2022-2023 G12
MOCK EXAM
MATH CP
PAPER 1

DIOCESAN BOYS' SCHOOL

MOCK EXAMINATION

MATHEMATICS Compulsory Part

PAPER 1

Question-Answer Book

January 2023

Time allowed: 2 hours 15 minutes
This paper must be answered in English

Name				
Class				
Class Number				
Group (Teacher's initials) [Tick your group]	G12DSM1 (KWN)		G12PMC1 (CHN)	
	G12DSM2 (LTC)		G12PMC2 (SLL)	
	G12DSC (CY)		G12JT1 (AK)	
	G12PMM1 (HLC)		G12JT2 (WKC)	

INSTRUCTIONS

1. After the announcement of the start of the examination, you should first write your Name, Class, Class Number and tick your Group in the spaces provided on Page 1.
2. This paper consists of THREE sections, A(1), A(2) and B. Each section carries 35 marks.
3. Attempt ALL questions in this paper. Write your answers in the spaces provided in this Question-Answer Book. Do not write in the margins. Answers written in the margins will not be marked.
4. Graph paper and supplementary answer sheets will be supplied on request. Write your Name, Class, Class Number, Group and the question number on each sheet, and fasten them with string INSIDE this book.
5. Unless otherwise specified, all working must be clearly shown.
6. Unless otherwise specified, numerical answers should be either exact or correct to 3 significant figures.
7. The diagrams in this paper are not necessarily drawn to scale.
8. No extra time will be given for writing anything after the 'Time is up' announcement.

Section A(1) Total	/ 35
Section A(2) Total	/ 35
Section B Total	/ 35

Paper Total	/ 105

SECTION A(1) (35 marks)

1. Make k the subject of the formula $13h = \dfrac{8k-5}{3k-2}$. (3 marks)

2. Let x and y be two positive numbers. The difference of x and y is 123 while $x:y=5:8$. Find the product of x and y. (3 marks)

Answers written in the margins will not be marked.

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3. (a) Round off 3455.89144 to the nearest ten.

(b) Round up 3455.89144 to 2 decimal places.

(c) Round down 3455.89144 to 2 significant figures.

(3 marks)

4. Factorize

(a) $3\alpha^2 - 24\alpha + 48$,

(b) $3\alpha^2 - 8\alpha\beta - 24\alpha + 32\beta + 48$.

(3 marks)

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5. The marked price of a vase is 30% above its cost. A loss of $48 is made by selling the vase at a discount of 28% on its marked price. Find the selling price of the vase. (4 marks)

6. Consider the compound inequality

$$-2(3x-4) > 5(6x-7)-8 \text{ and } 4x < -21 \quad \ldots\ldots\ldots\ldots (*).$$

(a) Solve (*).

(b) Write down the greatest odd integer satisfying (*).

(4 marks)

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考生編號
Candidate Number

補充答題紙
Supplementary answer sheet

本頁積分
Total marks on this page

試題號數
Question No. .....

7. In Figure 1, O is the centre of the circle $ABCDE$. BE is a diameter of the circle. AC and AD intersect BE at the points F and G respectively. It is given that $BC // OD$ and $\angle DAE = 30°$.

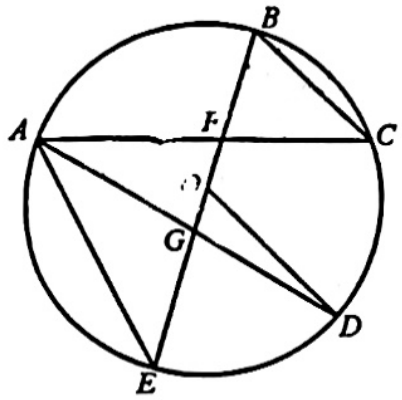

Figure 1

(a) Find $\angle CBE$.

(b) If $AF = AG$, find $\angle ACB$.

(5 marks)

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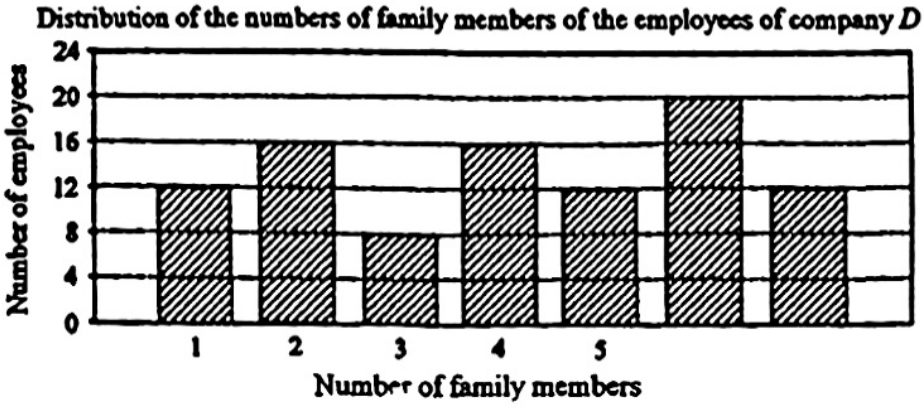
8. The bar chart below shows the distribution of the numbers of family members of the employees of company D.



