.



A. 16°
B. 17°
C. 26°
D. 27°

14. In the figure, the equations of the straight lines L_1 and L_2 are $ax + by + 2 = 0$ and $cx + dy + 2 = 0$ respectively.



Which of the following must be true?

I. $a < 0$
II. $b < 0$
III. $ad < bc$

A. I and II only
B. I and III only
C. II and III only
D. I, II and III

15. $\sin(180° - \theta)\cos(360° + \theta)\tan(90° - \theta) =$

A. $\sin\theta\tan\theta$.
B. $\cos\theta\tan\theta$.
C. $\sin^2\theta$.
D. $\cos^2\theta$.

16 If the quadratic equation $2x^2 + kx + (2k + 24) = 0$ has one double positive real root, then $k =$

A. -8.

B. 24.

C. -8 or 24.

D. 8 or -24.

17. For $0° \le x \le 360°$, how many solutions does the equation $\sin x(\cos^2 x - 2) = 0$ have?

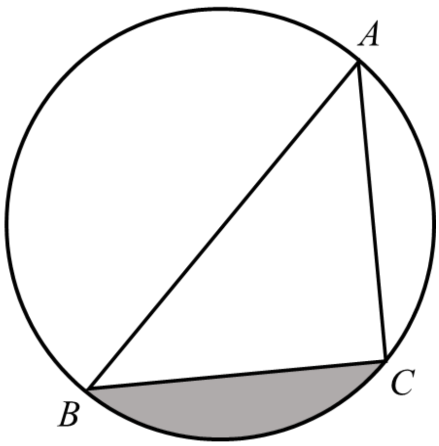
A. 7

B. 6

C. 4

D. 3

18. The figure shows the circle *ABC*. If $AB = 29$ cm, $BC = 20$ cm and $CA = 21$ cm, find the area of the shaded region, correct to the nearest cm^2.



A. 55 cm^2

B. 56 cm^2

C. 65 cm^2

D. 66 cm^2

Section B

19. The H.C.F. of $2a^2b^5$, $3a^5$ and $6a^3b$ is

A. a^2.

B. a^2b.

C. $6a^3b^5$.

D. $6a^5b^5$.

20. Solve $2(\log x)^2 - \log x^3 - 2 = 0$.

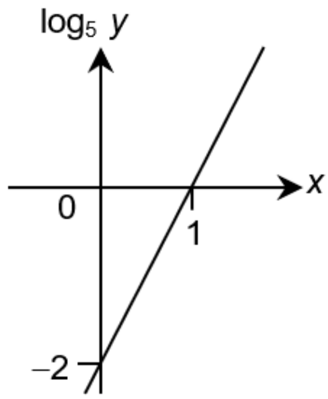
A. $x = \frac{1}{100}$ or $\sqrt{10}$

B. $x = \frac{1}{\sqrt{10}}$ or 100

C. $x = -\sqrt{10}$ or 100

D. $x = \sqrt{10}$ or -100

21. The graph in the figure shows the linear relation between x and $\log_5 y$.



If $y = ab^x$, then $b =$

A. $\frac{1}{100}$.

B. $\frac{1}{25}$.

C. 25.

D. 100.

22. The imaginary part of $\frac{6i^{124} + i^{357}}{2i - 3i^2}$ is

A. $-\frac{20}{13}$.

B. $-\frac{9}{13}$.

C. $\frac{9}{13}$.

D. $\frac{20}{13}$.

23. The three sides of ΔABC are 13 cm, 17 cm and $2a$ cm respectively. Given that $2 < a < 15$. Find the area of ΔABC.

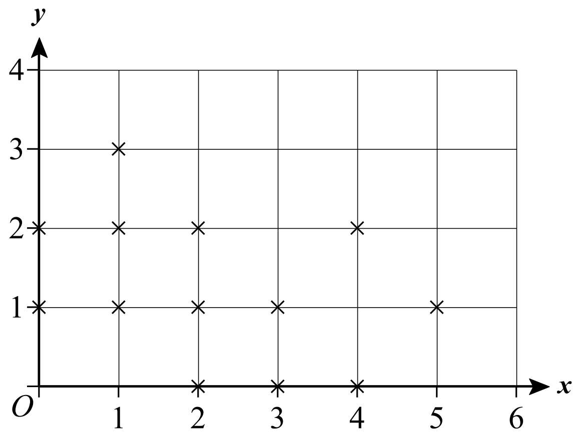
A. $\sqrt{(a^2-4)(225-a^2)}$ cm^2

B. $\sqrt{(a^2-4)(225+a^2)}$ cm^2

C. $\sqrt{(a^2+4)(225-a^2)}$ cm^2

D. $\sqrt{(a^2+4)(225+a^2)}$ cm^2

24.



The figure shows the solutions of some constraints by black crosses. If (x, y) satisfies these constraints, find the maximum value of $2x-y-3$.

A. 4

B. 5

C. 6

D. 7

25. Given that the quadratic inequality $(2-k)x^2-(k-2)x+1 \geq 0$ for any real values of x. Find the range of values of k.

