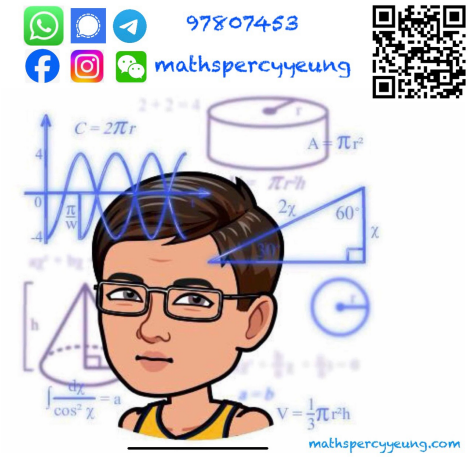
2024-2025 S5
2nd TERM EXAM
MATH CP
PAPER 2
MC



2024 – 2025
S5 Second Term Examination

MATHEMATICS Compulsory Part

PAPER 2

11th June, 2025
11:00 am – 12:15 pm (1 hour 15 minutes)
Total Marks: 45

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 30 questions in Section A and 15 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. $(5^{222})^4\left(-\frac{1}{25}\right)^{222} =$

   A. 5^{444}.

   B. 25.

   C. -2.

   D. $-\frac{1}{5^{444}}$.

2. If $P=\frac{VT}{R}-2$, then $T=$

   A. $\frac{P}{V}+2R$.

   B. $\frac{RP+2}{V}$.

   C. $\frac{R(P+2)}{V}$.

   D. $R\left(\frac{P}{V}+2\right)$.

3. If $1.0538 < a < 1.0583$, which of the following must be true?

   A. $a = 1.06$ (correct to 3 sig. fig.)

   B. $a = 1.05$ (correct to 3 sig. fig.)

   C. $a = 1.0$ (correct to 2 sig. fig.)

   D. $a = 1$ (correct to 1 sig. fig.)

4. Suppose the universal set $\mathbf{U}=\{u : u \text{ is a positive integer at most } 20\}$. It contains sets X, Y and Z, where $X=\{x:\ x \text{ is a multiple of } 2\}$, $Y=\{y:\ y \text{ is a multiple of } 3\}$ and $Z=\{z:\ z \text{ is a multiple of } 5\}$. Find $(X \cup Y) \cap Z$.

   A. {10, 20}

   B. {10, 15, 20}

   C. {5, 10, 15, 20}

   D. {2, 3, 5, 10, 15, 20}

5. Let k be a constant. Solve the quadratic equation $(kx+1)^2=1$.

   A. $x=0$

   B. $x=-\frac{2}{k}$

   C. $x=0$ or $x=-\frac{2}{k}$

   D. $x=0$ or $x=-2k$

6. The solution of $3x-1<-19$ or $\frac{15-7x}{6}<2-x$ is

A. $x<-6$.

B. $x>3$.

C. $-6<x<3$.

D. $x<-6$ or $x>3$.

7. If $\frac{x}{y}\geq 1$ and $y>0$, which of the following must be true?

A. $\frac{y}{x}\geq 1$

B. $\frac{x+3}{y+3}\geq 1$

C. $\frac{x+2}{y+3}\geq 1$

D. $xy\geq 1$

8. If a and b are non-zero constants such that $ax^2+2(cx-6)\equiv x(5b-x)+3b$, then $a-c=$

A. -11.

B. -9.

C. 0.

D. 9.

9. The scale of a map is 1 : 40 000. If the actual area of a garden is 2 km^2, then the area of this garden on the map is

A. 7.5 cm^2.

B. 12.5 cm^2.

C. 25 cm^2.

D. 50 cm^2.

10. If the selling price of 6 pears is equal to the cost of 9 pears, then the percentage profit of selling one pear is

A. 30%.

B. $33\frac{1}{3}\%$.

C. 50%.

D. 60%.

11. Given parallelogram $OABC$ where O is the origin. A and C are the points (–3, 6) and (–7, 5) respectively. Find the equation of OB.