(a) Write down the median, the inter-quartile range and the standard deviation of the above distribution.

(b) If n more employees are recruited and the numbers of their family members are all less than 6, write down

(i) the least value of n such that the median of the distribution increases;

(ii) the greatest value of n such that the mode of the distribution remains unchanged.

(5 marks)

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Answers written in the margins will not be marked.

9. It is given that $f(x)$ partly varies as $(3x-5)^2$ and partly varies as x^3. Suppose that $f(-2)=-266$ and $f(3)=49$.

(a) Find $f(x)$.

(b) Find the remainder when $f(x)$ is divided by $x^2-6x+12$.

(5 marks)

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SECTION A(2) (35 marks)

10. The stem-and-leaf diagram below shows the distribution of the weights (in grams) of the letters in a bag.

Stem (tens)	Leaf (units)				
1	a	4	8	9	9
2	7	8	8		
3	3	3	8	9	9
4	b	3	9		
5	7	c			

It is given that the mean and the range of the above distribution are 33 g and 47 g respectively.

(a) Find a, b and c. (3 marks)

(b) If a letter is randomly chosen from the bag, find the probability that the weight of the chosen letter is not greater than the mean of the distribution. (2 marks)

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11. In Figure 2, E is a point lying on AC. It is given that $AB = AD$ and $\angle ABC = \angle ADC = 90°$.

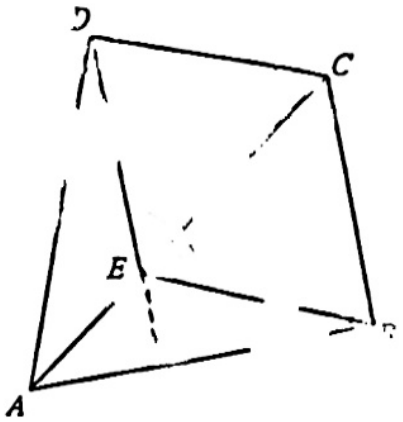

Figure 2

(a) (i) Prove that $\Delta ABC \cong \Delta ADC$.

(ii) Prove that $\Delta BCE \cong \Delta DCE$.

(4 marks)

(b) DE is produced to intersect AB at the point F and $\angle BFD = 90°$. Someone claims that $BCDE$ is a rhombus. Is the claim correct? Explain your answer. (3 marks)

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12. An inverted right circular conical container of base radius 78 cm and slant height 130 cm is held vertically. The container is fully filled with milk.

(a) Find the volume of milk in the container in terms of π. (2 marks)

(b) In Figure 3, an empty hemispherical vessel of radius 75 cm is held vertically. A solid right pyramid with a rectangular base $ABCD$ is placed in the vessel such that $ABCD$ is horizontal and the vessel touches A, B, C and D. The height of the pyramid is 150 cm and the dimensions of the base are 96 cm × 72 cm.

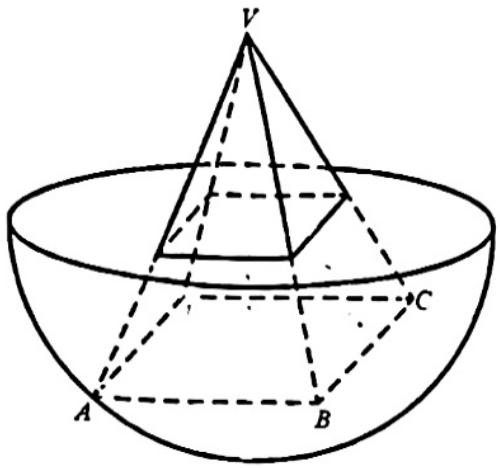

Figure 3

The milk in the container is now poured into the vessel. A craftsman claims that the milk will overflow. Do you agree? Explain your answer. (5 marks)

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13. The cubic polynomial $p(x)$ is divisible by $x+4$. When $p(x)$ is divided by $2x+3$, the remainder is -5. When $p(x)$ is divided by $2(x+3)^2$, the remainder is 22.

(a) Find $p(x)$. (4 marks)

(b) Let k be a real constant. Find the range of values of k such that the equation $p(x)+k(x^2+6x+8)=0$ has three distinct real roots. (4 marks)

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14. The coordinates of the points Q and R are $(18, -70)$ and $(-60, -96)$ respectively. Let C be a circle which passes through Q and R. Denote the centre of C by S.

(a) Prove that S lies on the straight line $3x + y + 146 = 0$. (2 marks)

(b) Suppose that the radius of C is 130 and S lies in quadrant II.

(i) Find the coordinates of S.

(ii) Let P be a moving point in the rectangular coordinate plane that maintains a fixed distance of 60 from the line segment RS. Denote the locus of P by Γ. T is the point on Γ nearest to Q and U is the point on Γ furthest from Q. A student claims that ΔRTU is a right-angled triangle. Do you agree? Explain your answer.
(6 marks)

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SECTION B (35 marks)

15. An eleven-character password is formed by a permutation of 1, 2, 3, 4, 5, 6, 7, 8, A, B and C.

(a) How many different eleven-character passwords can be formed? (1 mark)

(b) If the first four characters of the password are numbers arranged in descending order and no two letters are next to each other, how many different eleven-character passwords can be formed? (3 marks)

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16. Let $f(x)=2x^2-kx$, where $k>1$ is a real constant. The graph of $y=g(x)$ is obtained by translating the graph of $y=f(x)$ rightwards by 1 unit and then reducing the resultant graph along the x-axis to $\frac{1}{k}$ times the original.