A. $-2 \leq k < 2$

B. $k > 2$

C. $-2 < k < 2$

D. $-2 \leq k \leq 2$

26. Consider the following system of inequalities:

$$\begin{cases} x \geq 0 \\ y \geq 0 \\ x+3y \geq 12 \\ x+y \geq 8 \end{cases}$$

Let D be the region which represents the solutions of the system of inequalities. If (x, y) is a point lying in D, then the minimum value of $2x + 3y$ is

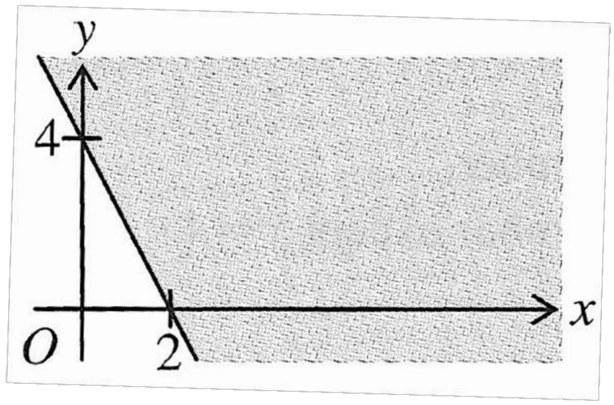
A. 0.

B. 12.

C. 18.

D. 24.

27.



The shaded region (including the boundary) represents the solution of

A. $y \geq -2x+4$.

B. $y \leq -2x+4$.

C. $y \geq 2x+4$.

D. $y \leq 2x+4$.

28. A cat is 8 m due east of a road sign. If the cat walks in the direction of S30°W, find the shortest distance between the cat and the road sign, correct to the nearest m.

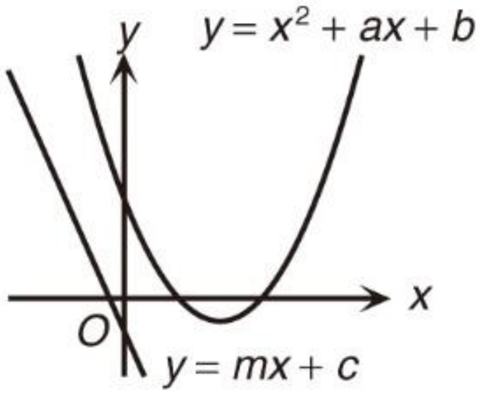
A. 4 m

B. 5 m

C. 7 m

D. 14 m

29. The figure shows the graphs of $y = x^2 + ax + b$ and $y = mx + c$. Given that they have no intersections.



Which of the following must be true?

I. $x^2 + ax + b = 0$ has two distinct real roots.

II. $(a-m)^2 < 4(c-b)$

III. $x^2 + (a-m)x + (b-c) = 0$ has no real roots.

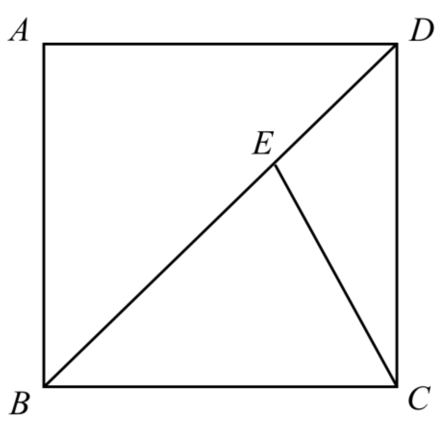
A. I and II only

B. I and III only

C. II and III only

D. I, II and III

30. In the figure, *ABCD* is a square and its area is 169 cm^2. If *E* is a point on *BD* such that $CE = 2DE$, find *DE*, correct to the nearest cm.



A. 4 cm

B. 5 cm

C. 11 cm

D. 16 cm

31. A manufacturer produces two types of products, Q and W, at a cost of \$120 and \$80 each respectively. He has a capital of \$2000 and the storeroom can only store 20 products. Let x and y be the numbers of products of Q and W produced respectively. Which of the following inequalities are the constraints for the manufacturer?

I. $3x + 2y \geq 50$

II. $x + y \leq 20$

III. x is a non-negative integer.

IV. y is a non-negative integer.

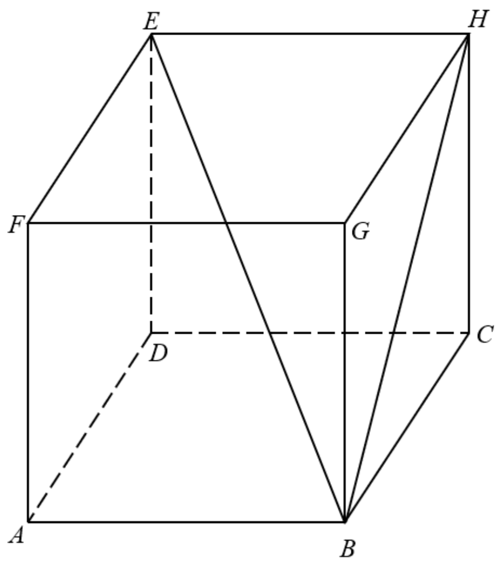
A. I and II only

B. III and IV only

C. II, III and IV only

D. I, II, III and IV

32. In the figure, *ABCDEFGH* is a cube. Let α be the angle between the line *BE* and the plane *ADEF* while β be the angle between the plane *BHE* and the plane *CDEH*. Which of the following is true?