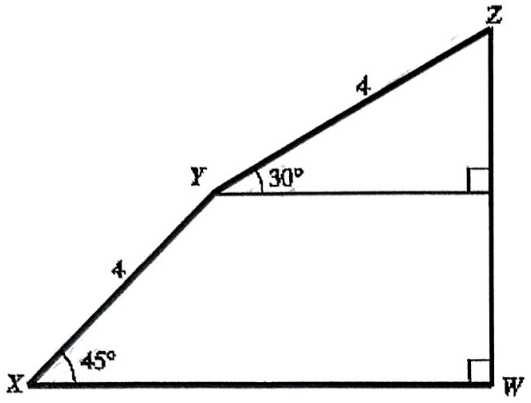
A. $10x-11y=0$

B. $11x+10y=0$

C $5x+y=0$

D. $x-5y=0$

12. In the figure, the gradient of the line joining X and Z is



A. $4\tan 75°$.

B. $4\tan 15°$.

C. $\frac{1}{\sqrt{3}}+1$.

D. $\frac{1+\sqrt{2}}{\sqrt{2}+\sqrt{3}}$.

13. Let $f(x)=27x^{25}+26px^{24}+p^{25}$, where p is a non-zero constant. Find the remainder when $f(x)$ is divided by $x+p$.

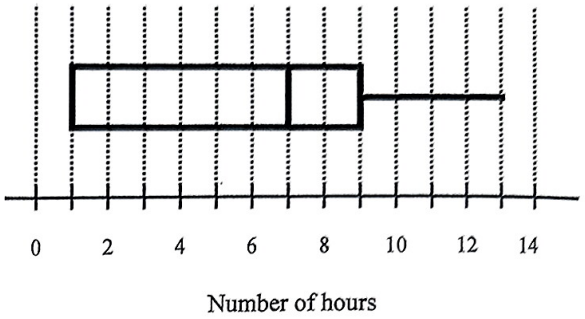
A. 0

B. $-2p^{25}$

C. $54p^{25}$

D. $53p^{25}$

14. The box-and-whisker diagram below shows the distribution of the numbers of STEAM activity hours attended by some students. Find the inter-quartile range of the distribution.



A. 2

B. 6

C. 7

D. 8

15. Which of the following statements about the graph of $y=(1+2x)(5-x)-9$ must be true?

I. The x-intercepts of the graph are $\frac{1}{2}$ and 4.

II. The y-intercept of the graph is –9.

III. The graph opens upwards.

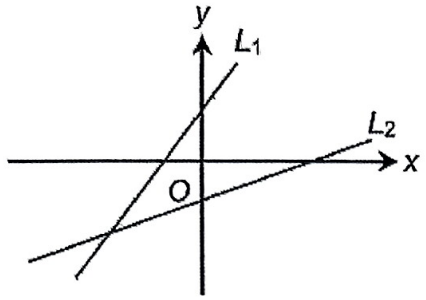
A. I only

B. III only

C. I and II only

D. II and III only

16. In the figure, the equations of the straight lines L_1 and L_2 are $ax+y-b=0$ and $cx+y-d=0$ respectively. Which of the following must be true?



I. $a<0$

II. $a>c$

III. $b>d$

IV. $ad<bc$

A. I and III only

B. II and IV only

C. I, III and IV only

D. II, III and IV only

17. The straight line $y=2x-5$ divides the circle $x^2+y^2+ax+2y-4=0$ into two semi-circles. Find the area of one of the semi-circles.

A. $\frac{9\pi}{4}$

B. $\frac{9\pi}{2}$

C. 9π

D. 18π

18. It is given that z varies directly as the square root of w and inversely as xy. If w is increased by 69%, x is decreased by 60% and y is increased by 4%, then z

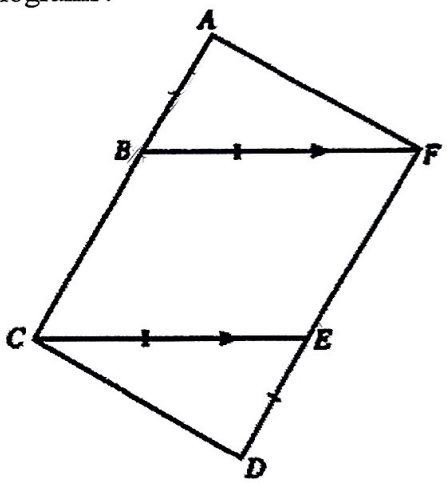
A. is increased by 312.5%.

