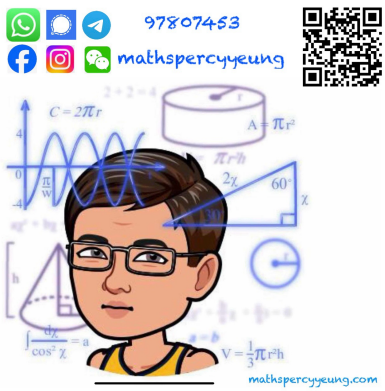
2024-2025 S6
MOCK EXAM
MATH CP
PAPER 2
MC



2024 – 2025
S6 Mock Examination

MATHEMATICS Compulsory Part

PAPER 2

22nd January, 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. $\alpha^2-\alpha-4\beta^2-2\beta=$

   A. $(\alpha+2\beta)(\alpha+2\beta+1)$.

   B. $(\alpha+2\beta)(\alpha-2\beta-1)$.

   C. $(\alpha-2\beta)(\alpha+2\beta+1)$.

   D. $(\alpha-2\beta)(\alpha-2\beta-1)$.

2. $7^{333}\cdot 5^{999}=$

   A. 35^{333} .

   B. 35^{999} .

   C. 875^{333} .

   D. 875^{999} .

3. If $\frac{a}{y}=\frac{2b}{2-y}$, then $y=$

   A. $\frac{a}{a+b}$.

   B. $\frac{2a}{a+2b}$.

   C. $\frac{a}{a-b}$.

   D. $\frac{2a}{a-2b}$.

4. The total price of 3 bottles of juice and 2 bottles of milk is \$110. If the price of 2 bottles of juice is \$50 more than that of 1 bottle of milk, find the total price of 2 bottles of juice and 3 bottles of milk.

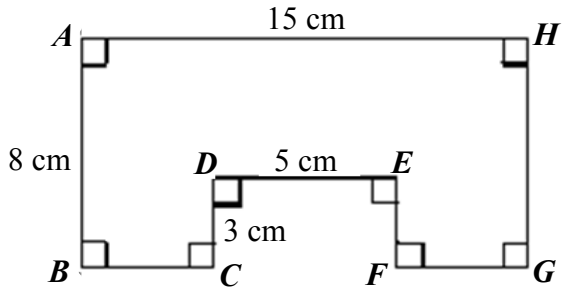
   A. \$80

   B. \$86

   C. \$90

   D. \$94

5. In the figure, *ABCDEFGH* is an octagon, where all the measurements are correct to the nearest cm. Let y cm^2 be the actual area of the octagon. Find the range of values of y.



   A. $89.5\le y<112.5$

   B. $89.5\le y<120.5$

   C. $97.5\le y<112.5$

   D. $97.5\le y<120.5$

6. If x and y are non-zero numbers such that $\frac{y+4x}{2y}-2=\frac{x}{y}$, then $x:y=$

   A. $2:3$.

   B. $3:2$.

   C. $5:6$.

   D. $6:5$.

7. Let k be a constant. If $(x-5)(x+6)=(k-5)(k+6)$, then $x=$

   A. 5 or -6.

   B. k or 5.

   C. k or $-k-1$.

   D. k or -6.

8. Let $\mathrm{p}(x)=x^2-8x+10$. If c is a constant, then $\mathrm{p}(c+1)-\mathrm{p}(c+2)=$

A. $-10c-1$.

B. $-10c+1$.

C. $-2c-5$.

D. $-2c+5$.

9. Let $\mathrm{f}(x)=2x^3+ax^2+5x+b$, where a and b are constants. When $\mathrm{f}(x)$ is divided by $x+2$, the remainder is -53. When $\mathrm{f}(x)$ is divided by $4-2x$, the remainder is

A. -53 .

B. -1 .

C. 1 .

D. 53 .

10. The least integer satisfying the compound inequality $\frac{3(x-6)}{2}<6x$ or $2x\geq -3(x-4)+13$ is

A. -3 .

B. -2 .

C. -1 .

D. 6 .

11. Mr Ho deposits \$150 000 in a bank at an interest rate of 6% p.a. compounded monthly. Find the compound interest he will receive 2 years later. (Give your answer correct to the nearest \$10)

A. \$18 000

B. \$18 540

C. \$18 970

D. \$19 070

12. The costs of coffee bean A and coffee bean B are \$21/kg and \$18/kg respectively. If x kg of coffee bean A and y kg of coffee bean B are mixed so that the cost of the mixture is \$20/kg, find $x : y$.