(a) Find $g(x)$ in terms of k. (2 marks)

(b) The equation of the straight line L is $y=-2x+3$. Denote the graph of $y=g(x)$ by Γ. Prove that L and Γ intersect at two distinct points. (3 marks)

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17. In Figure 4, AB is the diameter of the semi-circle ABC. D is the mid-point of AC and E is the foot of the perpendicular from D to BC produced. AE cuts the semi-circle at the point F and BF produced meets DE at the point G.

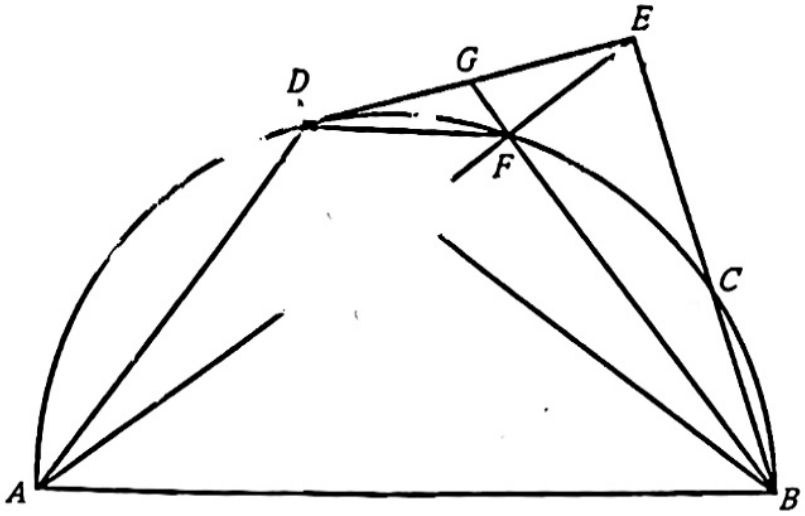

Figure 4

(a) Someone claims that ED is the tangent to the semi-circle at D. Is the claim correct? Explain your answer. (2 marks)

(b) Prove that $\Delta DGF \sim \Delta BGD$. (2 marks)

(c) Hence, prove that BG passes through the centroid of ΔBDE. (2 marks)

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18. Let c be a constant. The roots of the equation $6x^2-(c+3)x+4c-2=0$ are α and β. The 1st term, the 2nd term and the 3rd term of a geometric sequence are $\alpha+6$, 7 and $\beta+8$ respectively.

(a) Prove that $\alpha=-\dfrac{5c+5}{6}$. (3 marks)

(b) Suppose that the sum to infinity of the geometric sequence exists. Find n such that the sum of all terms from the nth term to the $(2n+2)$th term of the geometric sequence is greater than 37. (5 marks)

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19. In Figure 5(a), $ABCD$ is a thin quadrilateral metal sheet. It is given that $AD = 102$ cm, $BD = 85$ cm, $\angle ADC = 140°$, $\angle ABD = 60°$ and $\angle CBD = 90°$.

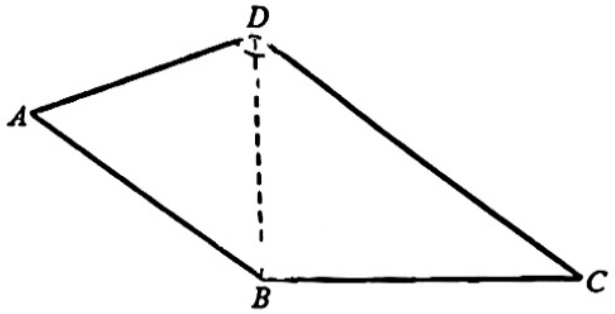

Figure 5(a)

(a) Find AB, BC and CD. (4 marks)

(b) The metal sheet described in (a) is folded along BD such that $\angle CAD = 90°$. Two thin triangular metal sheets are placed to this folded metal sheet to form a tetrahedron.

(i) Find the angle between the plane ABC and the plane BCD.

(ii) In Figure 5(b), the tetrahedron is placed with BCD lying on the horizontal ground and BC lying along the east-west direction. When the sun shines from N15°E with an angle of elevation ϕ, the shadow of the tetrahedron on the ground is $CBDF$ and the area of the shadow is $2\ m^2$.