B. is decreased by 312.5%.

C. is increased by 212.5%.

D. is decreased by 212.5%.

19. In the figure, ABC and DEF are straight lines. $AB=DE$, $BF=CE$ and $BF//CE$. Which of the following are parallelograms?



I. $BCEF$

II. $ACDF$

III. $ABEF$

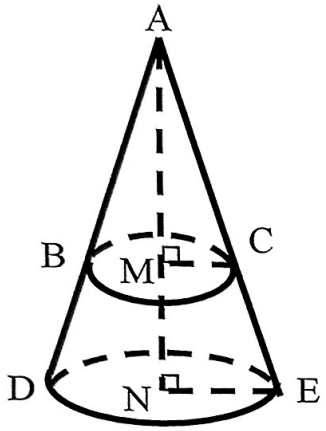
A. I and II only

B. I and III only

C. II and III only

D. I, II and III

20. In the figure, the plane passing through B and C is parallel to the base of the right circular cone. AMN is the height of the cone. If $AM : MN = 3:2$, what is the ratio of the curved surface area of the cone ABC to the curved surface area of the frustum $BCED$?



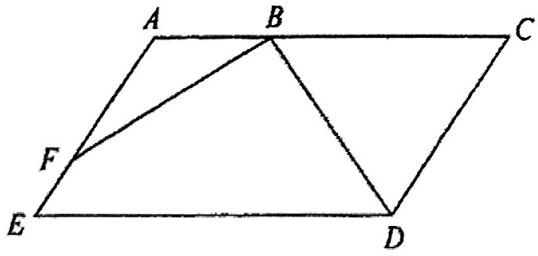
A. 9:25

B. 9:16

C. 4:9

D. 4:5

21. In the figure, $AEDC$ is a parallelogram. If $AB : BC = 1 : 2$ and $AF : FE = 2 : 1$ and the area of $AEDC$ is 45 cm^2, then the area of quadrilateral $BDEF =$



A. 30 cm^2.

B. 27 cm^2.

C. 25 cm^2.

D. 21 cm^2.

22. If $81^x = 27^{x+2y}$ and x, y are non-zero integers, then $y : x =$

A. 2:3.

B. 3:2.

C. 1:6.

D. 6:1.

23. If the volume of a cube is 270 cm^3, find its total surface area, correct the answer to 3 significant figures.

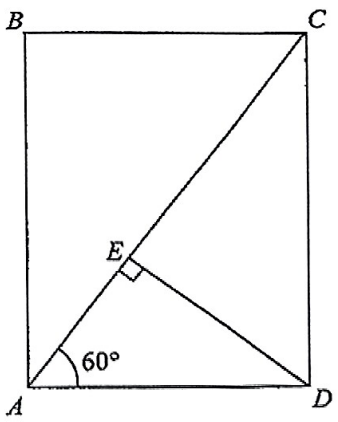
A. 1 620 cm^2

B. 1 080 cm^2

C. 251 cm^2

D. 167 cm^2

24. In the figure, $ABCD$ is a rectangle. It is given that E is the foot of the perpendicular from D to AC. If the area of ΔADE is 1 cm^2, then the area of ΔDEC is



A. 3 cm^2.

B. 4 cm^2.

C. 5 cm^2.

D. $2\sqrt{3}$ cm^2.

25. In ΔABC, $\cos C = \frac{2}{3}$, $AC = 4$ and $BC = 3$. Find the value of $\tan B$, correct the answer to 3 significant figures.

A. 8.94

B. 4.47

C. 2.98

D. 2.24

26. If the bearing of P from Q is $n°$ where $270 < n < 360$, then the bearing of Q from P is

A. $n°$.

B. $(n-180)°$.

C. $(90+n)°$.

D. $(180+n)°$.

27. The table below shows the distribution of the number of books read by a group of students during the Christmas holiday.

Number of books read	0	1	2	3	4
Number of students	1	10	7	8	k

Suppose $0 < k \leq 9$. Which of the following statements must be true?

I. The mean of the distribution is less than 2.5.

II. The median of the distribution is 2.

III. The mode of the distribution is 1.

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

28. The equations of the circles C_1 and C_2 are $x^2 + y^2 + 12x - 16y + 75 = 0$ and $2x^2 + 2y^2 + 12x - 16y - 87 = 0$ respectively. Which of the following must be true?