A. 2 : 1

B. 2 : 5

C. 3 : 1

D. 3 : 2

13. It is given that z varies as x and the square of y. If x is increased by 25% and y is decreased by 20%, then z

A. is decreased by 15%.

B. is increased by 15%.

C. is decreased by 20%.

D. is increased by 20%.

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

A. The x-intercepts of the graph are -1 and 3.

B. The line $x=-1$ is the axis of symmetry of the graph.

C. The graph opens upwards.

D. The y-intercept of the graph is 4.

15. The base radius of a right circular cone is 2 times that of a right circular cylinder while the height of the cylinder is 4 times that of the cone. If the volume of the cylinder is 30π cm^3, then the volume of the cone is

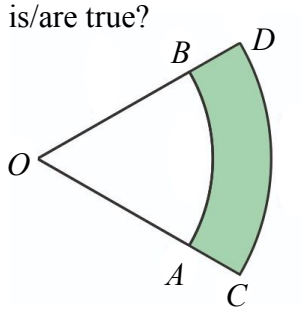
A. 10π cm^3 .

B. 20π cm^3 .

C. 30π cm^3 .

D. 160π cm^3 .

16. In the figure, OAB and OCD are sectors with centre O, where $OA = 18$ cm and $OC = 30$ cm. The area of the shaded region $ABDC$ is 80π cm^2. Which of the following is/are true?



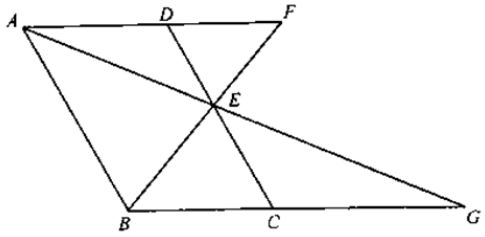
I. The angle of the sector OCD is $50°$.

II. The area of the sector OCD is 125π cm^2.

III. The perimeter of the sector OAB is 5π cm.

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

17. In the figure, $ABCD$ is a parallelogram. E is a point lying on CD such that $DE : EC = 4 : 5$. AD produced and BE produced meet at F while AE produced and BC produced meet at G.

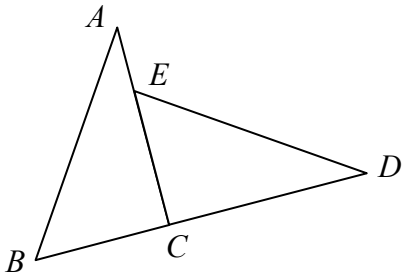


If the area of ΔDEF is 64 cm^2, then the area of ΔCEG is

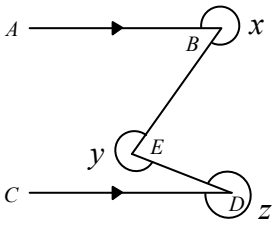
A. 80 cm^2.
B. 100 cm^2.
C. 125 cm^2.
D. 576 cm^2.

18. In the figure, AEC and BCD are straight lines and $\triangle ABC \cong \triangle DEC$. It is given that $\angle ACB = 90°$, $BC = 5$ cm and $CD = 12$ cm. Find the perimeter of ΔADE correct to 3 significant figures.