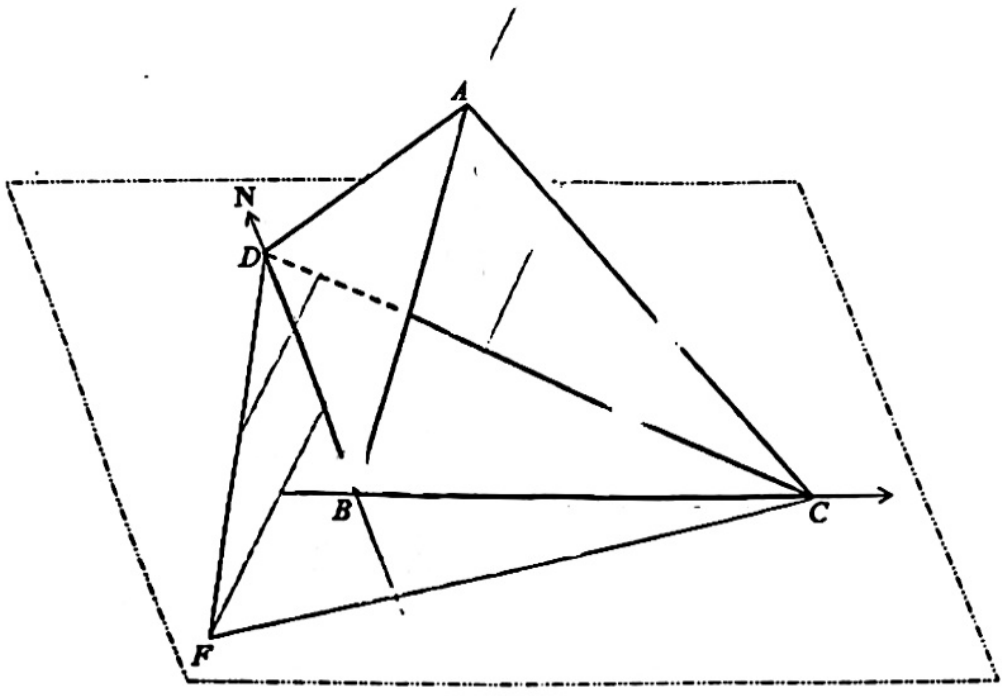

Figure 5(b)

A craftsman claims that ϕ exceeds $20°$. Is the claim correct? Explain your answer.
(8 marks)

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2022-2023 G12
MOCK EXAM
MATH CP

PAPER 2

DIOCESAN BOYS' SCHOOL
GRADE 12 MOCK EXAMINATION 2022-2023

MATHEMATICS Compulsory Part
PAPER 2

January 2023

Time allowed : 1 hour 15 minutes

Name: _____ (____) Class: _____ Group: _____

INSTRUCTIONS

1. Read carefully the instructions on the Answer Sheet. After the announcement of the start of the examination, you should write your name, class number, class and group in the spaces provided. No extra time will be given for writing anything after the 'Time is up' announcement.

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 are advised to 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.

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. $x^2-2xy-6y-9=$

   A. $(x+3)(x-2y-3)$.

   B. $(x+3)(x+2y-3)$.

   C. $(x-3)(x+2y+3)$.

   D. $(x-3)(x-2y+3)$.

2. $\dfrac{a^3b^{-5}}{(-2a^4b^{-2})^{-3}}=$

   A. $8a^9b$.

   B. $-\dfrac{8a^{15}}{b^{11}}$.

   C. $\dfrac{1}{8a^9b^{11}}$.

   D. $-\dfrac{1}{2a^{15}b^{11}}$.

3. If a and b are constants such that $(x-4)(x+a)+7\equiv(x-3)^2+b$, then $b=$

   A. -8.

   B. -2.

   C. 1.

   D. 6.

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

A. $x=\frac{5a+1}{2}$

B. $x=\frac{7a-1}{4}$

C. $x=2a$ or $x=\frac{5a+1}{2}$

D. $x=2a$ or $x=\frac{7a-1}{4}$

5. If $\frac{3}{z}+\frac{2}{y}=\frac{1}{x}$, then $y=$

A. $\frac{2xz}{x-3z}$.

B. $\frac{2xz}{z-3x}$.

C. $\frac{2xz}{3x-z}$.

D. $\frac{2xz}{3z-x}$.

6. $\frac{1}{2x+3y}+\frac{1}{3y-2x}=$

A. $\frac{6y}{9y^2-4x^2}$.

B. $\frac{6y}{4x^2-9y^2}$.

C. $\frac{4x}{9y^2-4x^2}$.

D. $\frac{4x}{4x^2-9y^2}$.

Go on to the next page

7. Solve the compound inequality $x-\frac{2x-24}{5}<3$ or $-6+2x<4x$.

A. No solutions

B. $x=-3$

C. $x\neq -3$

D. All real numbers

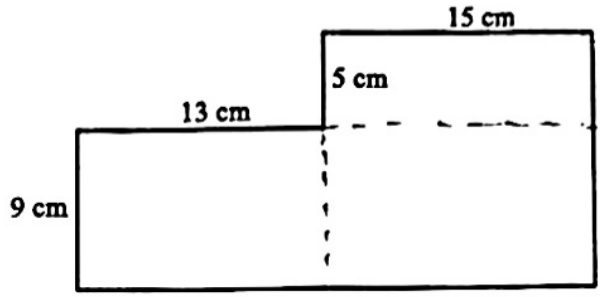
8. The figure shows a hexagon formed by removing a smaller rectangle from a larger rectangle, where all the measurements are correct to the nearest cm. Let x cm^2 be the actual area of the hexagon. Find the range of values of x.