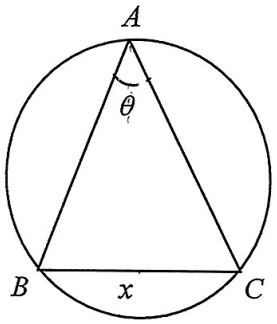
A. The distance between the centres of C_1 and C_2 is greater than 6 units.

B. The centre of C_2 lies on C_1.

C. The area of C_2 is triple that of C_1.

D. Both the centres of C_1 and C_2 lie in the fourth quadrant.

29. In the figure, ΔABC is inscribed in the circle of radius r. If $BC = x$, $r =$



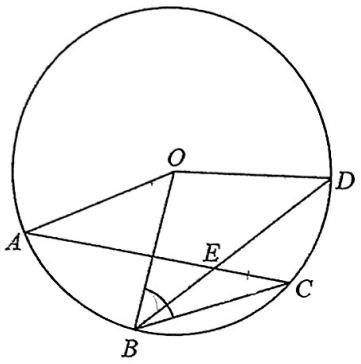
A. $2x\sin\theta$.

B. $\frac{x}{\sin\theta}$.

C. $\frac{2x}{\sin\theta}$.

D. $\frac{x}{2\sin\theta}$.

30. In the figure, O is the centre of the circle $ABCD$. The chords AC and BD intersect at the point E. If $\angle AOB = 54°$, $\angle AEB = 47°$ and $\angle BDO = 39°$, then $\angle CBO =$



A. 54°.

B. 59°.

C. 63°.

D. 66°.

Section B

31. A sum of amount is deposited at an interest rate of 8% per annum for n years, compounded half-yearly. At least how many years will the amount to be double?

A. 6

B. 7

C. 8

D. 9

32. The imaginary part of $(i^{21} + 5)(5i - 1)$ is

A. 24.

B. 10.

C. –10.

D. –24.

33. $10110100000_2 \div 16 =$

A. 101101_2.

B. 1011010_2.

C. 10010010_2.

D. 100100100_2.

34. If α and β are the roots of the equation $2\pi^{2x} - 11\pi^x + 10 = 0$, then $\pi^{\alpha+\beta} =$

A. 5.

B. $\frac{11}{2}$.

C. $\pi^{\frac{11}{2}}$.

D. π^5.

35. The mean mark of a mathematics test was 63 marks. Peter got 75 marks in the test and his standard score was 0.6. If Mary's standard score in the same test is half of Peter's standard score, find her score in the test.

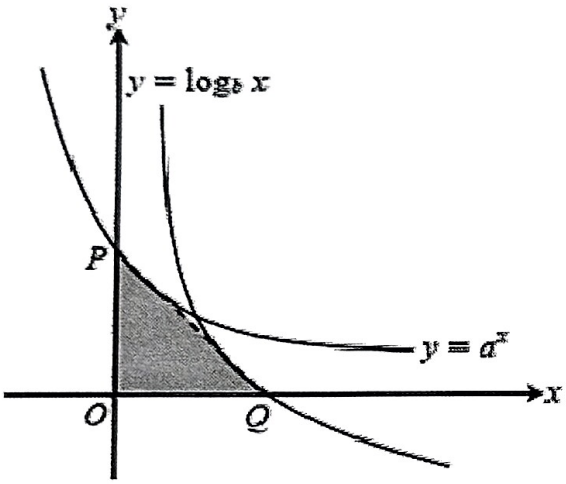
A. 87

B. 70

C. 69

D. 37.5

36. The figure shows the graphs of $y=a^x$ and $y=\log_b x$ on the same rectangle coordinate system. The graph of $y=\log_b x$ is the reflective image of $y=a^x$ with respect to the line $y=x$. The graph of $y=a^x$ intersects the y-axis at P while the graph of $y=\log_b x$ intersects the x-axis at Q. Which of the following must be true?



I. $a=b$

II. $0<a<1$

III. The area of ΔOPQ is $\frac{1}{2}ab$.

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

37. Workers A and B can finish the same job in x hours and $(x+3)$ hours alone respectively. If they work together, they can finish the job in $4\frac{3}{8}$ hours. Which of the following equations can be used to find the value of x?