A. 35.9 cm
B. 36.0 cm
C. 36.9 cm
D. 37.0 cm



19. In the figure, $AB // CD$. Which of the following must be true?



I. $\angle BED = 720° - 2x$

II. $x - y = 360° - z$

III. $x = y$

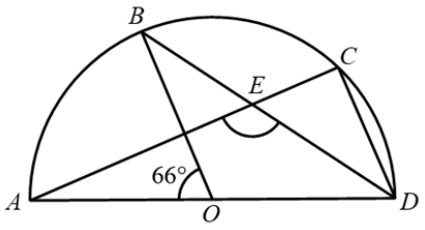
A. I only
B. II only
C. I and III only
D. II and III only

20. If an interior angle of a regular n-sided polygon is 5 times an exterior angle of the polygon, which of the following statements about the polygon is/are true?

I. It is a 10-sided polygon.
II. Each interior angle is 150°.
III. The order of rotational symmetry is 12.

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

21. In the figure, O is the centre of the semi-circle $ABCD$. AC and BD intersect at E. If $OB \,//\, DC$, then $\angle AED =$



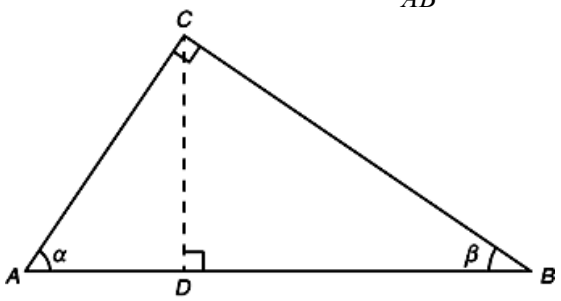
A. $112°$.

B. $123°$.

C. $147°$.

D. $156°$.

22. In the figure, D is a point lying on AB. If $\angle BDC = \angle ACB = 90°$, then $\dfrac{CD}{AB} =$



A. $\sin\alpha \sin\beta$.

B. $\sin\alpha \cos\beta$.

C. $\dfrac{\sin\alpha}{\sin\beta}$.

D. $\dfrac{\cos\alpha}{\cos\beta}$.

23. The polar coordinates of the point P are $(2, 240°)$. If P is rotated clockwise about the pole through $90°$, then the rectangular coordinates of its image are

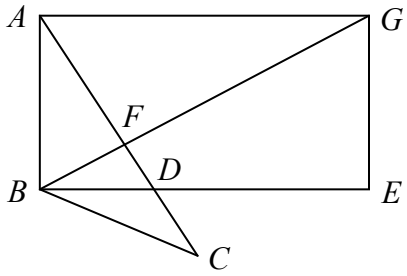
A. $(1, -\sqrt{3})$.

B. $(-1, \sqrt{3})$.

C. $(\sqrt{3}, -1)$.

D. $(-\sqrt{3}, 1)$.

24. In the figure, $ABEG$ is a rectangle. D is a point on BE such that AD intersects BG at F. AD is produced to a point C such that $BC = EG$. It is given that $AC \perp BG$.



Which of the following are true?

I. $\angle BGE = \angle CDE$

II. $\Delta AFG \sim \Delta DFB$

III. $\Delta ABF \cong \Delta CBF$

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

25. Find the constant a such that the straight lines $2x + (a+6)y - 12 = 0$ and $ax - 5y + 22 = 0$ are perpendicular to each other.

A. -10

B. -4

C. 1

D. 5

26. The coordinates of the points A and B are (4, 9) and (–2, 1) respectively. Let P be a moving point on the rectangular coordinate plane such that $AP = PB$. Find the equation of the locus of P.

A. $3x + 4y - 23 = 0$

B. $3x - 4y + 17 = 0$

C. $x^2 + y^2 + 2x + 10y + 1 = 0$

D. $x^2 + y^2 - 2x - 10y + 1 = 0$

27. Consider two circles C_1: $x^2+y^2+8x-6y-25=0$ and C_2: $3x^2+3y^2-24x+18y-75=0$. Which of the following is/are true?