A. $294.75\leq x<360.75$

B. $294.75<x\leq 378.75$

C. $290.25\leq x<360.75$

D. $290.25<x\leq 378.75$



9. Let $f(x)=4x^2+mx+n$, where m and n are non-zero constants. If $f(x)$ is divisible by $2x-1$, find the remainder when $f(x)$ is divided by $2x+1$.

A. $-m$

B. $-\frac{m}{2}$

C. 0

D. m

10. Let p, q and r be non-zero numbers. If $p:q=9:8$ and $(3r-p):(q+r)=3:23$, then $p:r=$

A. 3 : 1.

B. 6 : 1.

C. 7 : 18.

D. 18 : 7.

11. A sum of \$76000 is deposited at an interest rate of 4% per annum for 6 years, compounded half-yearly. Find the interest correct to the nearest dollar.

A. \$20386

B. \$96386

C. \$182401

D. \$201641

12. Let a_n be the nth term of a sequence. If $a_3 = 4$, $a_6 = 28$ and $a_{n+2} = a_n + 2a_{n+1}$ for any positive integer n, then $a_4 =$

A. 4.

B. 0.

C. 4.

D. 12.

13. It is given that z varies directly as the square of x and inversely as y. If x is increased by 20% and z is decreased by 20%, then y is increased by

A. 12.5%.

B. 20%.

C. 50%.

D. 80%.

Go on to the next page

14. Let a, b and c be positive constants. Which of the following statements about the graph of $y=(-ax+b)^2+c$ are true?

I. The graph opens upwards.

II. The equation of the axis of symmetry of the graph is $x=\frac{b}{a}$.

III. The graph has no x-intercepts.

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

15. The base diameter of a right circular cylinder is twice the base length of a right square-based pyramid while the height of the pyramid is thrice the height of the cylinder. If the volume of the cylinder is 320π cm^3, then the volume of the pyramid is

A. 320 cm^3.

B. $\frac{320}{\pi}$ cm^3.

C. 960 cm^3.

D. $\frac{960}{\pi}$ cm^3.

16. A circle is divided into a major segment and a minor segment by a chord of length 24 cm. The distance from the centre to the chord is 5 cm. Find the perimeter of the minor segment correct to the nearest cm.

A. 31 cm

B. 39 cm

C. 55 cm

D. 57 cm

17. The rectangular coordinates of the point P are $(-4,4)$. If P is rotated clockwise about the origin through $300°$, then the polar coordinates of its image are

A. $\left(4\sqrt{2},105°\right)$.

B. $\left(4\sqrt{2},195°\right)$.

C. $\left(8\sqrt{2},105°\right)$.

D. $\left(8\sqrt{2},195°\right)$.

18. The equation of the straight line L_1 is $2x-3y-12=0$. The straight line L_2 is perpendicular to L_1 and intersects L_1 at a point on the x-axis. Find the area of the region bounded by L_1, L_2 and the y-axis.

A. 15

B. 24

C. 27

D. 39

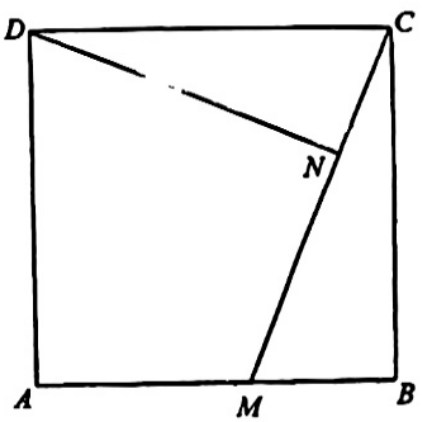
19. In the figure, $ABCD$ is a square of side 12 cm. M is a point lying on AB such that $AM = 7$ cm. If N is a point lying on MC such that DN is perpendicular to MC, then $MN : NC =$

A. 8 : 5.

B. 12 : 5.

C. 109 : 60.

D. 169 : 60.



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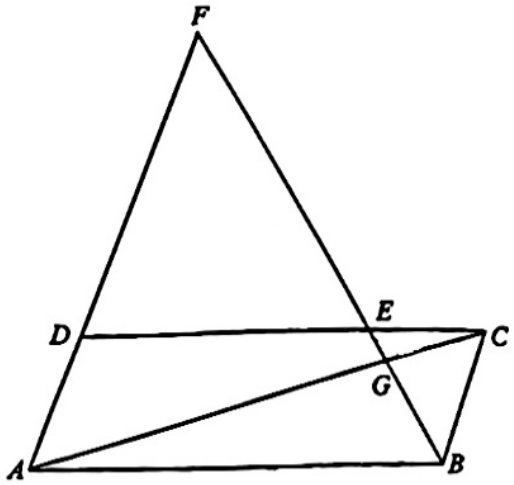
20. In the figure, $ABCD$ is a parallelogram. E is a point lying on DC such that $DE : EC = 2 : 1$. AD produced and BE produced meet at the point F. BE and AC intersect at the point G. If the area of ΔBCG is 6 cm^2, then the area of ΔABF is

A. 32 cm^2.

B. 36 cm^2.

C. 54 cm^2.

D. 72 cm^2.



21. In the figure, $ABCD$ and $EFGH$ are parallelograms. $AEBF$ and $HDGC$ are straight lines. AD and EH intersect at the point P, while BC and FG intersect at the point Q. AC intersects EH and FG at the points R and S respectively. If $CG = CQ$, which of the following must be true?