A. $\frac{1}{2x+3}=\frac{8}{35}$

B. $\frac{1}{x(2x+3)}=\frac{8}{35}$

C. $\frac{1}{x}-\frac{1}{x+3}=\frac{8}{35}$

D. $\frac{1}{x}+\frac{1}{x+3}=\frac{8}{35}$

38. 10 boys want to play a basketball match. Find the number of ways in which 2 teams of 5 boys can be formed.

A. 30240

B. 504

C. 252

D. 126

39. 6 couples are going to a banquet. 3 people are selected from the 6 couples to form a team to sing a song in the banquet. If there are no couples in the team, how many different teams can be formed?

A. 8

B. 160

C. 220

D. 960

40. Consider the system of inequalities:

$$\begin{cases} 2x+3y \geq 35 \\ x \leq 2y \\ x \geq 4 \end{cases}$$

Let D be the region which represents the solution of the above system of inequalities. If (x, y) is a point lying in D, then the least value of $x+y$ is

A. 6.

B. 10.

C. 13.

D. 18.

41. There are 15 boys and 10 girls in a class. 8 students are randomly selected from the class to form a committee. It is given that there are at least 1 boy and 1 girl in the committee. Find the probability that exactly half of the members in the committee are boys.

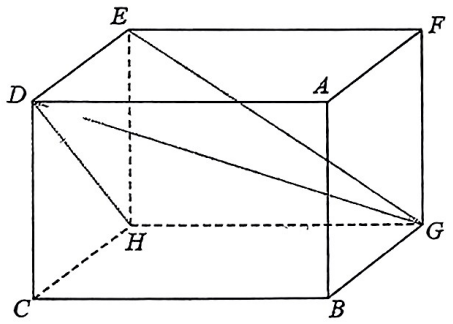
A. $\frac{8}{75}$

B. $\frac{117}{437}$

C. $\frac{910}{3413}$

D. $\frac{143}{23\,891}$

42. In the figure, $ABCDEFGH$ is a rectangular block, where $AB = AF = 10$ cm and $AD = 21$ cm. Let α be the angle between ΔDEG and ΔDEH while β be the angle between ΔDEG and ΔEGH. Which of the following must be true?



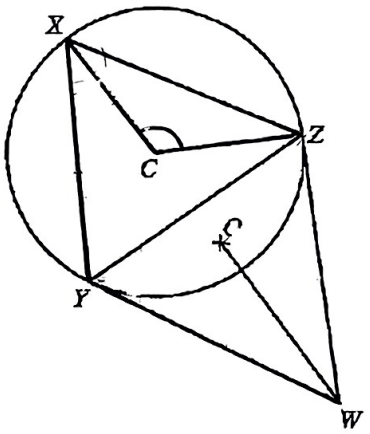
A. $\alpha < 60° < \beta$

B. $\alpha < \beta < 60°$

C. $60° < \beta < \alpha$

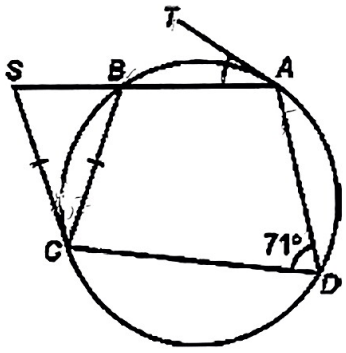
D. $60° < \alpha < \beta$

43. In the figure, WY and WZ are the tangents to the circle XYZ at Y and Z respectively. C and O are the circumcentre of ΔXYZ and the orthocentre of ΔWYZ respectively. If $\angle OWY = 26°$ and $\angle XZY = 56°$, then $\angle XCZ =$



A. $60°$.
B. $104°$.
C. $120°$.
D. $172°$.

44. In the figure, TA and SC are the tangents to the circle $ABCD$ at A and C respectively. $CS = CB$ and $\angle ADC = 71°$. SBA is a straight line. Find $\angle TAB$.



A. 33°
B. 36°
C. 38°
D. 39°

45. Let p and q be positive constants. It is known that the straight lines $L_1 : 4x + 3y - 3p = 0$ and $L_2 : qx - 3y + 3p = 0$ intersect at a point A on the y-axis. Suppose that L_1 and L_2 cuts the x-axis at the points B and C respectively. If the y-coordinate of the circumcentre of ΔABC is $-\frac{p}{16}$, then $q =$

A. 2.
B. 3.
C. 4.
D. 12.

END OF PAPER