I. C_1 and C_2 are concentric circles.

II. The lengths of diameters of C_1 and C_2 are the same.

III. Both C_1 and C_2 cut the y-axis at two points.

A. I only

B. I and III only

C. II and III only

D. I, II and III

28. Two numbers are randomly drawn at the same time from seven cards numbered 4, 4, 5, 5, 5, 8, 9 . Find the probability that the sum of the two numbers drawn is 13.

A. $\frac{5}{21}$

B. $\frac{5}{42}$

C. $\frac{5}{49}$

D. $\frac{10}{49}$

29. Consider the following positive integers:

4 4 4 7 10 10 12 13 x y

Let a, b and c be the standard deviation, the mode and the median of the above positive integers respectively. If the mean of the above positive integers is 7.2, which of the following must be true?

I. $a > 3.5$

II. $b = 4$

III. $c < 7$

A. I and II only

B. I and III only

C. II and III only

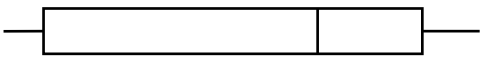
D. I, II and III

30. The stem-and-leaf diagram below shows the distribution of the ages of the members in a chess club.

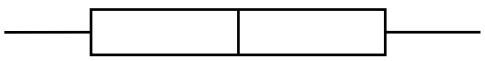
Stem (tens)	Leaf (units)						
3	1	2					
4	3	8					
5	0	3	3				
6	1	3	6	7	8	8	9
7	1	2	2	5	5	6	8
8	2	3	5				

Which of the following box-and-whisker diagram may represent the distribution of the above data?

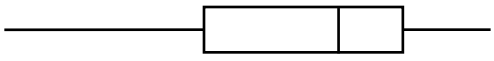
A.



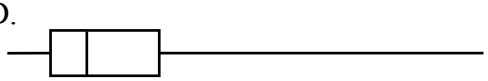
B.



C.



D.



Section B

31. The L.C.M. of $8m^2n^3p$, $16m^3np^2$ and $32mnp^4$ is

A. $32m^3n^3p^4$.

B. $64m^3n^3p^4$.

C. $2mnp$.

D. $8mnp$.

32. Express $11\times16^7+9\times16^4+24$ as a hexadecimal number.

A. $B0090018_{16}$

B. $B0090024_{16}$

C. $B0090180_{16}$

D. $B00090024_{16}$

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

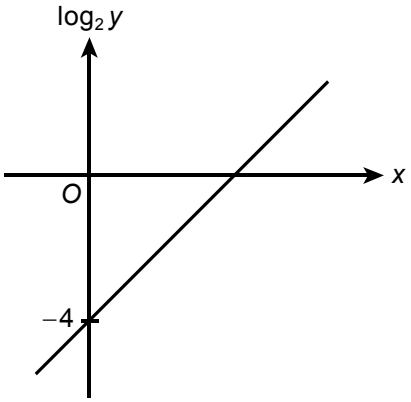
A. $x=\frac{1}{\sqrt{10}}$ or 100

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

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

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

34. The graph in the figure shows the linear relation between x and $\log_2 y$. If $y=ka^x$, then $k=$



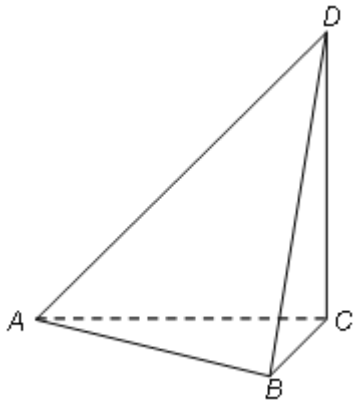
A. -8.