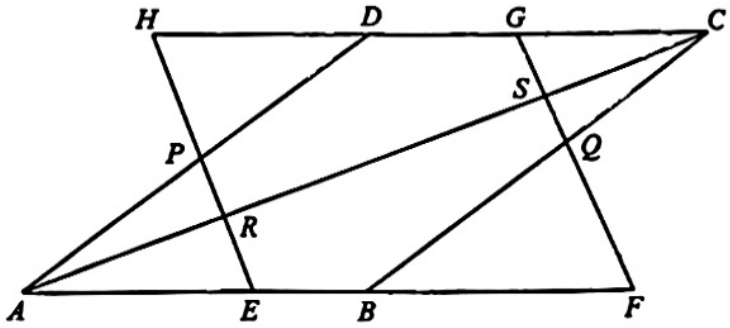
I. $\Delta bFQ \sim \Delta DPH$
II. $AE = AP$
III. $\Delta CGS \cong \Delta CQS$

A. I and II only

B. I and III only

C. II and III only

D. I, II and III



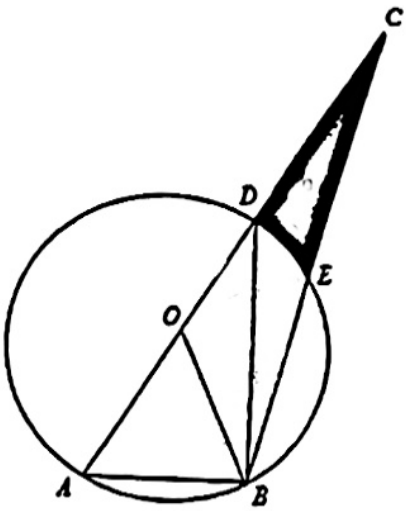
22. In the figure, O is the centre of the circle $ABED$ and AD is a diameter of the circle. AD produced meets BE produced at the point C. It is given that the radius of the circle is 3 cm and $\angle DBE : \angle OBD : \angle ABO = 1:2:4$. Find the area of the shaded region correct to 3 significant figures.

A. $3.07\,\text{cm}^2$

B. $3.43\,\text{cm}^2$

C. $3.79\,\text{cm}^2$

D. $4.15\,\text{cm}^2$



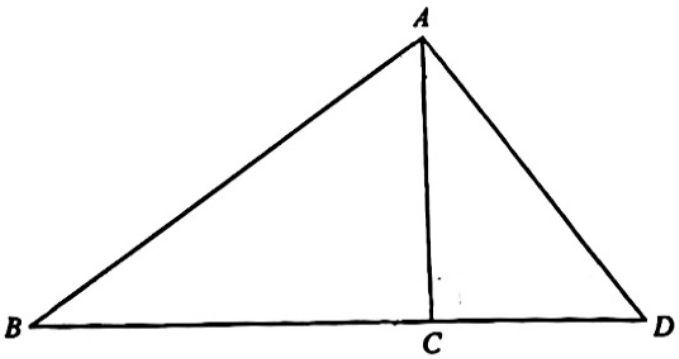
23. In the figure, BCD is a straight line and $\angle BAD = \angle ACB = 90°$. If $AB = k$ and $\angle ABC = \theta$, then $CD =$

A. $k\sin\theta\tan\theta$.

B. $k\cos\theta\tan\theta$.

C. $\dfrac{k\sin\theta}{\tan\theta}$.

D. $\dfrac{k\cos\theta}{\tan\theta}$.



24. The coordinates of the points A and B are (3, 1) and (−5, −5) respectively. Let P be a moving point in the rectangular coordinate plane such that $AB = 2AP$. Find the equation of the locus of P.

A. $3x-4y-5=0$

B. $4x+3y+10=0$

C. $x^2+y^2-6x-2y-15=0$

D. $x^2+y^2-6x-2y-390=0$

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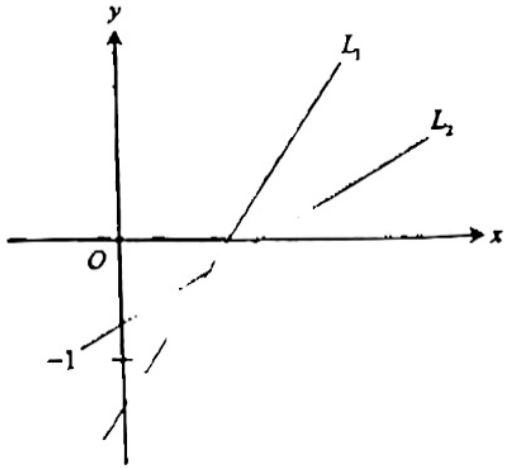
25. In the figure, the equations of the straight lines L_1 and L_2 are $3x + py - q = 0$ and $rx + 2y - s = 0$ respectively. Which of the following are true?