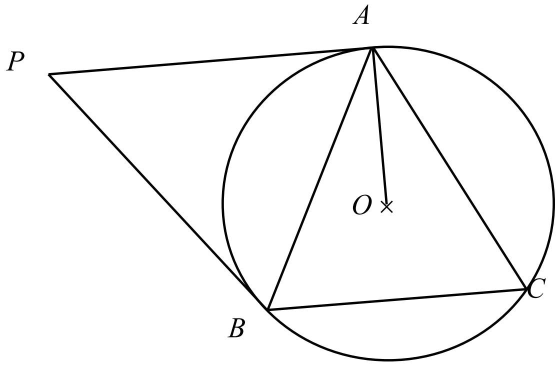
A. $\alpha < 60° < \beta$.

B. $\alpha < \beta < 60°$.

C. $\beta < \alpha < 60°$.

D. $60° < \beta < \alpha$.

33. In the figure, PA is the tangent to the circle ABC at A. It is given that $PA = PB$ and $AB = AC$.



Which of the following must be true?

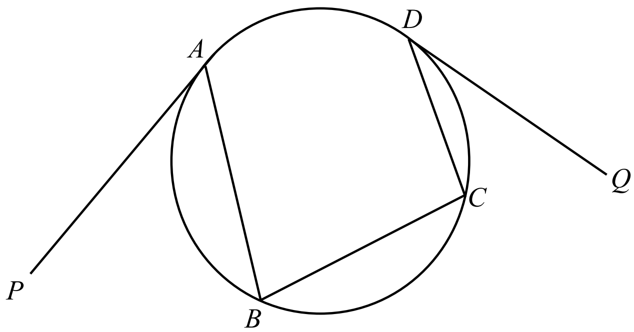
I. $PA // BC$

II. PB is the tangent to the circle at B.

III. AO is the angle bisector of $\angle BAC$.

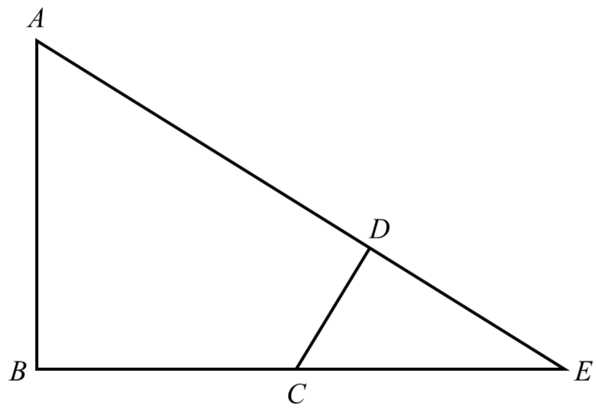
A. I and II only
B. I and III only
C. II and III only
D. I, II and III

34. In the figure, $ABCD$ is a circle. PA and QD are tangents to the circle at A and D respectively. It is given that $AB // DC$, $\angle BAP = 47°$ and $\angle CDQ = 33°$. Find $\angle BCD$.



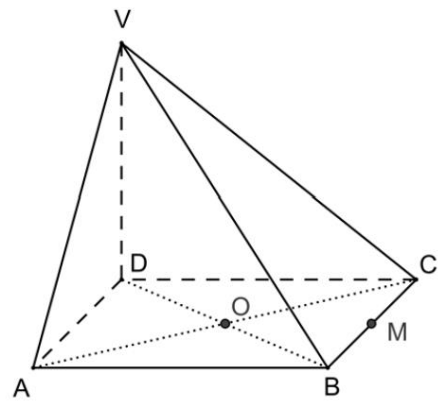
A. 80°
B. 83°
C. 96°
D. 97°

35. In the figure, $ABCD$ is a cyclic quadrilateral. AD produced and BC produced meet at E. It is given that $BC = 82$ cm, $CD = 32$ cm, $CE = 68$ cm and $DE = 60$ cm. Find the area of the circle passing through A, B, C and D.



A. 3281π cm^2
B. 4624π cm^2
C. 6562π cm^2
D. 9248π cm^2

36. In the figure, $ABCD$ is a rectangle and O is the intersection of AC and BD. M is the midpoint of BC and VD is the altitude of the pyramid. The angle between planes VBC and $ABCD$ is



A. $\angle VMD$.
B. $\angle VMO$.
C. $\angle VCD$.
D. $\angle VMA$.

END OF PAPER