B. 2.

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

D. $\frac{1}{16}$.

35. In the figure, the base ABC of the tetrahedron $ABCD$ lies on the horizontal ground. It is given that C is vertically below D. If $\angle ACB=90°$, $\angle CAD=45°$ and $\angle CBD=60°$, then $\cos\angle BAD=$



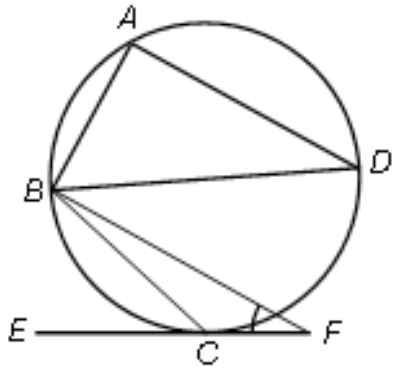
A. $\frac{1}{4}$.

B. $\sqrt{\frac{2}{3}}$.

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

D. $\frac{\sqrt{6}}{4}$.

36. In the figure, BD is a diameter of the circle $ABCD$. EF is the tangent to the circle at C such that AD // BF. If $\angle ABD=57°$ and $\angle CBF=14°$, then $\angle BFC=$



A. 28°.

B. 29°.

C. 32°.

D. 33°.

37. For $0°\le\theta\le360°$, how many solutions does the equation $3\sin x(\cos x-2)=0$ have?

A. 1

B. 2

C. 3

D. 4

38. If m is a real number, then the real part of $\frac{m^2 - i^{12}}{m + i^{11}}$ is

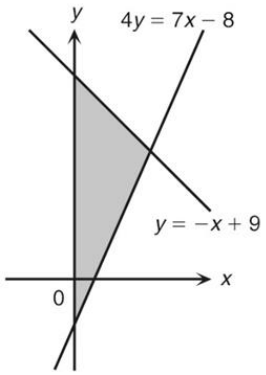
A. m .

B. $-m^2$.

C. $\frac{1-m^2}{m+1}$.

D. $\frac{m^3 - m}{m^2 + 1}$.

39. If (a, b) is a point in the shaded region, which of the following must be true?



I. $a \geq 0$

II. $a + b \leq 9$

III. $7a - 4b > 8$

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

40. Let O be the origin. The coordinates of the point A are $(15, -15)$. If the coordinates of the orthocentre of ΔOAB are $(-15, -5)$, then the y-coordinate of B is

A. -15 .

B. -5 .

C. 5 .

D. 15 .

41. Suppose a, b, c are in arithmetic sequence, where a, b, c are distinct positive real numbers. Which of the following must be in geometric sequence?

I. $\log 8^a$, $\log 8^b$, $\log 8^c$

II. $\log a^8$, $\log b^8$, $\log c^8$

III. 8^a, 8^b, 8^c

A. I only

B. III only

C. I and II only

D. II and III only

42. 3 different Mathematics books, 4 different Chemistry books and 5 different History books are put in a row on a bookshelf. How many different arrangements are there if the books of the same subject must be put together?

A. 60

B. 17 280

C. 103 680

D. 479 001 600

43. There are three computers A, B and C in a room. The probabilities that computers A, B and C will break down in the next year are 0.4, 0.6 and 0.9 respectively. Find the probability that exactly one computer will break down in the next year.

A. 0.146

B. 0.268

C. 0.345

D. 0.486

44. In an examination, the standard deviation of the examination scores is 5 marks. The examination score of Jayden is 61 marks and his standard score is 2. If the standard score of Kary is −0.4, then her examination score is

A. 49 marks.

B. 51 marks.

C. 53 marks.

D. 57 marks.

45. It is given that x is a real number. Let S_1 be a group of numbers $\{x-5\ ,\ x-1\ ,\ x\ ,\ x+2\ ,\ x+3\}$ and S_2 be a group of numbers $\{x-7\ ,\ x-3\ ,\ x-2\ ,\ x\ ,\ x+1\}$. Which of the following is/are true?

I. The means of S_1 and S_2 are equal.

II. The variances of S_1 and S_2 are equal.

III. The inter-quartile ranges of S_1 and S_2 are equal.

A. I only

B. II only

C. I and III only

D. II and III only

END OF PAPER