I. $pr < 6$
II. $3s > qr$
III. $p > -q$



A. I and II only

B. I and III only

C. II and III only

D. I, II and III

26. The circle C touches the x-axis at the point $A(6,0)$ and passes through the point $B(-2,4)$. C' is another circle such that C and C' are concentric. The ratio of the area of C' to the area of C is 1 : 4. Find the equation of C'.

A. $x^2 + y^2 - 12x - 20y + 36 = 0$

B. $x^2 + y^2 - 12x - 20y + 111 = 0$

C. $x^2 + y^2 - 12x - 20y - 264 = 0$

D. $4x^2 + 4y^2 - 48x - 80y + 519 = 0$

27. The circle C passes through the points $D(1, 16)$, $E(31, 0)$ and $F(8, 23)$. Which of the following is NOT true?

A. DE is a diameter of C.

B. The centre of C lies on the straight line $x - 2y = 0$.

C. The distance from the point F to the line segment DE is less than 9.5.

D. The point (3, 19) lies inside C.

28. ♦●■ is a 3-digit number, where ● and ■ are integers from 0 to 9 inclusive, and ♦ is an integer from 1 to 9 inclusive. Find the probability that at least one of the digits is 0.

A. $\frac{9}{50}$

B. $\frac{18}{99}$

C. $\frac{19}{100}$

D. $\frac{271}{1000}$

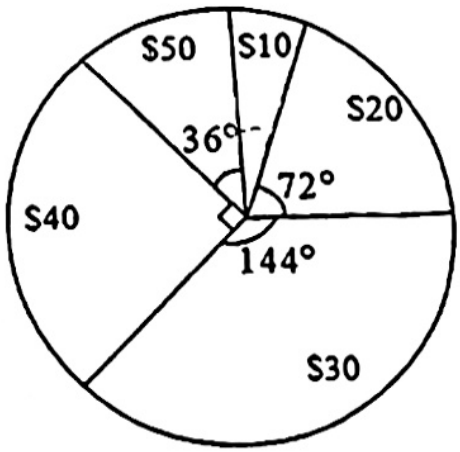
29. The pie chart below shows the distribution of the amounts of money donated by some students in a fund-raising event. Find the inter-quartile range of the amounts of money donated.

A. $10

B. $15

C. $20

D. $25



30. Consider the following integers:

6 7 11 14 14 14 16 16 16 16 16 20 b

If a, b and c are the mean, the median and the mode of the above integers respectively, which of the following must be true?

I. $14 < b \leq 16$
II. $a < c$
III. $b \geq a$

A. II only

B. I and III only

C. II and III only

D. I, II and III

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Section B

31. For $0° < \theta < 360°$, how many roots does the equation $4 + \cos(90° + \theta) = 4\cos^2\theta$ have?

A. 2

B. 3

C. 4

D. 5

32. $32^{10} + 32^2 - 4^4 =$

A. $F0000000F00_{16}$.

B. 4000000000300_{16}.

C. $F0000000F000_{16}$.

D. 40000000003000_{16}.

33. If $\frac{3}{2}\log_8 y = x + 1$ and $2(1 + \log_4 y)^2 = 9x + 14$, then $y =$

A. $\frac{1}{2}$ or 64.

B. $\frac{1}{4}$ or 2.

C. $\frac{1}{8}$ or 16.

D. $-\frac{1}{2}$ or 64.

34. It is given that y^2 is a linear function of $\log_2 x$. If the graph of the linear function passes through the points $(0,0)$ and $(-1,1)$, which of the following must be true?

A. $x=\left(\frac{1}{2}\right)^{y^2}$

B. $x=\left(\frac{1}{2}\right)^{y^4}$

C. $x=2^{y^2}$

D. $x=2^{y^4}$

35. The imaginary part of $\frac{i^{2024}+2i^{2025}}{i^{2026}+i^{2027}}$ is

A. -2.

B. $-2i$.

C. $-\frac{1}{2}$.

D. $-\frac{1}{2}i$.

36. Let p be a constant. If $1-p$, $p-12$ and $7-p$ are the first three terms of an arithmetic sequence, which of the following are true?

I. The 36th term of the sequence is 98.
II. Exactly 36 terms of the sequence are smaller than 100.
III. The sum of the first 50 odd terms of the sequence is 7000.

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

Go on to the next page

37. Consider the following system of inequalities:

$$\begin{cases} x \le 4 \\ y \ge 3 \\ x - 3y + 20 \ge 0 \\ 4x - 3y - 1 \le 0 \end{cases}$$

Let R be the region which represents the solution of the above system of inequalities. If (x, y) is a point lying in R, then the least value of $4y - 6x + 12$ is

A. 0.

B. 6.

C. 8.

D. 9.

38. Let m be a real constant. If the circle $x^2 + y^2 - 11x + 7y + 20 = 0$ and the straight line $y = mx - 5$ do not intersect, then the range of values of m is

A. $m < -3$ or $m > \frac{27}{31}$.

B. $m < -\frac{27}{31}$ or $m > 3$.

C. $-3 < m < \frac{27}{31}$.

D. $-\frac{27}{31} < m < 3$.

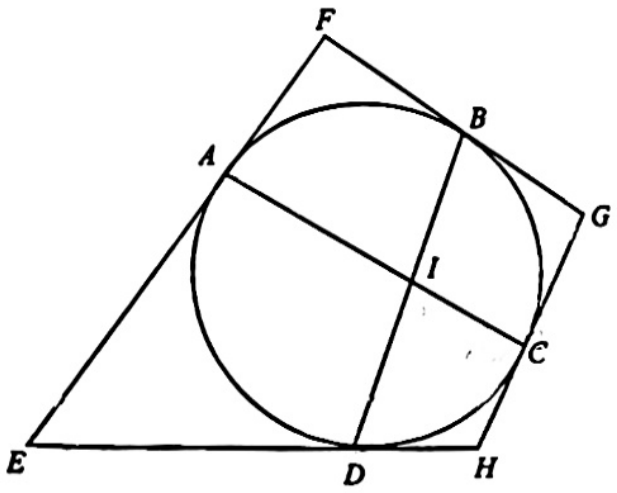
39. In the figure, $ABCD$ is a circle and $EFGH$ is a cyclic quadrilateral. EF, FG, GH and HE are the tangents to the circle at A, B, C and D respectively. AC intersects BD at the point I. If $\angle FEH = 86°$, then $\angle AID =$

A. 86°.

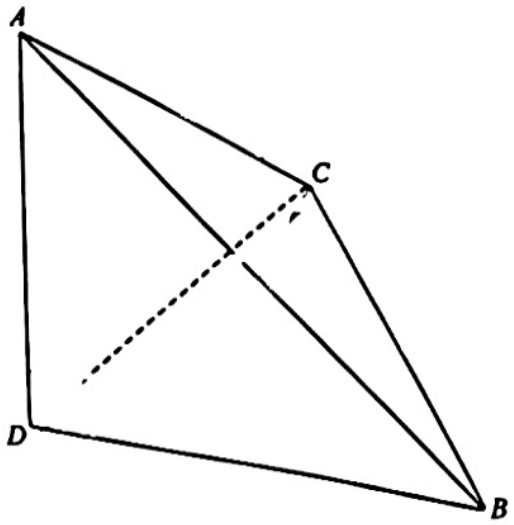
B. 90°.

C. 94°.

D. 110°.



40. In the figure, $ABCD$ is a pyramid. D is the projection of A on the plane BCD. It is given that $\angle BDC = 90°$, $AD = 4$ cm, $BD = 3$ cm and $CD = 2$ cm. Find the angle between CD and the plane ABC correct to the nearest degree.



A. 23°

B. 31°

C. 40°

D. 50°

41. Let O be the origin and k be a real constant. The coordinates of the points P and Q are $(p, 0)$ and $(0, q)$ respectively, where p and q are negative constants. If the equation of the straight line joining the orthocentre of ΔOPQ and the circumcentre of ΔOPQ is $2x - y = 3k$, then $p : q =$

A. 1 : 2.

B. 1 : 3.

C. 2 : 1.

D. 2 : 3.

42. There are 5 red balls and 5 white balls in a bag. 4 balls are randomly drawn from the bag at the same time. Given that at least 1 red ball and at least 1 white ball are drawn, find the probability that 2 red balls and 2 white balls are drawn.

A. $\frac{10}{21}$

B. $\frac{1}{2}$

C. $\frac{2}{3}$

D. $\frac{20}{21}$

43. Amy and Billy take turns to throw two fair dice at the same time until two equal numbers are obtained in a turn. Amy throws the two dice first. Find the probability that Billy obtains two equal numbers first and the two numbers are 6's.

A. $\frac{1}{11}$

B. $\frac{1}{12}$

C. $\frac{5}{36}$

D. $\frac{5}{66}$

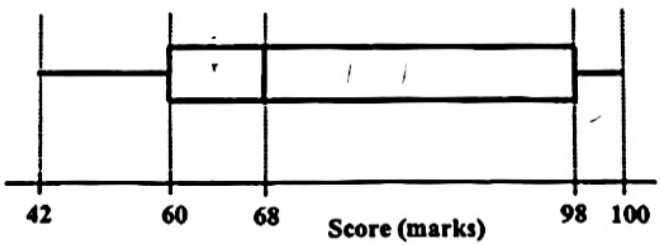
44. The box-and-whisker diagram below shows the distribution of the scores of some students in a Mathematics test. The standard deviation is 10 marks and the mean is higher than 60 marks but lower than 68 marks. Given that Leo's score is above the upper quartile, which of the following may be his standard score?

A. 2.5

B. 3

C. 3.5

D. 4



45. Let d be a non-zero real number, A be a group of numbers $\{-6d, -4d, -d, d, 2d, 5d\}$ and B be another group of numbers $\{-5d, -2d, -d, d, 4d, 6d\}$. The mean, the range and the variance of A are x_1, y_1 and z_1 respectively, while the mean, the range and the variance of B are x_2, y_2 and z_2 respectively. Which of the following is/are true?

I. $x_1 = x_2$
II. $y_1 = y_2$
III. $z_1 = z_2$

A. I only

B. III only

C. I and II only

D. II and III only

END OF PAPER